UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Department of Computer Science, FR-35
(Area Code 206) 543-1695

COLLOQUIUM

DATE: May 12, 1989 - Friday

TIME: 1:30 p.m. - 2:30 p.m.

PLACE: Room 201, Loew Hall

CLASS: CSci 590N

SPONSOR: Richard Ladner

SPEAKER: Manfred Warmuth
University of California - Santa Cruz

TITLE: Classifying Learnable Geometric Concepts with the Vapnik-Chervonenkis Dimension

ABSTRACT

There has been a surge of interest in learning from examples sparked by the introduction of a model of learning by Valiant. This model accounts for both the performance of the learning algorithm as well as the computational resources and the number of examples used. We extend Valiant's learnability model to learning classes of concepts defined by regions in Euclidean space [Er]. Our methods lead to a unified treatment of some of Valiant's results, along with previous results of Pearl and Devroye and Wagner on distribution-free convergence of certain pattern recognition algorithms. We show that the essential condition for distribution-free learnability is the finiteness of the Vapnik-Chervonenkis dimension, a simple combinatorial parameter of the class of concepts to be learned. Using this parameter, we analyze the complexity and closure properties of learnable classes. We will discuss applications to estimating the number of examples required to learn with certain neural nets. We also overview recent generalization of the methodology to learning real-valued functions from examples.
Joint work with Anselm Blumer, Andrzej Ehrenfeucht and David Haussler

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

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MEMBER AT LARGE "A" REPORT

What benefits do I receive from being an IEEE Member?

During the next several months I will be highlighting benefits that IEEE members have available to them. These will cover many of the basic services that the IEEE provides to its members. These benefits make IEEE membership a good investment.

Educational Programs

The IEEE has several self-study programs that are available to its members for a discount. These programs cover technical and personal development. These programs allow an engineer to gain additional knowledge about a subject or to learn about an unfamiliar technical area. The personal development programs teach how to communicate better and can help ease the road to management. Continuing Education
Achievement Units (CEAU's) are given for the programs available.

Technical Programs

-Digital Signal Processing 400 hour course Software Study Aid for Digital Signal Processing - 40 CEAU

-Introduction to Digital Speech Processing Software Study Aid for Digital Speech Processing - 8 CEAU

-Kalman Filtering and Digital Estimation Technology - 8 CEAU

-Spread Spectrum Signals and Systems - 8 CEAU

-Advanced Microprocessors - 8 CEAU

(continued)

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Send all changes of address (local or national) directly to:

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Coding Department
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331

Home Video Tutorials

-Industrial Robotics for the Electrical Engineer.
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-Power System Fault Analysis: Three-Phase Short Circuits.
-Power Systems Fault Analysis: Unsymmetrical Short Circuits.
-Power System Fault Analysis: Application to Industrial Power Distribution Systems.

Personal Development Courses

-Communication Techniques
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-Vocabulary Program
-Speech Power
-Corporate Grammer
-Speed Learning
-Memory Made Easy

IEEE Members can purchase these educational programs at a discount. For more information, order a free Publications Catalog from IEEE by calling 201-981-1393 or call Joe Blaschka Jr. P.E., Member at Large "A" at 206-821-8827.

DATA LINK ARTICLES

Materials for the DATA LINK must be received by the 2nd Tuesday of the month preceding publication.

Editor: George Golias
Puget Power
P.O. Box 97034 OBC-12S
Bellevue, WA 98009-9734
206/454-6363
FAX 206/462-3175

DATA LINK

JANUARY 1989

IEEE Seattle Section, 555 116th Ave NE, Suite 101, Bellevue, WA 98004 462-1333

WOOPS!

Our apologies to Mr Jack Lee and the Bonneville Power Administration for the incorrect spelling of "Bonneville" in last months issue of the Data Link. We fell victim to the spell checker on our word processor which changed it to a word which was not at all intended.

We did get the December issue published pretty quick though, didn't we?

-Editor

IEEE POWER ENGINEERING SOCIETY
Seattle Section

January Meeting

HYDROELECTIRIC GENERATOR REBUILD

Date: January 19, 1989

Time: 7:30 - 9:30 PM

Place: Puget Power Auditorium
Puget Power Building
10608 N.E. 4th Street
Bellevue, WA

Speaker: Martin Habib, Senior Electrical Engineer, Seattle City Light

Description of Meeting:

From 1982 to 1983, Seattle City Light rebuilt three 40 MVA hydroelectric generators at Gorge Powerhouse on the Skagit River, Newhalem, Washington. Martin Habib, Project Manager for the project, spent considerable time at the site administering and documenting the work. His presentation will cover both the technical and practical aspects of generator construction and will include slides taken during the various phases of the project.

Directions:

Take the N.E. 8th Street exit westbound off SR405. Turn left onto 106th Avenue N.E. and proceed south to N.E. 4th Street. The Puget Power Building is located on the N.E. corner of the intersection of N.E. 4th Street and 106th Avenue N.E.

For additional information, please contact Herb Johnson at 684-3573.

PIZZA FEED!

Date: January 25, 1989

Time: 7:30 PM to 9:00 PM

Place: Gwinn Commons (Cafeteria)
Seattle Pacific University
3rd Ave. W. & W. Nickerson St.
Seattle, WA

Menu: All you can eat pizza and beverage.

Event Schedule:

Live music prelude
School Introduction and Awards presentation

Guest Speakers:

Bob Braukus - "Real World vs. University"
Paul Kostek - "IEEE Advantages"

Cost:		
	Members	$5.00 each
	Member-spouse	$5.00 each
	Students	$1.00 each

For ticket information contact one of the following:

Jerry Dietzen - Puget Power	454-6363
Herb Johnson - Seattle City Light	684-3573
Brian White - Snohomish County PUD	347-4311
Bruce Darling - University of Washington	543-4703
Gary Erickson - Seattle University	296-5968
Don Peter - Seattle Pacific University	281-3640

ENGINEERING FAIR

The IEEE will be having a booth at the 14th Annual Engineering Fair during Engineers Week, 1989. The Engineering Fair is sponsored by the Puget Sound Engineering Council (PSEC) and will be held at the Sea-Tac Mall on February 24-26, 1989.

To make this a success, we need volunteers to help man the booth during the fair. It's an easy and fun way to become active in IEEE.

Please contact Norm Methven (946-5115) if you are interested in participating.

MICROWAVE THEORY & TECHNIQUES SOCIETY
ANTENNA & PROPAGATION SOCIETY

January Meeting

"Millimeter Wave Network Analyzer Measurements"

Date: January 11, 1989

Time: 8:00 PM

Place: Bellevue Community College
3000 Landerholm Circle
Bellevue, WA
Room #C202

Speakers: Jack Wallace, Senior Engineer
Mark Virtue, Design Engineer
Donn Harvey, Design Engineer
Boeing Electronics Company
High Technology Center, R.F. Lab

Abstract:

Included in the presentation will be:

1. A description of the required hardware and software modifications to an automated vector network analyzer.

2. Measurement accuracy and de-embedding capability.

3. Examples of the data for gallium arsenide microstrip circuits. As time permits, a description of future work will be presented.

Directions:

From I-90 (at Eastgate), take 148th Ave. exit north, then take left turn after Shell Station at the traffic signal to Bellevue Community College grounds. Room C202 is on the second floor on the north west corner of the building.

For Additional information, please contact Bob Brunton at 392-4990 or Roland Svennson at 241-1110.

INDUSTRIAL APPLICATION SOCIETY
January Meeting

Tour: I-90 Tunnel/1st Hill Structure

Date: January 17, 1989

Time: 4:30-5:30 PM IAS Executive Board Meeting
5:30-7:30 PM Tour
8:00 PM Dinner

Place: Denny's Restaurant
2420 76th Avenue S.E.
Mercer Island, WA

Traffic is scheduled to go across the new bridge June 1989. We have an opportunity to tour the control room in the ventilation building, the switchgear room where the primary gear, unit substation, lighting control, UPS, ATS, generator switchgear, and the fan controllers are installed. There will be a brief visit to the tunnel also.

Prior to the tour, we'll meet briefly at Denny's for an overview of the electrical single line diagram and receive detail directions how to get to the job site. Bring hard hat.

Reservation: Please reserve by Thursday, January 12th, by calling Lori at 575-2308.

DR. DON WALSH TO SPEAK ON DEEP DIVING MANNED SUBMARINES AND THE FUTURE OF TOURIST SUBMARINES

Date: January 19, 1989

Time: 6:00 - 6:30 No Host Bar
6:30 Dinner Party

Place: Ivar's Captains Table
333 Elliott Avenue
Seattle, WA

Dr. Don Walsh, Commander USN Retired, will be hosted at the January 19, 1989 Puget Sound Section, Marine Technology Society meeting. Walsh will speak on his record setting dive to 35,000 feet with Jacques Piccard and recent developments in manned submarine technology which are facilitating commercially viable tourist submarines. Walsh is president of International Maritime Inc., San Pedro, California, an oceanographic consulting firm that is actively developing market opportunities for tourist submarines.

To make reservations contact Frank Hughes (206) 523-4680 before Tuesday, January 17.

CIRCUITS AND SYSTEMS SOCIETY
COMPUTER SOCIETY

"Neural Networks for Associative Memories and Combinatorial Search Problems: An Introduction"

Date: January 24, 1989

Time: 7:30 PM

Place: University of Washinton
Faculty Club Reference Room

Speaker: Dr. Robert J. Marks II
Prof. of Electrical Engineering
University of Washington

Artificial neural networks (ANN's) can be loosely defined as a highly connected array of elementary processing elements (neurons). ANN's have been proposed for such seemingly unrelated problems of signal and image classification, associative memories and combinatorial searches.

The ability of an ANN to solve combinatorial search problems will be presented from a bottoms up viewpoint. Using simple lateral inhibition, a simple ANN is shown to show to be capable of locating that neuron with the largest initial state. Building on this conceptual foundation, ANN's are developed which solve the Queens and Traveling Salesman problems.

Parking is available on the UW campus at a cost of $1.50 ($0.50 for carpools or 2 or more). A no-host dinner is being planned preceding the meeting.

For additional information, call Pat Daniels at 296-5970 or Lowell Smilen at 643-9992.

AESS COMING EVENT
"WHO COMMITS COMPUTER CRIMES?"
"WHAT KINDS OF COMPUTERS ARE USED?"

To find out the answers to these questions and more plan to attend the AESS Meeting on February 22 at 7:00 P.M. at the Puget Power Auditorium in Bellevue. The speaker will be Mr. Ivan Horton, King County Deputy Prosecuting Attorney - Fraud Division.

Watch the February Data Link for more information.

AEROSPACE AND ELECTRONIC SYSTEMS SOCIETY
AND
MICROWAVE THEORY & TECHNIQUES/ ANTENNAS & PROPOGATION SOCIETIES
January Meeting

"Selected Topics in Space-Based Radar Systems and Technology"

Date: January 25, 1989

Time: 6:15 pm Lecture: Leopold Cantafio
7:30 Pizza Party

Place: Beagle Hall - Room 201
Seattle Pacific University
3rd Ave. W. & W. Nickerson St.
Seattle, WA

Speaker: Leopold J. Cantafio
Senior Staff Engineer
TRW Space & Technology Group

The new frontier for Radar Technology is in the space environment. The flights of SEASAT, SIR, IRACS, COSMOS 1500 and VENERA 15-16 by the U.S. and the U.S.S.R. are examples of successful Space-Based Radar (SBR) Systems. The desire by 127 members of the United Nations to place surveillance sensors (including radars) into space is another indication of the widespread interest in SBR Systems.

Leopold J. Cantafio received the BS in electrical engineering from the University of Alabama in 1952 and the MS in systems management from the University of Southern California in 1971. Mr. Cantifio has more than 35 years of experience in advanced radar systems while employed at RCA, Raytheon, The Aerospace Corporation, and TRW. Mr. Cantifio has been listed in Who's Who in the West since 1978 and is a member of the IEEE AES Radar Systems Panel and chairman of the Space-Based Radar Committee.

This meeting is open to everybody with door prizes from Fluke and HP to be given away. The third annual member pizza party will follow the talk, see article in this Data Link for details. For reservations, leave your name, daytime number and company name with Barbara at 462-1333. For further information, feel free to contact Eric Patton at 248-5738 or Jose Bolanos at 394-3566 during the days.

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CALL FOR PAPERS AND EXHIBITS FOR OCEANS '89 ISSUED

The Call for Papers and Exhibits for OCEANS '89 has been issued. This international conference will address methods for understanding the global ocean and will be held September 18-21, 1989 in Seattle, Washington. OCEANS '89 is co-sponsored by the Institute of Electrical and Electronics Engineers, Oceanic Engineering Society and the Marine Technology Society. Participants will include representatives of marine-related industries, academic institutions, and government agencies worldwide.

Original papers are invited on marine-related topics, including methods for assessing the global ocean; methods/technologies for exploring and working in the global ocean; and global ocean issues. The deadline for submission of abstracts is January 15, 1989.

Manufacturers of ocean engineering products and firms offering related services are invited to exhibit products and services throughout this conference. These exhibits will compliment the wide array of scientific and technical papers and panels, and will be viewed by conference participants. Typical attendance is about 1,000.

Technical program sessions already scheduled include: Marine Mineral Resources and Marine Mining; Seafloor Engineering; Undersea Vehicles; Underwater Photography; Ocean Pollution; planning, Management and Economics of the Global Ocean; Contemporary Research in Marine Affairs; Ocean Instrumentation; Satellite and Aircraft Remote Sensing; Diving; Remotely Operated Vehicles; Autonomous Underwater Vehicles; Arctic Acoustics Research; Ocean and Coastal Engineering; LORAN-C; Geology and Geophysics; and Marine Fisheries.

For further information on presenting or exhibiting at OCEANS '89, please contact Nancy Penrose, OCEANS '89 Program Coordinator, APPLIED PHYSICS LABORATORY, 1013 NE 40th St., Seattle, WA. 98105 or call (206) 543-3445

VIDEO CONFERENCES

Videotapes of the previous 26 satellite seminars are available for rental or purchase. Each tape comes with supporting documentation-complete notes, graphs, bibliographies, and presenters' biographies.

Each tape is a convenient method for our corporations, universities and technical organizations to present interesting and informative state-of-the-art programs to engineers and managers at their convenient time and place.

Costs range for rental from $300 to $650 and for purchase from $600 to $1700 for each tape and supporting materials.

Contact the Seattle Section Offic 462-1333, for further information.

Albert Kaye, P.E
17050 Northup Way #15
Bellevue, WA 98008-3064
Telephone: (206) 747-7154

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DATA LINK ARTICLES

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Editor: George Golias
Puget Power
P.O. Box 97034 OBC-12S
Bellevue, WA 98009-9734
206/454-6363
FAX 206/462-3175

DATA LINK

DECEMBER 1988

IEEE Seattle Section, 555 116th Ave NE, Suite 210, Bellevue, WA 98004 462-1333

POWER ENGINEERING SOCIETY
AND
ENGINEERING IN MEDICINE & BIOLOGY SOCIETY

JOINT MEETING
EFFECTS OF ELECTRIC AND MAGNETIC FIELDS
ON HUMAN HEALTH

Date:	Wednesday, December 14, 1988
Meeting Place:	Seattle City Light North Service Center Auditorium 1310 North 97th Street Seattle, Washington
Time:	7:30 - 9:00 P.M.
Speaker:	Jack Lee, Jr. Environmental Health Specialist Banefully Power Administration

Description: Mr. Lee will discuss the status of research involving potential human health effects of electric and magnetic fields. He will also talk about related land use and environmental issues.

BPA has conducted numerous environmental studies over the years, relating to health effects of AC and DC lines. In addition to the research he has done, Mr. Lee now chairs a committee which reviews research generally related to health effects of power lines.

This meeting is open to all IEEE members and guests.

Directions: From I-5 take the Northgate Way exit. Go west on Northgate Way to Aurora Ave., then south to N. 97th St. The North Service Center is two blocks east of Aurora on 97th. Park on the street and enter the building at the southwest corner.

For additional information contact Katie Geraghty at 544-4254, Herb Johnson at 684-3573 or Carol Jaeger at 822-1274.

SECTION MEETING

Third Annual Student Member-IEEE
Member Pizza Party

DATE:	Wednesday, January 25, 1989	
TIME:	7:30 PM - 9:00 PM	
PLACE:	Gwinn Commons (Cafeteria) Seattle Pacific University 3rd Ave W. & W. Nickerson St. Seattle, Washington	
MENU:	All you can eat pizza and beverage.	
COST:	Members	$5.00 each
	Member-spouse	$5.00 each
	Students	$1.00 each

The program will feature the activities of the various Seattle Section Societies. Put this date on your calendar now. Further information will be announced in the January Datalink.

DR. PATRICIA D. DANIELS
ELECTED TO NATIONAL OFFICE

Dr. Patricia D. Daniels, Chairperson of the Department of Electrical Engineering at Seattle University was recently elected to the National Administrative Committee of the IEEE Education Society as a Member at Large". She will serve in this position for two years. Congratulations to Dr. Daniels for her election to this important national office.

MICROWAVE THEORY & TECHNIQUES SOCIETY
ANTENNA & PROPAGATION SOCIETY

DECEMBER MEETING
MICROWAVE SEMICONDUCTOR DIODES:
FUNDAMENTALS AND APPLICATIONS"

DATE: Wednesday, December 7, 1988

PLACE: Bellevue Community College
3000 Landerholm Circle
Room # A252
Bellevue, Washington

TIME: 6:00 P.M.

SPEAKER; Gerald Hiller
Microwave Associates, Inc.
Semiconductor Applications
Manager

ABSTRACT: The first practical application of a semiconductor in an electronic circuit was the crystal detector used in early radio receivers. From this evolved the point contact microwave diode which became an essential element in radar receivers during World War II. At present, microwave semiconductor diodes are designed for use in complex receiving, control, tuning and power generation applications.

This talk will review the fundamentals of the various microwave semiconductor diodes and describe their basic application circuits. It will discuss how they differ from each other and from general purpose semiconductor diodes. It will also compare the special properties of GaAs material with Silicon. Included in the talk will be a historical perspective on the development of available microwave semiconductor diodes.

DIRECTIONS: From I-90 (at Eastgate) take 148th Ave. Exit north, then take left turn after Shell Station at the traffic signal into the Bellevue Community College grounds. Room A252 is on the second floor on the southeast corner of the building.

A no host dinner is planned following the meeting at 8:00 PM. The location will be announced at the meeting.

For additional information, please contact Bob Brunton at 392-4990 or Roland Svensson at 241-1110.

INDUSTRIAL APPLICATIONS SOCIETY
SEATTLE CHAPTER
NEW OFFICER ANNOUNCEMENT

CHAIRMAN:	Len Whalen
VICE CHAIRMAN:	Paulo Albuquerque
SECRETARY:	Ted Cross
TREASURER;	Rowe Moyle
EDUCATION;	Dan Lyons
NOMINATIONS:	Dick Becker
MEMBERSHIP:	Bob Fuhr
STUDENT ACTIVITIES:	Mark Delaney

INDUSTRIAL APPLICATIONS SOCIETY
DECEMBER MEETING
MEDIUM VOLTAGE SYSTEM
GROUNDING PRINCIPLES

DATE: Tuesday, December 13, 1988

TIME: 4:30-6:00 PM IAS Executive Board Meeting
6:00-6:30 PM No Host Cocktails
6:30-7:30 PM Dinner
7:30 Meeting & Program

PLACE; Executive Inn
200 Taylor Ave. North
Seattle, WA

Since most faults that occur on Power System Distribution Systems are line to ground faults, system grounding is very important. The purpose of grounding is to minimize potential overvoltages, comply with Local, State and NEC Codes for personnel safety requirements, and to assist in rapid detection and isolation of the trouble or faulted area.

When should the designer use (1) ungrounded, (2) high impedance, (3) low impedance or (4) effective or solid grounding? Please join us as J. Lewis Blackburn discusses the advantages and disadvantages or each method of grounding.

Mr. Blackburn worked as a Relay Designer and Relay Application Specialist for the Westinghouse Electric Corporation and has written many articles on the topic. He has also authored a book titled "Protective Relaying".

Reservation: Please reserve by Thursday, December 8th, by calling Lori at 575-2308.

CIRCUITS AND SYSTEMS SOCIETY
COMPUTER SOCIETY

"Neutral Networks for Associative Memories and Combinatorial Search Problems: An Introduction"

Date: Tuesday, January 24, 1989

Time: 7:30 P.M.

Place: University Of Washington
Faculty Club Conference Room

Speaker: Dr. Robert J. Marks II
Professor of Electrical Engineering
University of Washington

An abstract of the talk will appear in next month's Data Link. A no-host dinner is being planned preceding the meeting.

For additional information, call Pat Daniels at 296-5970 or Lowell Smilen at 643-9992.

1989 REFRESHER COURSE
FOR ELECTRICAL ENGINEERING BRANCH
PROFESSIONAL ENGINEERING EXAMINATION

The Electrical Engineering Branch Examinations will be held in several locations on April 14, 1989 and October 27, 1989.

Applications for taking the examinations must be into the Division of Professional Engineering not less than four months prior to the date of the examination. The address is: PO Box 9649, Olympia, WA 98504
Phone: 206/753-6966

A refresher course for those interested in reviewing electrical engineering fundamentals is being sponsored by the Seattle Section. The sessions will be held at Seattle University each Tuesday beginning January 10, 1989 thru March 14, 1989 from 7:00 to 9:00 PM.

The text, "Electrical Engineering Review Manual" by R.B. Yarbrough, is available at the Seattle University Bookstore for approximately $35 plus tax.

Registration for the course can be made to:

Albert Kaye, P.E.
Seattle Section, IEEE
555 116th Ave NE, Suite 210
Bellevue, WA 98004

Phone: 206/462-1333 (W)
206/747-7154 (H)

Please provide:

NAME: _____
IEEE MEMBER NO. _____
STREET ADDRESS: _____
_____
CITY: _____ STATE: ____ ZIP: _____
TELEPHONE NO. _____

COST: IEEE Member $60.00
Non Member $75.00

Please make checks payable to:
IEEE PE Refresher Course

PRE-COLLEGE ACTIVITIES VOLUNTEERS NEEDED

WHY are so few high school students considering a career in Engineering? They receive insufficient information about careers in this field! HOW can YOU help? A speaker list is being created in response to this need. Here is your chance to speak about your career! Mentors are also needed to assist with student projects and summer programs.

If you would like to be a speaker or a mentor, please call Lynne Green, 788-0412, or complete and return the form below to: IEEE Seattle Section, 555-116th Ave. NE, Suite 101, Bellevue, WA 98004

NAME: _____

COMPANY: _____

ADDRESS: _____

CITY/ZIP: _____

PHONE: _____

SPEAKER ___ MENTOR ___

DECEMBER PACE REPORT
Employment Assistance

The IEEE United States Activities Committee Employment Assistance Committee has a number of resources available for both employed and unemployed engineers and scientists.

- The Employment Guide for Engineers and Scientists is a popular and practical job hunter's manual. It is currently in its second printing. Copies are for sale ($7.50 member, $15.00 nonmember) from the IEEE Service Center by calling (201) 981-1393. Please specify IEEE Catalog No. UH0157-8 when ordering. Unemployed IEEE members can request complimentary copies by writing to the Washington Office. Please include your membership number in your written request.

- A Student Edition of the Employment Guide is also available. This two-volume manual has been specifically tailored to meet the special needs of graduating engineers. Copies may be purchased in university bookstores or from the IEEE Service Center ($8.95 member, $11.95 nonmember). Please specify IEEE Catalog No. UH0174-3.

- Two other resources for job hunters are PEER (the Professional Engineering Employment Registry) and SEER (the Self-Employed Engineer's Registry). These data base registeries are independently operated and are monitored and sponsored by IEEE. They are offered free for use be IEEE members.

Contact me if you want to borrow a copy of the Employment Guide or if want me to send you a brochure for PEER or SEER.

- Steve Allen
454-6363 Ext. 5134

IEEE 27TH VIDEOCONFERENCE
Sponsored by Seattle Section IEEE

SUPERCOMPUTERS

DATE: Wednesday, December 7, 1988

TIME: 9:00 AM to Noon - Pacific Time

PLACE: Lemieux Library Auditorium
Seattle University
Madison at Broadway
Seattle, Washington
Parking entrance at 12th & Columbia

FEES: IEEE Members $65.00
Non-Members $85.00
Students and Retirees $25.00

Additional information from Seattle Section Office, IEEE, 206/462-1333. Call for brochure or register by mail with the following form. Make checks payable to IEEE Seattle Section.

IEEE 27TH VIDEOCONFERENCE
Seattle Section
555 116th Ave NE, Suite 210
Bellevue, WA 98004

NAME: _____
ADDRESS: _____
CITY: _____ STATE: ___ ZIP: _____
Daytime Phone: _____
IEEE Member Number: _____

University of Washington Correspondence

INTERDEPARTMENTAL

Interactive Systems Design Laboratory, Department of Electrical Engineering, FT-10

September 9, 1988

TO: Prof. Richard Ladner
Dept. of Computer Science, FR-35

FROM: Prof. Les Atlas, Dept. of EE, FT-10 Les Atlas/cc

RE: Seminar on learning theory

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University and regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

LA:cc

cc: Prof. Robert J. Marks II

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON

Interactive Systems Design Laboratory
Department of Electrical Engineering, FT-10
Telephone: (206) 545-1315 or 543-6061

September 9, 1988

Stephen J. Eady, Ph.D.
Centre for Speech Technology Research
University of Victoria Science/Engineering
D329 Clearihue Building
P.O. Box 1700
Victoria, B.C. Canada
V8W2Y2

Dear Dr. Eady:

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

I'm sorry that we do not have funds available to help defray your travel expenses, but if you could make it to the University early enough, I could take you to lunch at our faculty club and show you some of our research facilities.

I hope to see you soon, and call me if you have any questions.

Sincerely,

Les Atlas
Associate Professor

LA:cc

cc: Prof. Robert J. Marks II

University of Washington Correspondence

INTERDEPARTMENTAL

Interactive Systems Design Laboratory, Department of Electrical Engineering, FT-10

September 9, 1988

TO: Prof. Doug Martin, Dept. of Statistics, GN-22

FROM: Prof. Les Atlas, Dept. of EE, FT-10

RE: Seminar on whatever you'd like

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University and regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

LA:cc

cc: Prof. Robert J. Marks II

University of Washington Correspondence

INTERDEPARTMENTAL

Interactive Systems Design Laboratory, Department of Electrical Engineering, FT-10

September 9, 1988

TO: Prof. Pat Kuhl, CDMRC, WJ-10

FROM: Prof. Les Atlas, Dept. of EE, FT-10 Les Atlas

RE: Seminar on learning and generalization

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University and regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

LA:cc

cc: Prof. Robert J. Marks II

University of Washington Correspondence

INTERDEPARTMENTAL

Interactive Systems Design Laboratory, Department of Electrical Engineering, FT-10

September 9, 1988

TO: Prof. Douglas Keefe
Dept. of Music, DN-10

FROM: Prof. Les Atlas, Dept. of EE, FT-10 Les Atlas/ca

RE: Seminar on neural nets (or anything else on signal processing and music)

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University and regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

LA:cc

cc: Prof. Robert J. Marks II

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON

Interactive Systems Design Laboratory
Department of Electrical Engineering, FT-10
Telephone: (206) 545-1315 or 543-6061

September 9, 1988

Ron Cole
Associate Professor
Department of Computer Science/Engineering
Oregon Graduate Center
Beaverton, OR 97006

Dear Ron:

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

I'm sorry that we do not have funds available to help defray your travel expenses, but if you could make it to the University early enough, I could take you to lunch at our faculty club and show you some of our research facilities.

I hope to see you soon, and call me if you have any questions.

Sincerely,

Les Atlas

Les Atlas
Associate Professor

LA:cc

cc: Prof. Robert J. Marks II

University of Washington Correspondence

INTERDEPARTMENTAL

Interactive Systems Design Laboratory, Department of Electrical Engineering, FT-10

September 9, 1988

TO: Prof. Edward Rubel
Dept. of Otolaryngology, RL-30

FROM: Prof. Les Atlas, Dept. of EE, FT-10 Les Atlas/cc

RE: Seminar on development of neural connections

I would like to invite you to present a seminar at one of our Interactive Systems Design Lab Seminars. These seminars take place on Wednesdays at 3:30 - 4:20 p.m. and are well-attended by University and regional industry people. The Wednesdays we have open for this coming Autumn Quarter are Oct. 5, 12 and 26; Nov. 2, 9 and 23, and Dec. 7. If you are able to give a seminar on one of these days, I will need a title and a short abstract.

LA:cc

cc: Prof. Robert J. Marks II

Engineering Continuing Education, GG–13
University of Washington
Seattle, WA 98195

Nonprofit Organization
U.S. Postage Paid
Seattle, Washington
Permit No. 62

09–9623/ANS98

Introduction to Artificial Neural Systems

September 15–16, 1988

Sponsored by College of Engineering
University of Washington, Seattle

Instructors

Les E. Atlas is an Associate Professor of Electrical Engineering at the University of Washington. His research interests include speech processing, auditory system processing and real time signal processor design. Dr. Atlas was recently involved in the restoration of voice transmissions from Korean Air flight 007. His work in neural networks is supported by a National Science Foundation Presidential Young Investigator's Award and, more recently, by the Washington Technology Center.

Robert J. Marks II is a Professor of Electrical Engineering at the University of Washington. He has published over fifty archival journal papers in the areas of optical computing, detection theory, signal analysis and processing, and neural computing. Dr. Marks is a Senior Member of IEEE and, in 1984, was awarded IEEE's Centennial Medal. He is currently Chair of the Neural Systems and Applications Technical Committee for the IEEE Circuits and Systems Society. His research in neural networks is supported in part by a grant from the SDI/IST's program in ultra-high speed computing and by the Washington Technology Center.

Introduction to Artificial Neural Systems

College of Engineering
University of Washington

- Two day course on the rapidly developing technology of artificial neural networks
- For those interested in emerging signal processing and pattern recognition algorithms and architectures, and for those involved in charting new industrial directions
- You will learn about the neurological basis for artificial neural networks, current and potential applications, and implementation of neural networks in various technologies.

September 15–16, 1988
Thursday–Friday
Seattle, Washington

Introduction to Artificial Neural Systems

September 15–16, 1988 University of Washington, Seattle

Course Contents

Technical

- Biological foundation of neural networks
- Neural network autoassociative memories
- Bidirectional associative memories
- Supervised and unsupervised learning
- Signal space interpretations
- Fault tolerance in neural networks
- Synchronous vs. asynchronous operation
- Hierarchical neural networks
- Network design based on energy reduction
- Error back propagation
- Temporal pattern learning
- Hebbian learning
- Signal classification networks
- Pattern extrapolation
- Image reconstruction
- Adaptive resonance theory
- Performance comparisons
- Silicon implementation of neural networks
- Optical implementation of neural networks
- Neural network storage capacity
- Search algorithms

Industrial

- The impact of neural networks on:
  - —future technology
  - —academic and government research
  - —industry
- Other current research in neural networks including a bibliography of historic and recent artificial neural network publications

Simulations

- Hands-on graphical neural net simulations
- Each participant will be given a neural network simulation program package

Who Should Attend

This short course is appropriate for engineers, computer scientists, and technical managers who would like to understand the theory of artificial neural systems and are interested in applying this technology to real world problems.

General Information

Researchers in computing and signal processing have long been intrigued by the computational and fault tolerant properties of the brain. There has recently been a surge of interest in processing architectures which are based loosely on biological neural networks. These artificial neural networks have been implemented successfully both electronically and optically.

Participants in this course will learn the theoretical underpinnings of artificial neural networks and will be presented with the most relevant recent research results. Case studies of the suitability of neural network architectures for several different applications will also be discussed. Interdisciplinary contributions to recent results in artificial neural network research will be stressed.

Applications of artificial neural networks include signal classification, image recognition, speech recognition and optimization. Electronic, optical and hybrid implementations of neural networks will be discussed. There will be in-class computer simulations of neural networks. Participants will be given a personal copy of a neural network simulation software package.

An educational videotape will be made of the instructor (the audience will not be filmed) during this course. This videotape will be available for purchase from Engineering Continuing Education.

Location

The course will be held at the University of Washington campus. Exact location (building and room number) will be printed on your confirmation letter.

Registration Information

The registration fee for this course is $475.00 if received before September 8 and $495.00 after that date. It includes all course materials, one floppy disk, lunch each day, and refreshment breaks. Full refund will be given up to five working days prior to the course. After that, a $25.00 handling fee will be deducted from your refund. The University is not responsible for any cancellation/change charges assessed by airlines or travel agencies.

No on-campus housing is available. However, a list of hotels and motels within walking distance of the campus will be sent upon request. Check the appropriate line on the registration form below.

Participants are encouraged to use public transportation whenever feasible. Bus information may be obtained from Metro Transit at (206) 447–4800. Campus parking is available at an additional cost of $3.00 per day paid at any University entrance.

Course Registration Form

Introduction to Artificial Neural Systems

September 15–16, 1988

☐ by September 8 **$475.00**

Please fill out this form completely to enroll:

☐ after September 8 **$495.00**

Name_____ Position_____

Affiliation_____ Work Phone_____

Company Address_____ City_____ ZIP_____

Home Address_____ City_____ ZIP_____

Send my confirmation to ☐ home ☐ work address.

Payment Method:

☐ Check enclosed payable to the University of Washington.

☐ Purchase order attached: please invoice my company.

☐ Bill my (circle one): **VISA** **MasterCard**

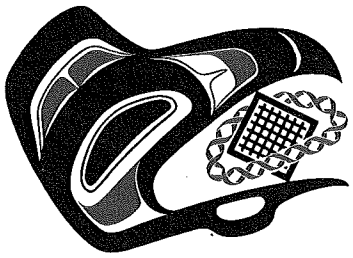
Acct. #_____ Exp. Date_____

Signature on card_____

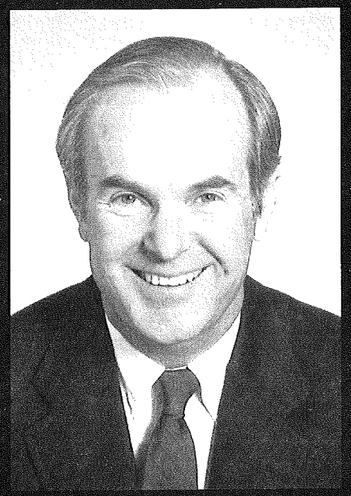
☐ Yes, send me a list of local hotels and motels. **ANS98**

Mail form with payment to: Engineering Continuing Education, 4725 30th Ave. NE, University of Washington, GG-13, Seattle, WA 98195. For more information, call (206) 543-5539.

The Washington Technology Center



1985-87 Biennial Report



From growing wheat to building aircraft, all our industries can benefit from increased productivity through advanced technology. The Washington Technology Center creates and speeds up the transfer of this new technology from the laboratories to the marketplace.

I am very proud of the accomplishments achieved by the Center in its first four years. I know the Center will play a crucial role in securing long-term economic growth for Washington state.

Booth Gardner

The Honorable Booth Gardner
Governor of Washington State

Table of Contents

WTC Highlights

	1985-1987	1983-1985
WTC Researchers[1]	**95**	43
Student Research Assistants[2]	**72**	30
Federal & Industry Grants & Contracts	**$12,596,658**	$2,148,521
Gifts (Cash or Equipment)	**$2,626,212**	$1,036,001
State Appropriations[3]	**$4,078,135**	$2,852,411
Expenditures (Ratio of non-state to state)	**2.8 to 1**	0.9 to 1
Invention Disclosures	**16**	5

[1]Includes regular and research faculty.
[2]Based on end of biennia.
[3]Includes both operating and capital funds.

Board Chairman's Message

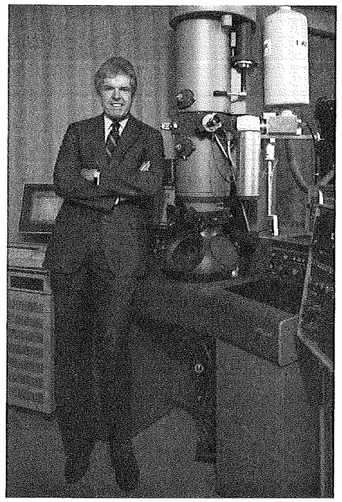


Photo: Joel A. Levin

John Gallagher, of Trinus Partners, L.P., stands next to the electron microscope purchased jointly in 1987 by WTC, federal, and industry funding. Used in the Advanced Materials Technology Program, the powerful microscope has a magnification capability of 750,000x (a spatial resolution of 0.2 nanometers).

For almost 20 years of my business career, I have encouraged the progression of promising scientific research toward practical applications that serve human needs. Experience has taught me that the transfer of technology into marketable products is a complex and precarious task. For innovation to thrive, a sensitive collaboration must be fostered among experts in science and industry. Reliable and adequate funding for research and state-of-the art laboratories is a necessity. Without these essential factors, creative products or inventions that could launch new companies or bolster existing ones might not be realized.

That is why our state needs the Washington Technology Center — to mobilize these elements in a manner that will help Washington become a leader in high technology research, development, and employment.

How does the Center make a difference? Quite simply, the Center brings the discoveries of the laboratory to the marketplace by attracting federal and private industry funding for commercially-promising research in Washington state. In doing so, the WTC keeps three priorities in mind: commit only to top quality scientific research; focus on a manageable number of programs; and balance the funding of programs so that the Center serves both large and small companies.

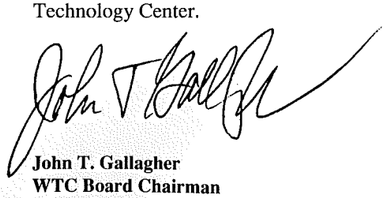
Our ability to recruit world-class researchers is an indicator of the quality of our seven programs. These researchers are willing to work with us because of the reputations of our universities and our growing high technology community. They also know that the Center will bring deserving visibility and priority to their research.

Making research opportunities available to small or start-up companies is another important strategy of the Center. Many such companies believe that only large corporations have the resources to identify and invest in promising university research. Recognizing that the focused efforts of a small company are often the surest vehicle for product commercialization and job creation, the Center is positioned to be supportive and flexible in working with developmental stage companies.

The impressive accomplishments highlighted in this report show that the WTC has made great progress in multiplying the state's commitment of research dollars in the past four years. For the Center to be judged successful in the long run, it must grow beyond its present scale. Without sacrificing quality, the Center must reach higher targets of program funding and increase its number of scientific thrusts.

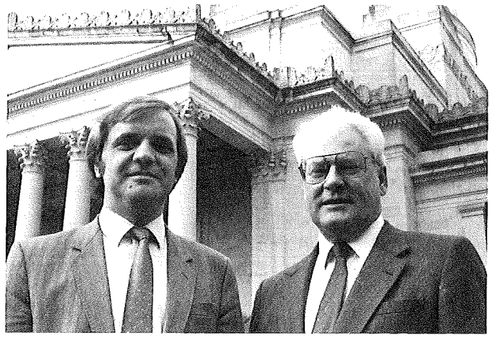
Meeting this challenge will depend partly on the direction and management given to the seven research programs we have in place. But just as important to the Center's future success is the level of new support and participation brought to WTC research by Washington's large and small businesses.

I invite you to invest in the economic growth of your enterprise, as well as the future prosperity of Washington state, by participating in the research programs of The Washington Technology Center.



John T. Gallagher
WTC Board Chairman

A Letter from the Directors



Associate Director Roger Breeze and Executive Director Edwin B. Stear stand in front of the Capitol Building in Olympia after testifying before legislative committees in the House and Senate.

By all measures, the 1985-1987 biennium was outstanding for the Washington Technology Center and its university, industry and government partners.

- Thanks to the Center's success in the 1983-1985 biennium, the Washington State Legislature responded by increasing its funding for the Center's programs for 1985-1987.
- In addition, the Legislature granted a $15 million appropriation for a permanent WTC facility on the University of Washington campus.
- Private industry and federal research grants, contracts, and gifts climbed from almost $3.2 million to $15.2 million. Generous industry donations of equipment gave us world-class laboratories, especially in the WTC's Compound Semiconductor, Manufacturing Systems, and Advanced Materials technology programs.
- Such investment has paid off in terms of patent applications, new technologies, and new ventures and company start-ups for Washington state, based on WTC research.

Why are these accomplishments so important to the Center?

The Center was established in 1983 by the Legislature to contribute to the state's long-term economic development through high technology research, education, and training. State leaders realized that innovation would not only make existing companies more efficient, it would create new products, new companies, and new employment.

The Legislature knew that the creation of high technology demands the brightest people—a university resource. The Legislature also

recognized that advanced research and technology development require expensive facilities and equipment, sustained by the promise of commercial success. Achieving commercial success requires financial backing and a home for new technology—industry's essential contribution. Still, an organization with scientific and administrative expertise was needed to bring the two groups together.

Thus, the Washington Technology Center was born, but only proven results would keep it alive.

Four years later, the WTC's successful blending of the interests of Washington's industries and universities, aided by state seed money, has surprised both its skeptics and its boosters.

- The state's economy has been strengthened by WTC developments in forestry, crop and animal agriculture; aircraft manufacturing devices; faster and more versatile computer chips; strong, lightweight ceramic materials; new applications in artificial intelligence; and sophisticated microsensors, to name just a few.
- Already three new Washington state companies have been formed based on WTC research. CHEMFET Corporation, in Bellevue, anticipates marketing its new Ph sensing device in 1987. SiMED Corporation, a start-up company in sophisticated medical devices in Bothell, expects to sell its pulse oximeter by the third quarter of 1988. Founded in 1987, SSC, Inc. will commercialize specially-processed superconducting powders to be manufactured at its Bothell laboratory.
- Both the University of Washington and Washington State University have attracted top faculty associated with the Center. Their research provides cutting-edge learning and employment opportunities for students. These highly-trained students become important human resources for our state's industries, perhaps one of our most effective and efficient means of technology transfer.
- Clearly the Center has tapped a felt need for research and technology development by private industry and the federal government. Private industry funding came from both the state's smallest businesses and its largest corporations. Our balance sheet, found within this report, shows that we attracted almost three dollars in non-state funding for every state dollar spent. In other words, we exceeded the legislative mandate for matching non-state funding by 200 percent.

The future looks equally bright. We expect even greater scientific achievements when we move into our new facility in 1989. The 67,000 sq. ft. building will facilitate the shared use of state-of-the-art equipment and the cross-fertilization of an array of scientific and technical disciplines. Already many scientists from our seven programs are crossing over to do research in a related WTC program. We expect that this increased proximity will magnify the effectiveness of their creative thinking and problem-solving.

We realize that the Washington Technology Center is still an experiment, not an institution. Risk is inherent in our enterprise. There are bound to be some deadends in some our research and technology development programs. This does not discourage us. In fact, we feel our demonstrated ability to quickly recognize and discontinue unproductive research and move in more promising directions is one of our important assets.

Thanks to the visionary people who have supported the Center from its infancy, we have built a sound base from which to venture. We will proceed with confidence to continue to create new technology for Washington's future prosperity.

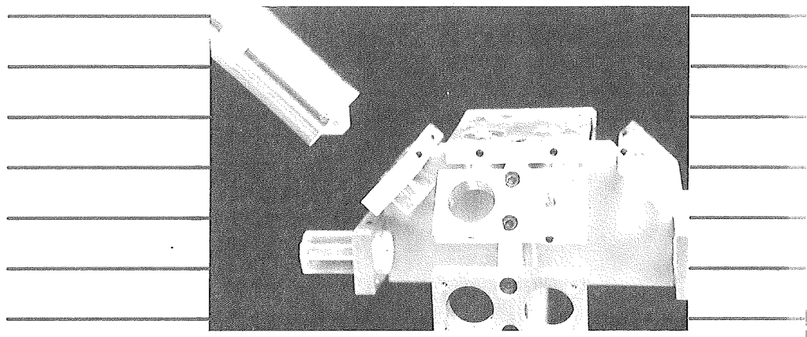
Edwin B. Stear

Edwin B. Stear
WTC Executive Director

Roger Breeze

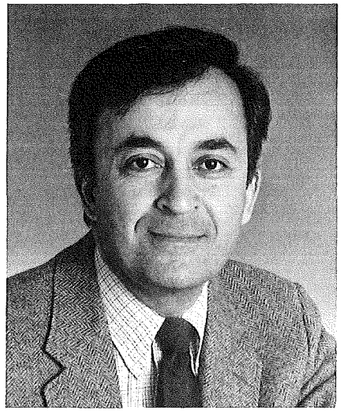
Roger Breeze
WTC Associate Director

WTC Technology Programs



The Fringe-Field Capacitance Probe, created under the Manufacturing Systems Technology Program, can evaluate the surface finish and accuracy of a drilled hole in less than a second—without slowing down the on-line manufacturing process. This WTC technology was supported by The Boeing Company.

Advanced Materials Technology Program



Ilhan A. Aksay, Ph. D., Program Director
Battelle PNL Professor, UW

Participating Researchers:

J. Aguilera-Granja
Ilhan A. Aksay
John C. Berg
John L. Bjorkstam
Daniel M. Dabbs
J. Thomas Dickinson
Nancy M. Doherty
Gary P. Drobny
Peter G. Edelman
B. E. Eichinger
Allan S. Hoffman
Richard E. Jordan
Eric W. Kaler
Ryoichi Kikuchi
Jan-Anders Manson
Buddy D. Ratner
John J. Rehr
Bruce Robinson
Mehmet Sarikaya
Michael Schick
James C. Seferis
Wan Y. Shih
Wei-Heng Shih
B. Sonuparlak
Gregory C. Stangle
Timothy Yin
T. Yogo
Richard L. Zollars

Since 1983, the Advanced Materials Technology Program has focused on the structure, properties, and creation or bonding of different materials. Major areas of research include lightweight, high-strength ceramics, superconductors, nanoscale materials processing, intermetallics and composites.

In four years, the program grew from 2 to 28 participating professors. Their work has already attracted industry and federal funding at the rate of more than six dollars for every state dollar invested.

Outstanding growth each quarter in personnel, facilities, equipment, and research funding in advanced ceramic materials has yielded exciting results in technology development and industry partnerships. Ilhan A. Aksay, in cooperation with other WTC researchers, filed for six patents in ceramic processing in this biennium. Thanks to generous support from state, federal and industry sources, the program acquired several high temperature furnaces, property characterization instruments and state-of-the-art optical and electron microscopes to allow the scientists to better process and characterize materials. Ceramic powder processing, developed in our laboratories, led to the creation of a start-up company, Seattle Superconducting Ceramics (SSC, Inc.) in 1987. SSC will soon manufacture high-yield, high-purity superconducting powders for direct conversion to superconducting ceramics.

The different ceramics being created by many WTC scientists are expected to be used in heat engines, electronics, and surgical implants.

In other work in advanced materials, UW graduate student Gabriel P. Lopez, under the direction of UW bioengineering professor Buddy Ratner, is developing a new technology to deposit thin films on the surface of materials. Such films are needed in microelectronic devices, chemical separation systems, sensors, and medical devices or implants that come in contact with the body. WSU physics professor J. Thomas Dickinson is researching fracto-emission, the release of microscopic particles when a crack in an insulating or interfacing material occurs. His research is expected to yield clues to how, why, and when cracks form in composites and adhesively bonded materials. In addition, the program is testing the reaction of materials simultaneously exposed to radiation and stress. Such tests have applications for space and laser technology.

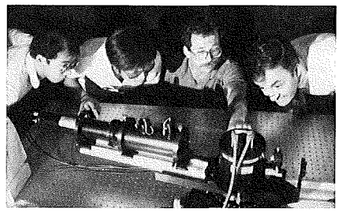
This time exposure shows the light emitted after 15 pulses of ultraviolet laser light strikes the surface of a sodium-rich silica glass. Dickinson's study of materials simultaneously exposed to radiation and stress has applications for space and laser technology.

The Advanced Materials Technology Program has five interrelated laboratories: Advanced Ceramic Materials, Polymeric Materials, Biomaterials, Metal-Matrix Composites, and Characterization. In addition, the program administers IBM-funded research in ceramic polymer composites.

Support for the Advanced Materials Technology Program in the 1985-1987 biennium came from the following sources: Deseret, Inc.; Hercules Inc.; General Dynamics Corp.; Lawrence Livermore National Laboratory; Battelle Pacific Northwest Laboratories; Alzeta Corporation; Kureha Chemical Co. Ltd.; McDonnell Douglas Corp.; Sumitomo Chemical of Japan; Martin Marietta Corp.; Oakridge National Laboratory; IBM; Genetic Systems Corp.; Weyerhaeuser Co. ; and Johnson & Johnson Co. Federal agencies sponsoring research included the National Science Foundation, Office of Naval Research, Defense Advanced Research Projects Agency, Air Force Office of Scientific Research, US Army Research Office and the National Institutes of Health.

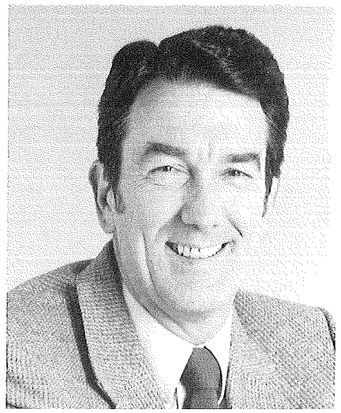
Program Summary

	1985-1987	1983-1985
Research Funding	**$5,831,865**	$784,584
Industry Gifts	**$208,741**	0
Research Expenditures	**$3,543,583**	$370,093
Participating Research Faculty	**28**	9
Student Research Assistants	**24**	9
Support Staff, Full and Part-time	**40**	5
Invention Disclosures	**5**	1



Research Associate Yoshihiro Hirata and research assistants Chan Han and Corrie Martin and Professor Ilhan A. Aksay inspect the laser light scattering apparatus which will be used to characterize submicron ceramic powders.

Compound Semiconductor Technology Program



Thomas G. Stoebe, Ph.D., Program D
Professor of Materials Science and Engineering, UW

Participating Researchers:
Robert B. Darling
Numan S. Dogan
Thomas Engel
Abdul Azim Khan
Kelin J. Kuhn
Larry Olsen
Y. Krishna Rao
Mani Soma
Thomas G. Stoebe

The world's first compiler-generated gallium arsenide (GaAs) integrated circuit, completed in 1987, originated from research begun in the WTC's Compound Semiconductor Program. Testing of the Arithmetic Logic Unit (ALU) showed it to be three times faster than a comparable silicon circuit while consuming up to 60 percent less power. The research, design, and testing was done in partnership with Seattle Silicon Corporation and GigaBit Logic, Inc.

The overall goal of the Compound Semiconductor Program is to use unique materials, many based on gallium arsenide, to create new high-speed circuits and devices with a greater variety of electrical and optical properties than silicon. One of the principal advantages of compound semiconductor circuits is that lasers and transistors can be integrated on the same chip. With minor modifications, they can be substituted for silicon parts in present computer designs to achieve higher overall system performance. Additionally, these materials offer new applications in optical detection and high temperature sensing.

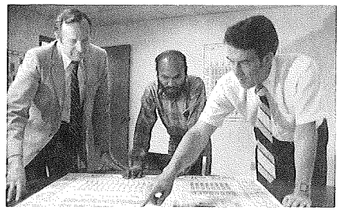
Because gallium arsenide is a synthetic compound, the Compound Semiconductor Program needed to acquire expert staff and equipment to do its own in-house production. Within this biennium, both these needs were met.

UW professors Mani Soma and Robert Darling of electrical engineering work with newly recruited materials science professor Kelin Kuhn to create, characterize, design, and test compound semiconductor electronics. With new equipment and laboratory space for metallo-organic chemical vapor deposition (MOCVD) and molecular beam epitaxy (MBE), the University of Washington's resources for compound semiconductor engineering rank in the top ten of comparable facilities in the nation.

These UW faculty are teamed with Professor Larry Olsen at Tri-Cities University Center and professors Numan Dogan and Azim Khan at WSU. In addition, graduate students at all three locations are being trained on state-of-the-art equipment and in advanced engineering research that did not exist on these campuses two years ago. Their contacts with many participating companies ensure that the advancing research will be transferred to industry—through the fostering of human, as well as technological resources.

For the immediate future, a search has begun for a senior leader at the UW to work in this program and provide for long-range program development. Overall, the long-term goal is to develop the optoelectronic integrated circuits needed for the technological developments of the 21st century.

Companies whose grants and gifts in 1985-1987 made this program possible included Boeing Aerospace; Seattle Silicon Corporation; United Epitaxial Technology, Inc.; Boeing Electronics; Intel Corporation; Digital Equipment Corporation; Gigabit Logic, Inc.; Honeywell Corporation; and Perkin-Elmer Corporation.



WTC Industry Fellow Dick Oettel, from Seattle Silicon Corporation, examines the layout of a GaAs Arithmetic Logic Unit (ALU) with professors Mani Soma and Tom Stoebe. The ALU tested three times faster than comparable silicon circuits.

Program Summary

	1985-1987	1983-1985
Research Funding	**$2,083,669**	$328,575
Industry Gifts	**$712,747**	$146,250
Research Expenditures	**$1,993,195**	$387,714
Participating Research Faculty	**9**	5
Student Research Assistants	**12**	5
Support Staff, Full and Part-time	**9**	0
Invention Disclosures	**2**	0

UW professors Robert Darling and Kelin Kuhn examine the workings of the new Molecular Beam Epitaxy machine, housed in a new facility for compound semiconductor research. MBE can create a wide variety of compound semiconductors.

Computer Systems and Software Technology Program

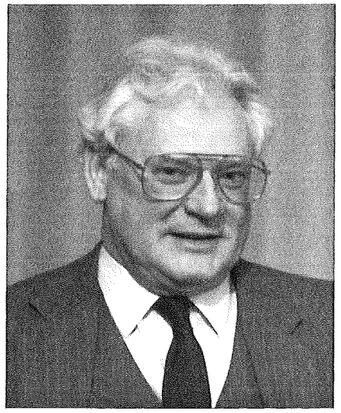


Photo: Joel A. Levin

Edwin B. Stear, Ph.D., Program Director
Professor of Electrical Engineering, UW

Participating Researchers:

Les E. Atlas
Jean-Loup Baer
Alan H. Borning
Y. Paul Chiang
Narsingh Deo
Mark Manwaring
Robert J. Marks II
Yacov Shamash
Alan C. Shaw
Edwin B. Stear

The Computer Systems and Software Program underwent a significant reorientation over the 1985-1987 biennium to anticipate and promote innovations for the next generation of computers.

At the outset, the WTC research project on software generators evolved into an emphasis on "real-time systems." Real-time systems are computer systems that meet strict timing constraints, critical in the monitoring of rapid transit, air traffic control, medical life-support systems and commercial aircraft navigation and control systems. UW researcher Alan Shaw, internationally recognized for his research in this area, was selected as a Fulbright Research Scholar at the University of Paris in 1986. Shaw showed how to incorporate time as one of the top level considerations in software design.

WTC researcher Mark Manwaring at WSU developed techniques for combining analog and digital circuits on the same integrated circuit chip. His other projects addressed languages for parallel processing and the design of a LISP processor to function in a real-time environment.

Three new research areas in Computer Systems and Software were chosen in 1985-87 to receive major emphasis in the next biennium: integrated systems and engineering design, neural networks, and medium-scale multi-processors.

The goal of the new WTC research project in integrated systems and engineering design is to develop integrated computer-based tools so powerful and comprehensive that manufacturers can use them from the initial stages of facility, tool and product design clear through the final stage of product fabrication. This sophisticated set of tools would interconnect thousands of chips and eliminate the need for data to be entered several times for different software. Information will then be accessed more rapidly, cheaply and accurately.

A neural network is a form of parallel processing that extends the intelligence of the computer. Modeled after the brain, a neural network processes information faster because its neurons work simultaneously and cooperatively, rather than sequentially like traditional computers. WTC researchers are designing neural networks to do what the human brain does: learn or generalize from past experiences. One expected use for these neural networks is speech recognition, a difficult task for a typical computer which cannot accommodate infinite variables of pitch, inflection and pronunciation.

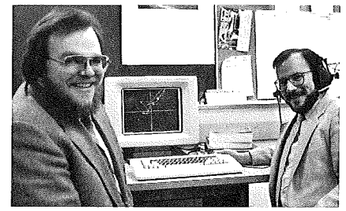
Edward Lazowska explains the advantages of parallel processing over standard sequential computing. He is simplifying parallel processing for the non-scientific user.

Pioneering the use of medium-scale multi-processors is a second area of new research in parallel processing. UW researcher Edward D. Lazowska has been granted a DEC SRC Firefly experimental prototype multiprocessor workstation for his WTC research. Parallel processing is already very effective for certain scientific problems such as weather forecasting or integrated chip design. Lazowska and his researchers will concentrate on simplifying parallel processing for a broader range of users, performing office or computer-aided engineering tasks, for example.

Five different Boeing companies sponsored research contracts during 1985-1987, including Boeing Aerospace, Boeing Computer Services, Boeing Commercial Airplane, Boeing Electronics, and Boeing Military Airplane. Industry gifts came from Intel Corporation; Tektronix, Inc.; and Hewlett Packard.

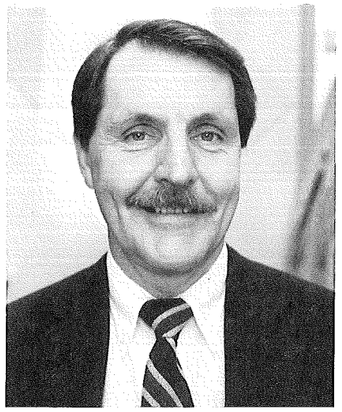
Program Summary

	1985-1987	1983-1985
Research Funding	**$675,987**	$130,000
Industry Gifts	**$214,384**	0
Research Expenditures	**$606,172**	$132,097
Participating Research Faculty	**10**	3
Student Research Assistants	**13**	3
Support Staff, Full and Part-time	**0**	2
Invention Disclosures	**1**	0



UW researchers Robert Marks (left) and Les Atlas (right) collaborate in their work to make a neural network computer that can function more like the human brain: processing information simultaneously and cooperatively, with the ability to learn from past experience.

Manufacturing Systems Technology Program



Jens E. Jorgensen, Ph.D., Program Director
Boeing Professor of Manufacturing, UW

Participating Researchers:
Abdel E. Bayoumi
Martin C. Berg
Dale E. Calkins
Bruce L. Chapman
James D. Chalupnik
Clayton T. Crowe
Mark A. Ganter
Joseph L. Garbini
C. Howard Hamilton
David Hutton
Jens E. Jorgensen
L. Alden Kendall
William E. Moritz
Cornelius Nevrinceanu
Mamidala Ramulu
Ali Saberi
Richard F. Tinder

This biennium, WTC researchers in the new Manufacturing Systems Technology Program filed for two patents. Both industry-sponsored inventions are expected to be licensed and used in manufacturing industries throughout the nation, as well as within the state.

The Fringe-Field Capacitance Probe, sponsored by both Boeing and General Motors, is a sensor that can evaluate the surface finish and accuracy of a drilled hole in less than a second—without slowing down the on-line manufacturing process.

The Shim Gauge Measuring System, also sponsored by Boeing, is an automated sensor that allows manufacturers to quickly measure the gap between structural parts. A numerically controlled machine would then produce the shim, or filler, to fit exactly into that gap.

In addition, WTC researchers continue to improve their ability to detect cutting tool wear by monitoring the sounds tools emit during machining. By using a fluid-coupled sensor, the accoustic emission technique can be applied to rotating-cutter operations such as milling and drilling.

These three examples demonstrate the overall purpose of the program—to increase the productivity and quality of manufacturing in state and national industries. Specific areas of research include sensor development for on-line inspection and control, computer-aided manufacturing, small parts assembly (electronic and electromechanical), and design for producibility. In addition, research is expanding into the simulation of flexible manufacturing systems and the use of geometric modeling and expert systems in the design process.

Facilities for this program have been improved greatly during this biennium. The WTC sponsored the renovation of a 3,000 sq. ft. manufacturing laboratory at the UW. A computational facility for geometic modeling and analysis of experiments valued at $300,000 was donated by Digital Equipment Corporation. WSU gained an additional 2,500 sq. ft. of laboratory space for manufacturing research in the new engineering building which opened in 1986.

Both universities have attracted new faculty to their campuses and to the WTC Manufacturing Systems Program. These new scientists promise to enhance future research in the use of artificial intelligence to both control the various machining and assembly processes and plan the flow of materials and products through a factory. In addition, a major expansion is expected in geometric modeling to mathematically describe and analyze objects, the supervisory control of machining cells which take in sensory data, the use of natural languages for machine commands, and machine vision systems which will allow machinery to run unattended.

Students engaged in WTC research in this program have become an important industry resource. Two such students used their manufacturing expertise to found their own companies in the state.

Companies and federal agencies who sponsored research in this program in 1985–1987 included Boeing Commercial Airplane; SME Manufacturing; PACCAR, Inc.; General Dynamics; Boeing Aerospace; General Motors; IBM; and the National Science Foundation. Industry gifts came from JML Research Inc.; John Fluke Mfg. Co., Inc.; Hewlett Packard; and Digital Equipment Corporation.

Professor Joseph Garbini demonstrates a capacitance probe to touring representatives from Hewlett Packard. The probe checks the accuracy of drilled holes and their surface finish in less than a second.

Program Summary

	1985-1987	1983-1985
Research Funding	**$1,351,298**	$380,124
Industry Gifts	**$483,951**	0
Research Expenditures	**$1,757,492**	$184,157
Participating Research Faculty	**17**	10
Student Research Assistants	**10**	8
Support Staff, Full and Part-time	**13**	5
Invention Disclosures	**2**	1

Representatives from Digital Equipment Corporation present a VAX computer system for WTC manufacturing research at the UW. Left to right are Joseph Garbini, WTC researcher; William E. Lewis, District Sales Manager for DEC; J. Ray Bowen, Dean of the College of Engineering, UW; Jill Bennett, University Relations for DEC; and Jens Jorgensen, WTC researcher.

Medical Biotechnology Program

Travis McGuire, Ph.D., Program Director
Professor of Veterinary Microbiology and Pathology, WSU

Participating Researchers:
A. F. Barbet
Roger Breeze
Janice L. Carlson
William P. Cheevers
William C. Davis
Thomas J. Inzana
James M. Lee
H. Denny Liggitt
Travis C. McGuire
Lance E. Perryman
James N. Petersen
Sandra S. Ristow
Ursula Storb
Stephen M. Taylor
Tilahun Yilma
Bernard Van Wie

Freeing cattle from fatal diseases, learning how to increase the production of human and animal antibodies to fight infections and tumors, and building cell reactors which may be used to produce valuable pharmaceuticals has been the focus of research in the WTC's Medical Biotechnology Program for the past two years.

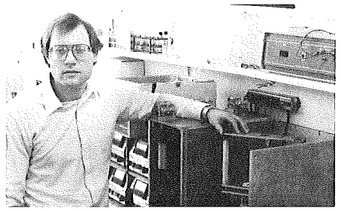
With his collaborators, Travis McGuire, WSU professor of veterinary microbiology and pathology, isolated a protein that proved effective for protecting cattle against anaplasmosis. Anaplasmosis is the most prevalent of blood parasitic diseases among half the world's livestock producing areas. A recombinant replica of this protein has been made to develop a vaccine.

W. C. Davis developed a set of monoclonal antibodies for use in immunological research in humans and animals. The antibodies, licensed to VMRD, Inc. in Pullman, Washington, recognize molecules on three types of white blood cells (histocompatibility antigens on T and B lymphocytes and macrophages). These molecules regulate the immune response to pathogens.

WTC researchers accomplished important advances in bioprocessing through the creation of two bio-reactors and a centrifugal cell separator at WSU that can be used for both plant and animal cells. These new technologies hold great promise for future applications in medicine and the pharmaceutical industry.

Plant cells which have been genetically modified to manufacture a model protein product can be grown more efficiently and on a larger scale in the bio-reactor developed by James Lee. Bernard Van Wie invented a continuous centrifugal bio-reactor which can be used to grow hybridoma cells used to produce monoclonal antibodies. Pharmaceutical companies use these types of cells to produce valuable medications such as interferon, growth hormones, and insulin.

James Petersen is credited with other medical-related technologies that succeeded during the biennium. His work included development of on-line computer-optimized bioprocessing techniques, an enzyme sensor that measures sugar levels during the conversion of waste cellulose to glucose, and a centrifugal cell separator, which aids the processing of blood for transfusions.



Dr. Bernard Van Wie stands next to the continuous centrifugal bio-reactor he invented as part of his WTC research.

In a new WTC project, WSU professor Sandra S. Ristow and her research associate Jeanene Arnzen are detecting strains of a deadly virus in fish. Infectious hematopoietic necrosis virus, common in private and government hatcheries, has devastated trout, salmon and steelhead populations. They use the ELISA system to identify effective monoclonal antibodies for rapid detection of the disease and knowledge of common sites for possible vaccine production.

Companies which helped fund this program's research included John Fluke Mfg. Co., Inc.; COBE Laboratories, Inc.; DuPont; Genetic Systems Corp.; Genentech, Inc.; Instrumentation Laboratory, Inc.; and Norden Labs. Participating federal agencies included the United States Department of Agriculture, US Agency for International Development, National Science Foundation, Bi-national US-Israel Agricultural Research and Development, and National Institutes of Health. The Engineering Foundation, Grayson Foundation, and Whitaker Foundation provided additional funding.

Program Summary

	1985-1987	1983-1985
Research Funding	**$2,691,341**	$130,000
Industry Gifts	**$607,487**	$98,480
Research Expenditures	**$2,308,306**	$223,480
Participating Research Faculty	**16**	9
Student Research Assistants	**4**	3
Support Staff, Full and Part-time	**26**	0
Invention Disclosures	**2**	3

To protect our fisheries, WSU professor Sandra S. Ristow with research associate Jeanene Arnzen uses the ELISA system to identify effective monoclonal antibodies which detect a virus fatal to fish.

Microsensor Technology Program

Peter W. Cheung, Ph.D., Program Director
Professor of Electrical Engineering and Bioengineering, UW

Participating Researchers:
Peter W. Cheung
Kukjin Chun
Clement E. Furlong
Mansour Moinpour
William D. Scott
Rubens A. Sigelmann
Sinclair S. Yee

Two start-up companies in Washington state are directly attributable to the research breakthroughs in the WTC Microsensor Technology Program. CHEMFET Corporation of Bellevue and SiMED Corporation of Bothell are developing new products while they sponsor ongoing WTC research to improve or diversify their product lines.

The CHEMFET product uses a silicon-based microsensor to detect the acid or alkaline levels in a medium. It can be used in scientific research and industries such as food processing, plastics, or petroleum refining. Related inventions in the future might measure different chemical concentrations—such as salt or sugar levels in food or toxic chemicals in a chemical spill.

SiMED, a manufacturer of advanced medical instruments, has developed a sophisticated pulse oximeter which uses transmitted or reflected light to measure and continuously monitor oxygen levels in a patient's blood. The technology is very valuable during patient surgery, recovery, or therapy.

Microsensor technology unites novel combinations of physical, chemical, and materials properties with recent advances in microelectronics. These achievements make it possible to create small electronic sensing devices that can measure and process information from a wide variety of environmental factors such as temperature, pressure, sound, chemical composition, and distance. Microsensors are effective communicators when linked with computers or robots, which are programmed to function in specific ways under prescribed conditions. The microsensor becomes the eyes, ears, nose, tastebuds, and sense of touch for either machine.

Research in microsensors attracts scientists from many disciplines. New classes in microsensor technology, for example, attracted about 25 undergraduates from such fields as bioengineering, biology, chemical engineering, chemistry, materials science, mechanical engineering, and physics. Many graduate students are paid researchers who helped set up and maintain the laboratory, as well as participate in microsensor design, fabrication, and testing.

For the 1985-1987 biennium, the primary goal of the Microsensor Technology Program was to stimulate interest in the research, development, and commercial uses of microsensors and to build a Microsensor Fabrication Laboratory where such research could begin.

With the joint sponsorship of the Washington Technology Center and the University of Washington College of Engineering, a new laboratory for microsensors was built within an existing campus building. Design consulting for the room-within-a-room layout of the laboratory was contributed by IBM. The sandwich and modular design of the laboratory allows for routine maintenance and cleaning while avoiding contamination of the clean-process aisles. In addition, it provides for flexibility in updating the laboratory and for later moving it to the WTC's new permanent research facility in 1989.

The Center received $644,000 in cash and equipment donations to support the building effort from Boeing; Fairchild Camera and Instrument Co.; Chevron; Sundstrand Data Control, Inc., DuPont; Hewlett-Packard; IBM; Intel Corporation; and John Fluke Mfg. Co., Inc.

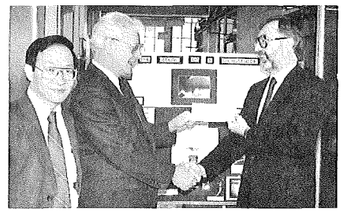
CHEMFET Corporation sponsored a major research contract with this program during the biennium.

Graduate student Shams Karimyar makes important connections for the Microsensor Fabrication Laboratory. The new laboratory was built under the joint sponsorship of the WTC and the UW College of Engineering.

Program Summary

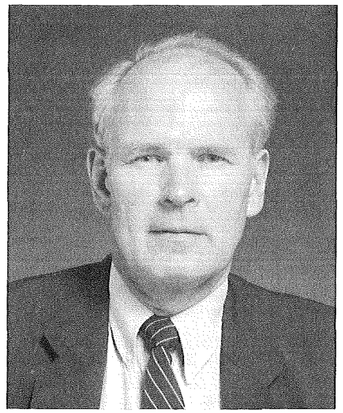
	1985-1987	1983-1985
Research Funding	**$1,237,589**	$1,135,956
Industry Gifts	**$306,352**	$791,271
Research Expenditures	**$1,742,299**[1]	$1,073,603
Participating Research Faculty	**7**	1
Student Research Assistants	**5**	1
Support Staff, Full and Part-time	**5**	3
Invention Disclosures	**4**	0

[1]Exceeds revenue due to expenditures made in 85-87 from research funding received late in 83-85.



Randy Turpin, President of CHEMFET Corporation, presents a check to WTC Executive Director Edwin B. Stear and Peter Cheung to continue a research contract with the Microsensor Technology Program.

Plant Biotechnology Program



Benjamin D. Hall, Ph.D., Program Director
Professor of Genetics, UW

Participating Researchers:
Alan Ager
R. Culeman
Milton P. Gordon
Benjamin D. Hall
Paul Heilman
Thomas M. Hinckley
Bjorn F. Hrutfiord
Chong X. Huang
Michael L. Kahn
Andris Kleinhofs
Paul F. Lurquin
Betty McConaughy
Kyosti V. Sarkanen
Henrietta D. Seet
Barbara A. Smit
Reinhard F. Stettler
Stuart E. Strand
Elizabeth Van Volkenburgh

In 1985, jobs in lumber, wood products, and the pulp and paper industry constituted 18.5 percent of all manufacturing employment in Washington. In 1986, the state's 36,000 farms produced $2 billion worth of food crops. The WTC sees the need to apply high technology to these traditional industries — to help make them more efficient and productive and keep our economy strong.

The WTC's plant biotechnology program for food crops and forest products is pioneering research in genetic engineering to create plants with disease and insect resistance and improved growth traits. Common plant diseases or pests greatly reduce the quality and quantity of yearly harvests and require costly chemical spraying.

Species now being studied include poplars, potatoes, and barley. Genetic discoveries in these plants will have wider application in other food crops; for example other grains, tomatoes, apples, cherries, asparagus, mint and raspberries. Likewise, the work being done with fast-growing poplar hybrids should be of great use in other forest tree species.

Professors Reinhard Stettler and Milton Gordon's research to identify the genetic defenses of a hybrid poplar is built on previous industry and federal cooperation to create a poplar that is both fast-growing and resistant to drought and flooding. The U.S. Department of Energy and Martin Marietta Energy Corporation support such research because they believe the poplar can be used as a renewable energy resource as solid or liquid fuel. The fibers of the poplar are also ideal for use in the wood products industry for making high-grade paper.

In conjunction with the U.S. Department of Agriculture and with support from the Washington State Potato Commission, the WTC sponsored research to create new, patentable varieties of high-yielding, disease-resistant potatoes. Collaborative research takes place at the UW and in a new USDA/WSU laboratory in Prosser, Washington.

This biennium WTC scientists made an important breakthrough in reducing farmers' reliance on commercial fertilizer for their crops. WSU professor Andris Kleinhofs isolated the gene in barley which converts nitrates in the soil to nitrites, a form of nitrogen that can be used for growth. Once agronomists understand how this enzyme works, they can enhance the natural ability of many crops to get food from the soil. Another WTC researcher, Michael Kahn, is investigating nitrogen fixation in alfalfa. *Rhizobium meliloti*, a naturally-occurring nitrogen-fixing bacterium, supplies alfalfa with enough nitrogen so that it can grow well without additional nitrogen fertilizer. Studying this natural interaction may lead to higher yields of alfalfa and other legume crops such as peas, beans, and soybeans.

Other WTC research sought to improve the malting quality of barley.

Companies which helped support this program's research included Crown Zellerbach Corporation, Weyerhaeuser Company, Martin Marietta Corporation, and Great Western Malting Company.

Federal grants came from the Department of Energy, the United States Department of Agriculture, and the National Science Foundation.

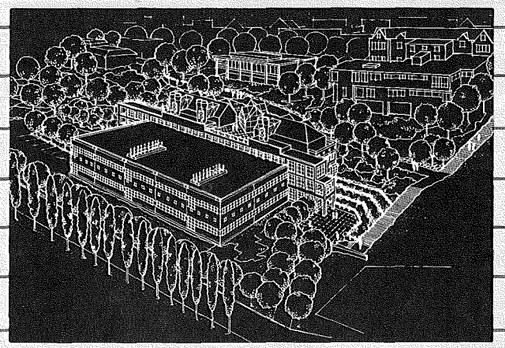
WTC scientists Paul Heilman (left) and Rheinhard Stettler (right) check on the progress of their hybrid poplar seedlings. The photo to the far left shows a mature hybrid poplar planted at the WSU research center in Puyallup.

Program Summary

	1985-1987	1983-1985
Research Funding	**$1,635,241**	$211,782
Industry Gifts	**$92,500**	0
Research Expenditures	**$1,209,304**	$155,104
Participating Research Faculty	**18**	6
Student Research Assistants	**6**	2
Support Staff, Full and Part-time	**14**	2
Invention Disclosures	**0**	0

As part of a study to reduce the fertilizer needs of various crops, microbiology professor Michael Kahn prepares to dilute and count some mutant bacteria.

New Building for WTC Research



In 1987, the Washington State Legislature approved funding for a 66,500 sq. ft. permanent facility for the Washington Technology Center on the University of Washington campus. The flexible research facility, designed by NBBJ Group, will provide space for joint industry/university research in the seven research programs. Groundbreaking for the building is expected in the third quarter of 1988, with completion scheduled for late 1989.

Government Partners

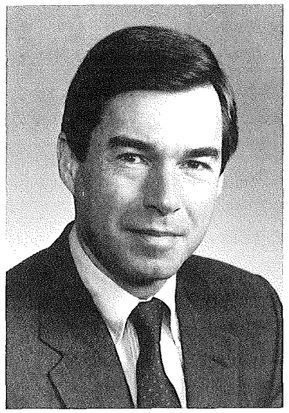
In 1983, the Legislature agreed to fund the Washington Technology Center as an interdisciplinary program to support major high-technology education and research initiatives within the state. To leverage its investment of tax dollars, the Legislature required the WTC to attract non-state funding to match each state dollar spent. Within the 1985-1987 biennium, the WTC attracted a ratio of $2.8 from federal and industry sources for each $1 expended by the state.

But the partnership between the WTC and government programs goes far beyond appropriations. The WTC provides an important government contact for assisting small and medium-sized businesses in the fields of advanced materials, microelectronics, manufacturing systems, computer systems and biotechnology. We offer technology expertise, scientific and engineering information and consultation on the Center's emerging technologies. We interact with companies statewide, transferring technologies and processes that make products and services more competitive in national and international markets.

The WTC's Technology Assistance Program (TAP) coordinates its efforts at various levels through Washington's already-in-place economic development programs. The WTC presents technology-based information to representatives of organizations such as the Department of Trade and Economic Development (DTED), the State's Small Business Assistance Center, 39 city and county economic development councils, the state's 28 Associate Development Organizations (ADO's), Washington State University's Small Business Development Center, Washington's 59 public port districts and incubator facilities within the state. These representatives, familiar with the industrial needs in their communities, can approach the WTC for help for local businesses.

The Board of Directors is keenly aware of the legislative intent which gave birth to the Washington Technology Center—that is, to invest in long-term economic growth for Washington state. In response, the Board has developed a Washington First Policy. Such a policy will ensure that qualified Washington firms have the first opportunity to license WTC intellectual property, inventions and new processes generated in the Center.

"The WTC strengthens existing companies by providing technologies to make them more efficient. It also nurtures the creation of new companies that introduce new or improved products to the marketplace.



For Washington state to keep its competitive edge in international trade, we must lead the world in efficiency and innovation. The WTC helps make that happen."

John C. Anderson
Director of the Washington State Department of Trade and Economic Development

"Our current research with the WTC will help us launch the second generation of pulse oximetry, differentiating our company from any other pulse oximetry company in the world. We're very happy with the Tech Center. We intend to continue our relationship with the WTC to do our core research and look into related advanced sensor technology for medical uses."

Dr. Michael P. H. Lau, President SiMED Corporation

Dr. Lau (right) stands in front of SiMED Corporation's headquarters with his co-founder Alfred P. Lee, Ph.D.

Industry Partners

The Washington Technology Center was founded to promote joint industry-university research and technology development and is greatly dependent on industry support. Industry support comes from research partnerships, generous gifts of equipment and the exchange of university and industry researchers.

One way that the WTC helps industry is by contributing directly to the training of a highly-skilled work force. Many graduate students, supported in their research by WTC funding, go on to transfer that know-how to existing and start-up companies.

The WTC also offers a program of Industry Fellowships and Associateships. Industrial researchers sponsored by their employing companies can dedicate a sabbatical leave or some portion of their scheduled employment to collaboration with WTC researchers on mutually-promising research. Such collaborations between industry and WTC researchers keep both apprised of recent advances in research. At the same time, the exchange of knowledge nurtures attention to, and the creation of, new technologies.

In all such interactions, the focus is to make commercially-applicable discoveries sufficiently promising to be patented and licensed to the sponsoring company and/or another interested Washington firm.

85-87 Industry Gifts

Genentech, Inc.	$523,000
Hewlett Packard	390,398
Perkin-Elmer Corporation	377,000
Digital Equipment Corporation	342,244
Seattle Silicon Corporation	215,000
John Fluke Mfg. Co., Inc.	187,670
Crown Zellerbach Corporation	92,500
Intel Corporation	88,845
IBM	81,785
Johnson & Johnson	72,352
Tektronix, Inc.	64,600
DuPont	64,233
Instrumentation Laboratory, Inc.	50,000
Weyerhaeuser Company	41,924
Deseret, Inc.	31,721
Fairchild Camera & Instrument	23,203
Genetic Systems Corporation	19,758
Other (Awards less than $15,000)	41,764
TOTAL Gift Awards	$2,626,212

A SiMED worker assembles a pulse oximeter that uses light to measure oxygen levels in the blood. The instrument is used as a medical diagnostic tool for patients during surgery, critical care, and recovery.

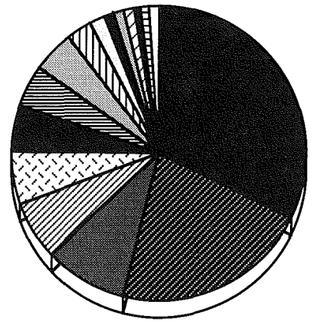
How Industry Participates

The Center encourages industry to participate in WTC research programs in a variety of ways, including:

- Projects sponsored by individual companies and the Center
- Projects sponsored jointly by a consortium of companies and the Center
- Projects sponsored totally by individual companies
- Projects sponsored by research & development limited partnerships
- Projects in support of Small Business Innovative Research Grants
- The Industry Research Fellow and Industry Associate programs, whereby company-sponsored researchers spend a sabbatical working on Center research projects
- A facilities and equipment gift program, whereby industries donate funds and/or equipment to the participating universities in support of Center research projects

Proprietary interests of all participating parties are protected through formal contracts based on a set of model agreements. These agreements, which cover the various guidelines for university and industrial participation in the Center, are available from the Center upon request.

Major Industry Grants & Contracts for 85-87

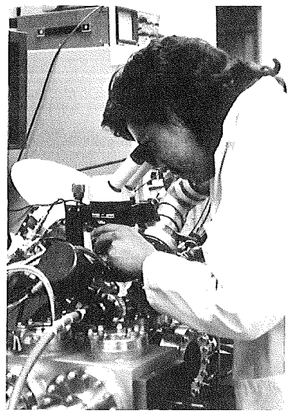


IBM	$2,198,886
Boeing Electronics	$1,491,615
Chemfet Corporation	$629,256
Boeing Commercial Airplane	$444,591
Other (Awards less than $50,000)	$394,435
Boeing Military Airplane	$351,722
Martin Marietta Corporation	$314,322
Norden Labs	$308,604
United Epitaxial Technologies, Inc.	$186,666
General Dynamics Corporation	$119,730
Boeing Aerospace	$82,939
Sumitomo Chemical of Japan	$80,000
General Motors	$76,673
Great Western Malting Company	$65,000
Alzeta Corporation	$50,000
McDonnell Douglas Corporation	$50,000
TOTAL Grants and Contracts	$6,844,439

Randy Kurosky and Corrie B. Martin, formerly UW researchers in Advanced Materials, are now lead scientists for SSC, Inc., a start-up company in Bothell which uses WTC technology to process superconducting ceramic powders.

University Partners

"Working on a WTC project has given me an opportunity to have an integral role, not only in basic and applied research and development, but also in the science and technology transfer activities associated with them.



This should prove to be invaluable experience in many of the phases of technology development I will encounter in my career as a professional research and development engineer."

Gabriel P. Lopez
Graduate student in chemical engineering, UW

The Washington Technology Center could not accomplish its mission without forging links to the state's research universities. The universities contribute the infrastructure, place and people who can advance scientific knowledge with commercial significance. In return, the WTC's presence benefits the universities by helping to attract new, world-class researchers, new research sponsors and donations, and by funding state-of-the-art scientific equipment and facilities.

University students have benefited by the new training now offered related to WTC research and equipment. While pursuing their graduate studies, many students employed in WTC research experience the excitement of advancing scientific discoveries in their chosen fields. Such experience has made them attractive recruits to private industry and government laboratories who need their acquired technical expertise.

The WTC is proud to help strengthen our state's research universities while it seeks to promote long-term economic growth for all Washingtonians.

"High technology companies have always gravitated to regions with strong universities. Those companies, in turn, support government funding to retain top faculty and build first-class facilities for all our students. The WTC helps bond the reciprocal relationship of a strong university and strong business community in this state."

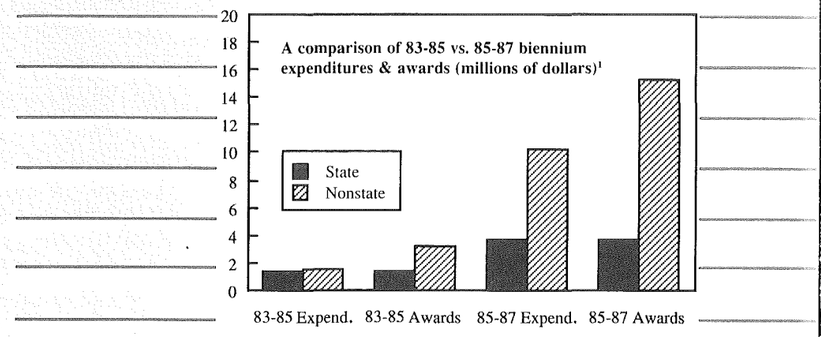
William P. Gerberding
President
University of Washington

"The WTC/WSU partnership is a relationship of outstanding mutual benefit. Program areas supported by the Center match well with ongoing activities and interests of our faculty. Furthermore, this partnership provides additional incentives to WSU faculty and students. The knowledge that results from their University-based research can be put to use by private industry is very appealing."

Samuel H. Smith
President
Washington State University

WTC Financial Report

WTC Operating Expenditures and Awards



Committed to the Center in 1985-87 were $15 million in external awards, attracted by the $3.6 million appropriation provided by the state. On a cumulative basis over the biennium, over 2.8 nonstate dollars was expended for every state dollar expended.

[1]Awards include multi-year contracts and therefore will exceed expenditures within a given biennium. Figures exclude capital funds.

AWARDS AND APPROPRIATIONS

	1985-1987	1983-1985
NON-STATE AWARDS		
Industry Grants & Contracts	**$6,844,439**	$1,636,994
Industry Gifts	**2,626,212**	1,036,001
Federal Grants & Contracts	**5,752,219**	511,527
TOTAL Non-State Awards	**$15,222,870**	$3,184,522
STATE APPROPRIATIONS		
Operations	**3,624,965**[1]	1,384,811[2]
Capital		
Microsensor Laboratory	**0**	570,000
MBE Laboratory	**303,170**	0
Permanent Facility		
Planning & Design	**150,000**	898,000
Construction	**0**	0
TOTAL Capital	**$453,170**	$1,468,000
TOTAL State Funds	**$4,078,135**	$2,852,811
TOTAL AWARDS/APPROP.	**$19,301,005**	$6,037,333

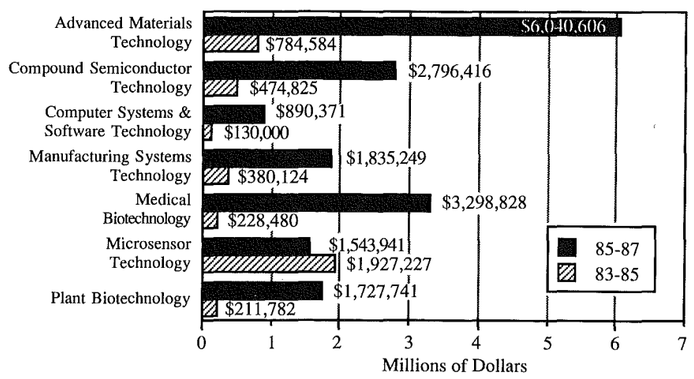
Explanatory Notes

[1]Initial appropriation of $3,605,002 plus $19,963 for salary increases during the biennium.

[2]Initial appropriation of $1,389,000 less $4,189 budget cut in the second year of the biennium.

Research Awards by Program[3]

State and Non-State



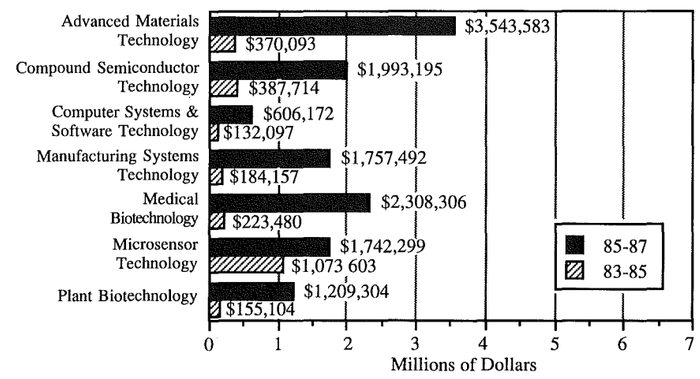
[3]Includes grants, contracts and gifts.

EXPENDITURES

	1985-1987	1983-1985
OPERATING EXPENSES		
Industry Grants & Contracts	**$4,095,046**	$424,557
Industry Gifts	**2,628,580**	854,015
Federal Grants & Contracts	**3,523,829**	265,390
TOTAL Non-State Expenses	**$10,247,455**	$1,543,962
State Operating Expenses	**3,624,746**	1,376,967
TOTAL Operating Expenses	**$13,872,201**	$2,920,929
CAPITAL EXPENSES (State)		
Microsensor Laboratory	**0**	570,000
MBE Laboratory	**110,562**	0
Permanent Facility		
Planning & Design	**153,632**	421,711
Construction	**0**	0
TOTAL Capital Expenses	**$264,194**	$991,711
TOTAL EXPENDITURES	**$14,136,395**	$3,912,640

Operating Expenditures by Research Program

State and Non-State



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- **Advanced Materials**
- **Compound Semiconductors**
- **Computer Systems and Software**
- **Manufacturing Systems**
- **Medical Biotechnology**
- **Microsensors**
- **Plant Biotechnology**

ISDL PICNIC

THIS SUNDAY

June 26 — noon 'til 3 pm

At Magnuson Park

(East end of NE 65th St.)

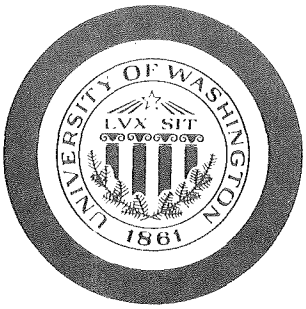
You can get to Magnuson Park from campus by taking Sand Point Way north and taking a RIGHT on NE 65th St. or you can get to the park by taking the NE 65th St. exit from Highway 5 and heading east until lake Washington.

The picnic will be held at the north end of the park by the swimming area on Lake Washington.

Professors will bring barbecue stuff, condiments, and drinks. Bring whatever food you want to barbecue and/or eat.

Activities will include:

1. Volleyball
2. An egg toss
3. The story why Cindy still has her office
4. What do the initials ISDL stand for?



UNIVERSITY OF WASHINGTON
COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING

Industrial Affiliates Program

Cordially Invites You To Attend

Annual Review

Tuesday, May 10, 1988

Sponsored by the Department of Electrical Engineering and:

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MORNING PROGRAM
Walker Ames Room, Kane Hall

8:00 - 9:00 a.m. — Registration (coffee and donuts)

9:00 - 9:30 a.m. — Welcome - Professor S. S. Venkata, Director
E.E. Department Review - Professor R. P. Porter, Chairman
State of the College - Dean J. R. Bowen

9:30 - 11:30 a.m — Three Keynote Speeches

Theme: "The Role of Education, Research and Technology in Maintaining the Competitive Edge"

Mr. Hunter Simpson, Trinus
Mr. Lee White, National Semiconductor
Mr. Peter Will, Hewlett Packard

Noon - 1:30 p.m. — **Lunch - Hub, West Ballroom (UW to host)**

AFTERNOON PROGRAM
HUB Auditorium

1:30 - 4:30 p.m. — **Technical Presentations**

1. J. S. Meditch, "Advances in Telecommunication Network Architectures: The 21st Century Begins Tomorrow"
2. A. K. Somani, "Design of Highly Reliable Computer Architectures"
3. L. Shapiro, "CAD to Vision Research"
4. R. W. Albrecht, "Mobile Robots"
5. L. Atlas/R. Marks, "Advantages of Artificial Neural Networks as a Computing Structure"
6. R. N. Clark, "Fault Detection in Dynamic Systems"
7. Y. Kim, "Future Digital Imaging Network Systems and their Imaging and Graphics Workstations.

1:30 - 5:30 p.m. — **Poster Session**

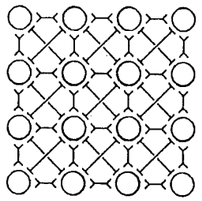
A display of 10 on-going research projects will be explained by graduate research assistants.

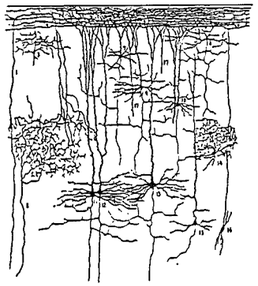
4:30 - 5:30 p.m. — **Reception (Wine and Cheese)**

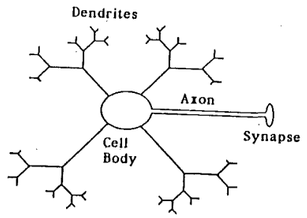
Neural Networks as a Computing Structure

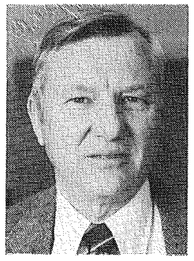
L. E. Atlas and R. J. Marks, II.

Neural networks are computer architectures which mimic the processing of a biological network of neurons. A major application for them is in development of computers which can be trained to recognize and classify unknown patterns. A brief account will be given on the history of artificial neural networks and the current state of the art. A class of neural networks will be presented whose dynamics can be interpreted geometrically. The performance attributes of this class of networks will be contrasted with other popular neural network architectures.









Fault Detection in Dynamic Systems

R. N. Clark

Detection of sensor faults using functional redundancy, as opposed to hardware redundancy, is accomplished using state estimation and other techniques of modern control theory. A basic Fault Detection Scheme is described and used to illustrate functional redundancy and to show the origin of several current research problems, including several relating to the robustness of the detection scheme. Some feasibility studies involving applications are also described.

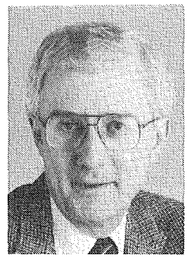
Future Digital Imaging Network Systems and their Imaging and Graphics Workstations.

Y Kim

The digital Imaging Network and Picture Archiving & Communication Systems (DIN/PACS) is an integrated system consisting of hardware and software that utilizes technology from image processing, pattern recognition, data communications, information management, computer design and data storage. As the workstation is the point of contact to the users, the level of success of the DIN/PACS system is highly dependent on the successful implementation of the workstation. Inexpensive high-performance DIN/PACS workstations allow image analysis and processing on multiple related images from central archival image databases over a high-speed imaging network.

In the next 10-20 years, the DIN/PACS system will be widely accepted, not only in hospital environments, but also in diverse industrial settings and military applications where many images from different sources have to be archived, transferred, fused, processed and analyzed quickly.

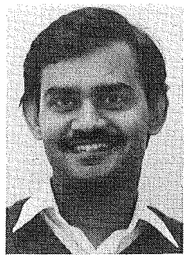
TECHNICAL PRESENTATIONS



Advances in Telecommunication Network Architectures: The 21st Century Begins Tomorrow

J. S. Meditch

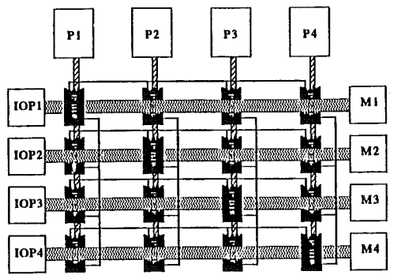
The concepts of fast circuit switching and fast packet switching, coupled with rapid advances in optoelectronics and photonic switching technology, point to significantly enhanced telecommunication services in the near future. We describe and explore these concepts and technologies, and their implications for the next generation of telecommunication network architectures.



Development of a Fault Tolerant Computer Architecture

A. K. Somani

The applications of complex computer-based control systems have seen a tremendous increase in the past decade. Dependability is always a main concern in the design of such systems. To achieve high reliability and dependability, incorporation of redundancy is almost a must. However, to be able to achieve required performance, managing redundancy efficiently is a very skillful task. In our research, we are currently developing a methodology for deriving distributed fault-tolerant computer architecture for embedded real-time applications. Recent research results and potential issue for the candidate architectures will be presented.



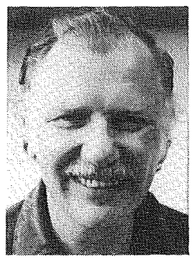
Fully Voted Processors

A CAD-Model-Based System for Object Localization

L. G. Shapiro

Given a CAD model of an object and a set of inspection specifications. we would like to automatically generate the vision procedure to inspect a part that is an instance of the model. Since the position and orientation of the part may be wholly or partially unknown, the first step in the procedure is to determine the pose of the object. Assuming the sensor involved is a CCD camera, this reduces to matching the features extracted from a two-dimensional graytone perspective projection image of the object to the corresponding three-dimensional features of the model. Since 2D to 3D matching is more complex and time consuming than 2D to 2D matching, our preference is to match a data structure representing features and their spatial relationships extracted from the image to a similar 2D data structure generated from the CAD model.

Our approach is to use the CAD model to *predict* the features to generate a set of *view classes* for use in the matching. A view class is a cluster of views of the object which all produce similar data structures. Then a single *representative* data structure can represent the entire cluster of views and be used to match the structure extracted from the image. Important questions that must be answered are 1)how do we predict features from CAD models without generating entire artificial images of the object, 2)what is a good representation for the features extracted from one view, 3) what criteria should be used for forming view classes, and 4) how should the matching from part structure to view class representatives be achieved most efficiently. In this paper we will report on our ongoing research in these areas.



Mobile Robots

R. W. Albrecht

The fledgling program in mobile robotics in the EE Department at the UW has produced simulations of mobile robots that illustrate several important attributes. These include exploring an environment and making maps, finding optimal paths from a current location to a goal, avoiding obstacles, marking an environment with beacons, etc. These simulations will be shown and one case will be demonstrated with an actual robot.

POSTER PRESENTATIONS

An Application of Modern Control Theory
R. N. Clark

This presentation discusses the technique called *Eigenstructure Design* as it applies to the problem of controlling an oblique wing research aircraft, which is unsymmetrical about its vertical plane. To attain such control, a total of 90 gain parameters must be calculated, and solving this problem requires a computer program optimizing the eigenvalues and eigenvectors of the augmented system.

Development of Expert Systems as On-Line Power System Operational Aids
C. C. Liu

The prototype customer restoration and fault testing (CRAFT) system helps dispatchers perform on-line analyses to locate faults causing transmission line outages. The CRAFT system is the first step in a broader effort to build an experimental expert system for the emergency control of power systems. A computer demonstration of CRAFT will be given.

Reducing Image Sampling Density Below the Nyquist Limit
K. F. Cheung and R. J. Marks

A technique to uniformly decimate samples in a multidimensional low-pass bandlimited signal without information loss is presented. In many cases, the overall sampling density can be reduced below the Nyquist density and ultimately to the hyper-area of the support of the function's spectrum. The presentation includes discussions of regaining deleted samples, sampling images obtained through systems with circular pupils, and noise sensitivity of restoration.

Clock Skew Effects in Iterative Algorithms
S. Oh, L. E. Atlas, R. J. Marks II and D. C. Park

Clock skew effects resulting from different optical paths, can significantly degrade the predicted accuracy and speed of a processor. This display shows that, in the absence of temporal dispersion, certain iterative algorithms have steady state solutions which are independent of clock skew.

Accurate Computing with Inexact Processors
J. J. Choi, D. C. Park, S. Oh, L. Atlas and R. J. Marks, II

The performance of inexact processors can be improved at the cost of throughput by using parallel redundant computations to correct errors at the processor's output. This presentation demonstrates that multilevel block codes can be used to correct errors in optical processors.

Power System Stability Assessment Using Artificial Neural Networks

D. C. Park, M. Aggoune, M. Damborg and R. J. Marks II

A three layered neural network with a single output neuron is trained with the stability data of a power system. For an input of current system states in the stimulus neural layer, the network responds with a positive output for a stable system and a negative state for instability. The manner in which the network generalizes the training data will be specifically addressed.

An Artificial Neural Network-based Codebook Search Technique

C. Pope, L. Atlas and C. Nelson

This presentation compares the results of a vector quantized PCM (VPCM) codebook search problem using two techniques: a standard linear (full-codebook) search, and an ANN search approach. The results indicate that the ANN approach can provide the speed of a tree search coupled with the minimum memory characteristics associated with a linear search, at the expense of requiring a multiprocessor configuration.

Polarimetric Radar System

S. M. King

Improving detection and discrimination of a target using the radar system concerns the polarizaation status of the received wave. This presentation includes the results of the investigation into the polarization of signatures of a wide range of targets, using the polarimetric radar system and its calibration.

A Real-Time Frequency Shift Decoder for the Last Transmission of Korean Airlines Flight 007

J. D. Schlatter and L E. Atlas

The finite-element method is applicable to a wide variety of practical integrated optic devices including optical waveguides, semiconductor lasers, laser arrays, directional couples, modulators and switches. Computed numerical results to specific examples are presented and discussed.

Application of Finite Element Analysis to Integrated Optics

S. H. Lou

The finite-element method is applicable to a wide variety of practical integrated optic devices including optical waveguides, semiconductor lasers, laser arrays, directional couplers, modulators and switches. Computed numerical results to specific examples are presented and discussed.

Purpose of the Industrial Affiliates Program

The purpose of the University of Washington's Department of Electrical Engineering Industrial Affiliates Program is to provide a high quality collaborative program with local, regional and national industry that mutually benefits the Department's academic program and industry's growth and development. The program is designed to foster a closer relationship between the department and industry using three primary vehicles: (1) industrial liaison, (2) joint research projects, and (3) graduate and continuing education for practicing engineers.

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October 1989 Edition
Volume 3.1

MESSAGE FROM THE PRESIDENT

As the new academic term starts, I am pleased to welcome you back from your summer vacations and other hopefully pleasurable activities to another year of professional growth and creativity, also pleasurable, I trust. As you can see from the newsletter cover sheet, we have been making some stylistic changes, but the quality of the contents is not yet improved significantly. The obvious reason for that is the fact that this first newsletter is the result my meager efforts as Editor pro tem, following on the heels of the literary genius of our recently retired Editor, Ted Houk. Not to confuse you too much, Ted has retired from the editorship, but not from Boeing Aerospace! As I mentioned at our last meeting, Ted's quill is getting dull (no double entendre intended), and a new editor is being sought with great eagerness. So, if you'd like to see your name in lights, please contact me or one of the other officers of our section, and we shall give you the keys to the executive cookie jar.

Another significant change is that we have been successful in attracting several local optics-related firms to support our section as Corporate Sponsors. Our thanks to

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- Luxar, of Bothell, manufacturing medical laser instruments,
- MetriCor, in Woodinville, specializing in optical fiber sensors,
- B. E. Meyers & Co., Inc., in Redmond, manufacturers of night vision systems, and
- Solidlite Corp., in Redmond, making solid state lasers from 1 – 5 μm.

We seek to attract more such corporate support (minimum contribution is $75 for the year), as well as individual contributions as Supporting Members ($50 minimum). The funds will be used to reduce membership and meeting fees for our student members in an effort to attract their greater participation. We think this will have a significant positive effect in increasing the awareness of students of professional opportunities available to them in local companies working in the optics field. We hope other companies, both large and small, will subscribe to this effort.

I would also like to encourage our industrial friends to use this medium to find prospective employees, as the need arises. In addition to knowing about a fairly large pool of current students, those of us in academia often hear from students graduating at universities around the country who wish to settle in the Puget Sound area. We hope to distribute this newsletter widely in the local academic community so that interested students will be attracted. Make use of our newletter to attract your future employees!

If you have not sent in your yearly section membership dues, please do so. An application form is attached for your convenience.

Our next meeting will be on Monday, October 16, and we feature a talk by Dr. Kathy Laakmann, President and Founder of Luxar. The meeting format will be the same as our last meeting, with a no-host bar and appetizers before the meeting, and an optional dinner with the speaker at a local restaurant after the talk. Please contact one of the officers to let us know you're coming. That will be a great help to us so we can order enough food for everyone. As always, the technical talk is free to all. The meeting fee pays for the food. I hope to see you there.

Your President,

Martin Afromowitz

(Please Post)

OPTICAL SOCIETY *of* AMERICA
PUGET SOUND SECTION

Dinner Meeting

Monday, October 16
University of Washington
Faculty Club

Parking in Padelford Lot
Directions at any entrance gate

Agenda:

6:00 Munchies and no-host bar
6:45 Business Meeting
7:00 Technical Program:

Getting a new technology and new product onto the market

Dr. Kathy Laakmann
President and Founder
Luxar

8:00 Break to local restaurant for dinner

Tickets are available from:

Martin Afromowitz or Don Wunsch
Electrical Engineering, FT-10
University of Washington
Seattle, WA 98195
(206) 543-6244

Tim Majoch
Boeing Aerospace, MS/8H-01
Box 3999
Seattle, WA 98124-2499
(206) 773-7614

Gordon Mitchell
MetriCor
18800 142 NE
Woodinville, WA 98072
(206) 483-5577

Price:

Regular members and their guests	$ 3	
Student members and their guests	$ 1	(Courtesy of our corporate sponsors)
Membership (Regular)	$10	
Membership (Student)	$ 3	

Martin A. Afromowitz, President
OSA Puget Sound Section
University of Washington, FT-10
Seattle, WA 98195

Puget Sound Section

MARKS II, ROBERT J.
PROFESSOR
DEPT. OF ELECT. ENG. FT-10
UNIV. OF WASHINGTON
SEATTLE, WA 98195

06-1030

Address Correction Requested

Partially Coherent News 1, 5 (3/1988)
Newsletter of the Puget Sound Section
of the Optical Society of America

NOTICE! NOTICE! NOTICE! NOTICE! NOTICE! NOTICE! NOTICE!

This newsletter is being sent out on a general mailing list as part of the annual membership renewal/recruitment drive. The rest of the mailings for the year will be sent to members only.

Enclosed is the membership application for you to join/rejoin the Puget Sound Section of the Optical Society of America. It's well worth the dues. Note how subtly we charge nonmembers for the dinner part of our bi-monthly meetings (see the enclosed April 5, 1988 meeting announcement). It's our incentive to join PSOSA. If you mail in your membership application WITH your dinner reservation, plus a check (or two) to cover dues and the member's dinner fee, you become a member for a year and eligible for the member's dinner rate. The student member's rate is especially attractive. Besides, you then receive the rest of the year's newsletters.

A small point: It's OK to skip the dinner part of the meeting and show up for free at the business meeting and technical program, as long as you are a dues-paying member. The programs are great!

EDITOR'S COLUMN

This newsletter is bigger than usual, being filled out with the above polemic, a meeting announcement, a membership application, announcement of new officers, various official business matters and so on. The only space saving combines the humor column and the Outgoing President's message. Ted Houk, Ed.

NEW OFFICERS LIST, effective April 5, 1988:

President:
R. Aaron Falk
Boeing Aerospace
P.O. Box 3999, MS 87-50
Seattle, WA 98124-2999
773-9949

President Elect:
Prof. Martin A. Afromowitz
Electrical Engineering FT-10
University of Washington
Seattle, WA 98195
543-6244

Secretary-Treasurer:
C. David Capps
Boeing Aerospace
P.O. Box 3999, MS 87-50
Seattle, WA 98124-2999
773-9949

Student Representative:
Ralph Jorgenson
Box 361
Mercer Island, WA 98040
232-3038

Newsletter matters c/o the Secretary-Treasurer. The editor is Ted Houk, 773-9950, at the next desk.

OPTICAL SOCIETY OF AMERICA
PUGET SOUND SECTION

Prof. Leung Tsang, Secretary-Treasurer
University of Washington
Department of Electrical Engineering, FT-10
Telephone: (206) 543-6185 or 543-2150

Optical Society of America, Puget Sound Section
Finance Report: April 1987 - February 29, 1988

A. Income:	
1. Membership dues	673.00
2. dinner meetings	2367.21
Total	3040.21
B. Expenses:	
1. dinner meetings	2569.63
2. Student help for secretarial services (D. Park)	160.00
3. Ordering checks	8.50
4. Reimbursement of Student Representative for Officers' Lunch meeting (S. Broschat)	5.00
5. Contribution to Washington Science Teachers Annual Contest	50.00
6. Bank Service Charge	3.50
Total	2796.63
Balance as of 2/29/88	243.58

Prepared by: Leung Tsang Leung Tsang 3/13/88
Secretary-Treasurer

A Proposed Amendment to the PSOSA By-Laws

Concerning the election of officers, our by-laws require that ballots be mailed to all regular and student members. If there is but a single nominee, this is an undo expense. The following addendum is proposed for inclusion at the end of section IV, paragraph 3 of the PSOSA By-Laws:

"If there is only one nominee for President-Elect and only one nominee for Secretary-Treasurer, election can, at the discretion of the President, be held at a publicly announced business meeting prior to May 1. Election will be by a two thirds vote of the regular members in attendance. The same procedure may be used if there is but one Student Representative nominee. Election will be made by a two thirds vote of student members in attendance."

According to our bylaws, this revision requires a two thirds vote at our next meeting in order to be adopted.

OPTICAL SOCIETY OF AMERICA
PUGET SOUND SECTION

MEMBERSHIP APPLICATION

FULL NAME(First/Middle/Last)

Date of Birth

HOME ADDRESS :

STREET ADDRESS

CITY/STATE/ZIP

BUSINESS ADDRESS:

TITLE

COMPANY

DEPT./MAIL STOP

STREET ADDRESS

CITY/STATE/ZIP

(Please Post)

OPTICAL SOCIETY OF AMERICA
PUGET SOUND SECTION

Dinner Meeting

Tuesday, April 5
University of Washington Faculty Club
Parking in Padelford Lot
Directions at any gate (nominal parking fee)

Agenda

6:00 Arrival

6:30 Delicious Dinner: chicken dijon, caesar salad,
chocolate marble cheese cake, & wine.

7:45 Business Meeting

8:00 Technical Program:

There is More to Color than Meets the Eye

Davida Teller and Delwin Lindsey,
U.W. Dept. of Psychology

9:00 Adjourn

Ticket reservations must be made by Apr. 1
Tickets are available from:

Leung Tsang or Shira Broschat
Dept. of Electrical Eng., FT-10
University of Washington
Seattle, WA 98195
(206) 543-6185

R. Aaron Falk
MS 87-50, Box 3999
Boeing Aerospace
Seattle WA 98124
(206) 773-9949

Price:	Regular Members and their spouses.....	$17
	Student Members and their spouses.....	$ 9
	Nonmembers	$27

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OPTICAL SOCIETY OF AMERICA
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Partially Coherent News 1, 4 (1/1988)
Newsletter of the Puget Sound Section
of the Optical Society of America

EDITOR'S COLUMN

NEWSLETTER NAME FINAL BALLOT
Vote for one.

___4_ Sound Optics

___1_ The Anti-Darkon Times

__11_ Partially Coherent News

The newsletter of the Puget Sound Section of the Optical Society of America was named by a Final Ballot taken at the December 1, 1987 meeting. The results are shown here. The write in candidate of the October 8 meeting won!

To encourage member contributions to our newsletter, here is my address and phone number:

Theodore L. Houk
Boeing Aerospace Co.
P.O. Box 3999, MS 87-50
Seattle, WA 98124-2999

(206) 773-9950 (new!)

The February 2, 1988 meeting should be another of the great ones, with the National OSA Travelling Lecturer, Dr. Richard L. Abrams of Hughes Aircraft Company speaking on Optical Phase Conjugation. Devices employing this effect have been used as the ultimate mirror, reversing phase as well as propagation direction to allow compensation of optical path imperfections. One spectacular example was a laser which used an optical phase conjugator and a kitchen spatula as its resonator. Along my line of interest is the application shown in this figure. See you at the talk!

Ted Houk, Editor

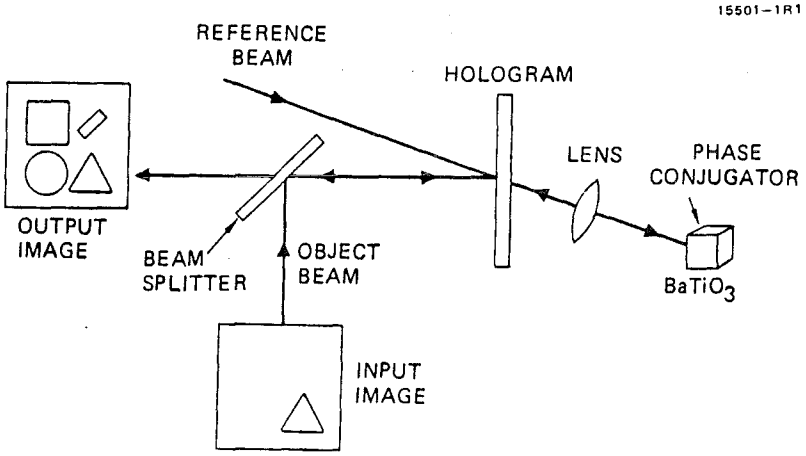

Figure 4. Schematic of an experiment which demonstrated the complete image reconstruction from a partial input.

How do you distinguish between workers in classical optics and quantum optics?

Ask them, "What's ν?"

The classical optics people reply, "c/λ".

The quantum optics people reply, "E/h".

Message from the President:

The time has drawn near for the election of next fiscal year's officers. R. Aaron Falk, our current President-Elect will, of course, continue as the Chapter's President. The positions that we will soon fill are President-Elect, Secretary-Treasurer and Student Representative. According to our by-laws, I am to appoint a nominating committee. I have chosen our current officers: R. Aaron Falk, Leung Tsang and Shira Broschat. Chapter members can also nominate candidates. Five signatures are needed. Five student members can nominate the student rep. The official deadline is February first.

I just got back from an SPIE* meeting in LA. Are there people that attend most every talk at these get-togethers? My mind begins to saturate after about three papers. The valuable time, I believe, is that spent in the halls talking to colleagues you've met previously or only through the printed page. What a feast of ideas that develop! I also found out that frequent trips to Disneyland helped sharpen my mind. Indeed, as President of the local OSA chapter, I felt it my responsibility to understand all of the optics in the haunted house ride there. I dutifully report to you that, contrary to what others have told you, there are no holograms used in this attraction. I have heard second hand, interestingly, that the ride makes use of the largest beam splitter in the world. It is used to generate the see-through ghosts that are dancing in the haunted ball room. I also heard that the beam splitter cracked and that the crack was transformed into a spider web. Although I earnestly looked, I saw no such crack. (Maybe the crack was at the ride at Walt Disney World.) Does anyone know what technique is used to generate the 3-D effect in the Captain EO film at Disneyland? Whatever it is as didn't work for me: my eyes didn't know what to focus on. The only lasting impression was a headache. Although the Star Tours attraction makes no clever use of optics, it was outstanding!

You'll be glad to know we got back to Seattle before the big storm hit LA.

What did you think of our last meeting? I really think that it was the best we've had so far. Our speaker was perfect! He held the interest of technical members as well as their spouses. This is quite a fine line to walk. I particularly enjoyed the blatant greed demonstrated in gift portion of the dinner meeting. This was truly a delightful evening.

Quickly approaching is the period of renewal for the Puget Sound Optical Society of America membership for next fiscal year. Ten dollars is so little to pay for so much.

Robert J. Marks II

* *The Society of Photo-Optical Instrumentation Engineers* is an OSA sort of group that holds lots of meetings and publishes yellow colored proceedings and the *Optical Engineering* journal.

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P.O. Box 3999, MS 87-50
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(206) 773-9950 (new!)

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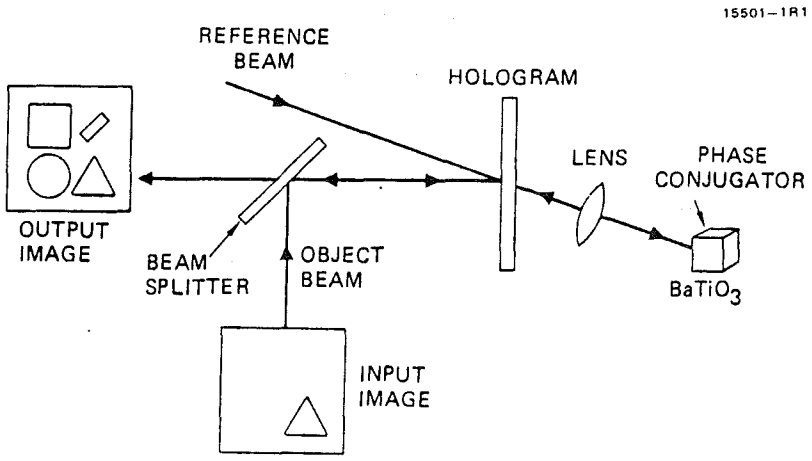

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Partially Coherent News 2, 3 (11/1988)
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of the Optical Society of America

EDITOR'S COLUMN

Because Dave Capps, our Chapter Secretary, is on vacation in India and neighboring countries, there seems to be no report of the last meeting. Let me rush in where angels fear to tread by giving one.

A conference sponsored by this chapter is being planned for some time in 1990. The focus is on applied optics. Member input on place, etc. is solicited via the questionnaires in the last newsletter.

A T-shirt bearing Maxwell's equations embedded in a Genesis 1:1 context was left over from the August picnic. This was auctioned off in a short, spirited bidding session to Don Wunsch, who thereby gained some enlightenment. In a brief contributed presentation, AI (Artificial Ignorance) with applications to middle management was illustrated: a robot rams a wall, backs off and rams it again.

The annual OSA speaker was John N. Howard, former Chief Scientist at the Air Force Geophysics Laboratory, Bedford, Massachusetts, speaking on "The Scientific Contributions of John William Strutt, Lord Rayleigh". These were 600 papers (even more than David Casasent) and a number of famous students including Poynting and J. J. Thomson. After getting Cambridge's top senior wrangler physics degree of 1867 (usually THE prerequisite for a Cambridge or Oxford faculty post), Strutt returned to his parents' 6000 acre (9.4 square miles) dairy farm to begin research on Newton's color wheel work, using his extended family and any visitors as subjects. Noting weather-dependent results, he measured the skylight spectrum, related it to small-particle scattering theory and published "why the sky is blue" as paper number 8. He inherited his peerage in 1873. In 1879, recovering from rheumatic fever by making a vacation float trip on the Nile, he passed the time by writing his famous book on the theory of sound, deriving almost everything from first principles as he had brought few reference materials with him. As Cavendish Professor at Cambridge, he set up the surviving (Handbook of Chemistry and Physics) practical units for volt, amp and ohm, publishing 60 papers in 60 months. Lured in 1892 to the Royal Institution by the availability of DC electricity, he found discrepancies in the densities of nitrogen prepared from air and ammonia, chemically reacted away the nitrogen and in parallel with his colleague William Ramsey prepared the first samples of argon. This inserted a new column into the chemical periodic table and won Nobel Prizes for the two workers. The full text of Rayleigh's papers is available from Dover press.

Ted Houk, Editor

MARKS II, ROBERT J.
PROFESSOR
DEPT. OF ELECT. ENG. FT-10
UNIV. OF WASHINGTON
SEATTLE, WA 98195

MESSAGE FROM THE PRESIDENT

Tis the season to be jolly. Tis also the season to be thinking about next year's officers. As per the constitution, I am appointing a nomination committee consisting of the current officers, Dr. Ted Houk and Dr. Bob Marks. The committee will nominate one person for each of the offices of Secretary-Treasurer and President-Elect. The Student Member Representative Ralph Jorgenson will also be nominating his successor. If you have an active interest in filling one of these posts, please contact one of us and let your interest be known. Note also, that additional persons can be nominated by petition signed by five or more members and sent to the secretary-treasurer prior to February 1, 1989.

On a lighter note, we plan to repeat the well received gift exchange at this December's meeting. Unfortunately, the organization does not have enough funds in the bank to buy you all something. Instead, please bring a wrapped gift worth $5 or less to place in the communal pile. Gifts relating to optics or perhaps something to make the spirits "light" would be especially apropos to the occasion. After the dinner we will redistribute the wealth with, I hope, as entertaining a style as last year.

Happy Holidays

REMEMBER
BRING A GIFT FOR THE EXCHANGE

(Please Post)

OPTICAL SOCIETY *of* AMERICA
PUGET SOUND SECTION

Dinner Meeting

Tuesday, December 6
University of Washington
Faculty Club

Parking in Padelford Lot
Directions at any entrance gate

Agenda:

6:00	Arrival
6:30	Delicious Dinner! *(And a gift exchange ... Please bring one!)*
7:45	Business Meeting
8:00	Technical Program:

Optics of the Free Electron Laser and its Application in SDI

Jacob B. Romero, Boeing Aerospace

9:00 Adjourn

Ticket reservations may be made prior to December 1
Tickets are available from:

Martin Afromowitz or Ralph Jorgenson
Electrical Engineering, FT-10
University of Washington
Seattle, WA 98195
(206) 543-6244

R. Aaron Falk or Dave Capps
M.S. 87-50, Boeing Aerospace
Box 3999
Seattle, WA 98124
(206) 773-9949

Price:

Regular members and their guests	$17
Student members and their guests	$ 9
Non members	$27 (Includes membership fee)

Optics of the Free Electron Laser and its Application in SDI

This talk will present an overview of the Strategic Defense Initiative concept of the application of the high-power free electron laser (FEL). A brief introduction to the FEL will discuss how it works and what its capabilities are. The optics requirements for the FEL become crucial as the power is increased. Specific concerns include alignment, sideband suppression, harmonic removal and optical guiding by the medium. This talk will describe how these issues are being addressed.

Jacob B. Romero

Dr. Romero received a BS from the University of New Mexico in 1954, and an MS (1957) and PhD (1959) from the University of Washington, all in Chemical Engineering. He joined The Boeing Company in 1959 where he worked on advanced propulsion and laser research for 11 years. From 1966 to 1969 he was Associate Professor of Chemical and Nuclear Engineering at the University of Idaho, Moscow, ID, while on leave from Boeing. He joined the Evergreen State College, Olympia, WA, in 1972 and was Professor of Applied Sciences there from 1972 to 1984. In 1984 he rejoined The Boeing Company and his present work there is on free electron lasers. Dr. Romero has several publications in propulsion technology, nuclear technology, and lasers.

david Spengler Job 3589 Phone 3-2520 Waxed
Revised 4-1 88

ST8 NEURAL NETWORKS

The problems of the traveling salesman have long been a subject of considerable speculation and humor. But one such problem, that of mapping out a minimum-distance route among 30 or 40 cities, is part of the serious research effort in the field of optical computers. The Traveling Salesman Problem (TSP) represents the type of puzzle that a computer modeled on the neural network of the brain could solve with ease.

Robert Marks II, professor, and Les Atlas, assistant professor, both of electrical engineering, are combining their skills in optical computers and speech recognition to help uncover the secrets of neural networks. One possible outcome of their work might be a computer which could solve a combinatorial search problem like the TSP.

Developing a computer that can deal with such complexity requires an understanding of the human (biological) brain and the way in which its billions and billions of neurons interact. Each neuron is connected to a large number of other neurons that make up individual neural networks. And the operation of the network is based on the changing status of each individually functioning neuron and its ability to sense changes in those neurons to which it is connected.

Professors Marks and Atlas, working with a team of graduate students, have developed and are training an *artificial* neural network in their Interactive Systems Design Lab (ISDL). Their model is called the APNN or Alternate Projection Neural Network. Marks points out that much conventional training is based on sets of rules, "but if you had to give rules by which something was a bush or a tree, it would be very, very difficult." It is necessary, then, to program a neural network in the same way that humans are programmed. "You show the neural network a bush and you say 'That's a bush;' and you show it a tree and you say, 'That's a tree;' and you show it another tree and you say,'That's another tree;' and after a while the neural network begins to learn to distinguish all by itself; it learns by example as opposed to learning by rules."

The motivation for developing an artificial neural network computer model of the biological network is plain. Every day the scientist can observe the results of human neural networks in action— a human can identify a tree or a bush in a picture that contains both trees and bushes. And, although we are naturally equipped with the ability to classify in this way, a non-biological neural network must be trained to make such distinctions.

Optics, Marks' specialty, will be used to 'show' the computer images and to manipulate the data internally. "At the front end of the computer, where you gather the data," Marks explains, "there might be an array of photo-detectors that would detect the image. Internal manipulation of the data that is conventionally done electronically would be done using light instead of electrons. It's obviously faster; you can't get much faster than light."

More than just a search for speed is involved in modeling the internal architecture of a neural network. The hundreds of electronic connections required between the neurons using a conventional computer would be impossible due to interference, but using photons rather than electrons eliminates this interference. The basic artificial neural network consists of many nodes or neurons that do very simple operations, and in some models, every neuron is connected to every other neuron. Using conventional connections would require the impossible: wires crossing other wires and electrons attempting to go through electrons. Marks describes the advantage of using optics: "If you do it optically, photons can go through photons. Light can go through itself, so using light gives you the nice ability to have the natural physics for intense interconnections of the

Designing the interconnects in artificial neural networks has been a problem since the first models were conceived in the sixties. Marks tells of an early method of interconnecting the nodes used by Bernie Widrow at Stanford when he put together a neural network for predicting the weather. To develop the necessary interconnections, "He had to do some incredibly strange things." says Marks, "He bought these pencil leads that he could program, and he could 'grow' them. He immersed them in a solution and they would get thicker or skinnier." Interestingly, Widrow's weather predicting neural network out-performed the local weatherman in a month long test. Fortunately for researchers today, they don't have to grow their own technology; it already exists.

One technology available with the neural network is parallel rather than serial processing. "One neuron doesn't have to wait for what another neuron does; they all kind of do their own thing and come out with a really neat answer."

Reaching "a really neat answer" in neural network parlance is called converging; and Atlas and Marks' APNN outperforms previous thermodynamic sorts of neural networks in accomplishing convergence efficiently and consistently. Thermodynamic models, which use an energy reduction approach, are relatively poor models, because as Marks says "one time the neural network converges to one thing, and another time it converges to something else. Our model of the APNN, on the other hand, draws upon a wealth of mathematical theory, including projection onto convex sets, which is a recent field of interest and analysis that we've been able to borrow."

Besides convergence, the ability of a neural network to generalize—incorporate new data that it has never seen before—is a requirement of any efficient classification network. Marks, using the tree-bush analogy, explains generalization between the two modeling systems, "It's easy to train a classifier to respond to training data, that is, recognize something you've shown it before. What's important, however is how it responds to new data. Can it recognize a totally new bush? And the disadvantage of the conventional neural network is that determining how it will respond can only be done empirically. "You actually have to expose it to the new material and see if it responds correctly.

"However,with the APNN, the math is so well developed that we can predict the manner in which the network generalizes, and we can write down math equations that show whether and in what manner the network generalizes to other than the training data." Training a network by example requires incredible amounts of time to pass through the data, and the problem with conventional neural nets is that they can forget the earliest data by the time they are exposed to the final data. This forgetting requires repetitive passes through the training data. However, repetitive passes are not required for the APNN, because it has an elephant-quality memory. It never forgets. A single pass through the training data is sufficient.

Improved memory within the actual computer architecture is another advantage of the APNN. A conventional computer memory is location addressable, but the APNN is content addressable. So rather than using the address of a mailbox to locate contents, the APNN, given simply a part of the contents of the mailbox, can decide what mailbox that content is in. This associative memory ability of the artificial neural network could allow the APNN to identify a black and white picture (similar to a digitized picture) of the Mona Lisa, given only her smile. "We have a matrix of neurons," explains Marks, "that can take on gray levels. In this matrix every neuron is connected to every other neuron,and each neuron can assume a value that relates to a gray level. So, having been given a picture of the Mona Lisa, the gray levels of that picture are imposed on the neurons and the information is stored in the interconnects," (these interconnects correspond to the synapses that connect the neurons in the biological brain) "and remarkably, if the network is then given only the Mona Lisa's smile, the APNN could then extrapolate the entire face of the Mona Lisa."

The future of the APNN can be extended to some "real world" applications: A *speaker-independent*

large data base containing many words from many sp[illegible]rs, the team plans to have a demonstration system ready in two years. Other applications include efficient routing of computer links and an expert system to identify irregularities in electrocardiograms (EKG's).

~~A considerable amount of research is still needs~~ ~~ways to develop the hardware for the APNN. But~~ and ~~board by the~~ incredibly high level of interest in the ~~field and the available funding~~, Marks and Atlas are optimistic that neural network computers will be commercially available in the near future.

END

Funding for Atlas and Marks' APNN comes from a variety of sources: The National Science Foundation, The Office of Naval Research, Physio Control Corp and The Washington Technology Center. Although a considerable amount of research remains to be done, based on the available funding and the incredibly high level of interest in the field,

Statements by Candidates for 1985 Executive Vice President

The following independently written statements by the two candidates for Executive Vice President, Dr. George P. Rodrigue and Mr. Merlin G. Smith, have been especially prepared for readers of IEEE newsletters. It is hoped that these statements will supplement the biographicl sketches and other statements made by the candidates which appear elsewhere in the IEEE literature and that they will assist IEEE member voters in the election process.

Statement by George P. Rodrigue

The IEEE is primarily a technical organization and has limited financial assets. Unlike a major corporation or government agency, the IEEE cannot hire full-time professionals to carry out most of its programs. However, the IEEE has enormous resources in its volunteer members, and its professional staff is best utilized to facilitate the voluntary actions of members. Our meetings and conferences are successful because interested and capable engineers volunteer both time and talents. Our publications are pre-eminent in many fields because reviewers, authors, and editors volunteer their efforts. In the professional area members write position papers, testify before government agencies, and lobby with local school boards, and the aggregate of individual member reputations has political power.

The IEEE has a good track record, but much remains to be done in making the engineering profession a rewarding life-long career. I believe that the IEEE Board of Directors should promote programs that foster collective and mutually supportive actions on the part of IEEE members. The program "Finding Your Way" that I successfully urged the Board to approve last year is one such example. This program builds its data base on the recommendations of technically qualified members, and will provide to IEEE members guidance on the best tutorial material available in a broad range of specific technical areas.

Programs in the professional area are also most successful when a heavy infusion of volunteer effort exists. I believe that part of the problem with the AAES is that it has no significant base of volunteer support. A true pooling of the knowledge and talents of engineers from various societies with common professional goals must be achieved. Top-down organizations rarely work on a voluntary basis.

Statement by Merlin G. Smith

It is an honor to be considered for the position of Executive Vice President. Participation in the Executive Committee and Board of Directors affords the opportunity to consider all the interests of the Institute. We are particularly interested in promoting efforts which foster interorganizational or interdisciplinal synergisms. These and other priorities are:

- Joint industry, government and university programs
- Cooperative activities between Society and Regional entities
- Collaboration amongst regional, technical and educational groups in the generation of affordable educational programs
- Conference services to an increasing number of members
- Publications to serve a broader member base
- Intersociety conferences and publications
- Individual-recognition programs
- Recognition of Engineering and Computer Science professions
- Responsible participation in societal and governmental forums
- An environment encouraging greater volunteer participation.

One of the specific functions of the Executive Vice President is to chair the Conference Board. As a founder and a current member of this Board, we can be effective in the brief one-year term of office. We also bring the experience as a past chairman of a major conference board, the National Computer Conference Board, chairmanship of the NCC, founder of the Compcon Fall series, and initiator of a number of workshops and meetings.

We have the support and encouragement of our employer, and we are prepared to give it a good effort.

Centennial Medalists — Information Theory Group

As part of its 100th anniversary celebration, the IEEE has awarded 1984 Centennial Medals to persons for outstanding contributions. Below is a list of the names of the recipients who are members of the Information Theory Group.

R. Bartnikas
V.K. Bhargava
G. Cook
R. Eier
R.M. Fano
A. Gersho
M.E. Hellman
V.K. Jain
J.L. Massey
P. Morgan
M.B. Pursley
H.W. Schuessler
L.M. Silverman
M.G. Strintzis
A.D. Wyner

C.R. Baugh
R.C. Booton
T.F. Curry
P. Elias
G.D. Forney, Jr.
R.M. Gray
C.W. Helstrom
F.C. Kohli
C.D. McGillem
K.A. Norton
I.S. Reed
R.J. Schwarz
D.B. Sinclair
K.W. Uncapher
S.S. Yau

V. Belevitch
S.H. Bouchey
W.C. Dean
R.M. Emberson
K.S. Fu
C.J. Gueguen
E. Herz
D.G. Lampard
J.S. Meditch
R.L. Pickholtz
M. Ristenbatt
C.E. Shannon
M. Sloan
R. Valle-Sanchez
J. Zaborsky

E.R. Berlekamp
A.A. Collins
M. Eden
W.L. Everitt
R.G. Gallager
A.H. Haddad
T.A. Hostetler
R.J. Marks, II
F. Minozuma
E. Protonotarios
O.H. Schmitt
G. Shapiro
N.J.A. Sloane
B. Widrow
L.A. Zadeh

The VIIth Symposium on Information Theory and Its Applications of Japan

CALL FOR PAPERS

The VIIth Symposium on Information Theory and Its Applications will be held from Monday, November 5 to Wednesday, November 7, 1984, at the Green Palace Hotel, Tochigi, Japan. The Green Palace Hotel is located in the Nikko National Park about 95 miles northeast of Tokyo (2 hours from Tokyo by train).

The cost for full participation will be ¥15,800. (US$70. estimated) for two nights stays including all meals, plus the registration fee of ¥14,000. (US$65. estimated) for non-students, or ¥7,000. (US$33. estimated) for students.

Papers presenting new results in information theory and its applications are solicited. Areas of interest are:

- Algebraic coding theory
- Data compression
- Communication theory
- Detection and Estimation
- Stochastic processes
- Computer complexity
- Computational complexity
- Source and channel coding
- Data security
- Computer networks
- Shannon theory
- Optical communication
- Prediction
- Multi-user Information Theory

The deadlines of:

Notice of intent	August 7, 1984
Complete manuscript (Camera-ready copies)	September 7, 1984
Registration	October 11, 1984

By the notice of intent, the authors' kits and registration forms will be sent to authors. The notice of intent and the registration should be addressed to the symposium co-chairman:

Professor Shigeichi Hirasawa
Department of Industrial Engineering and Management
School of Science and Engineering
Waseda University
Shinjuku, Tokyo 160
JAPAN
Telephone: +81 3 209-3211

All manuscripts should be sent to the program chairman:

Professor Kenkoh Uchida
Department of Electrical Engineering
School of Science and Engineering
Waseda University
Shinjuku, Toyko 160
JAPAN

General inquiries concerning the symposium may be directed to either the symposium chairman or the co-chairman:

Professor Kazuo Horiuchi
Symposium Chairman
Department of Electronics and Communication Engineering
School of Science and Engineering
Waseda University
Shinjuku, Tokyo 160
JAPAN

Professor Shinsaku Mori
Symposium co-chairman
Department of Electrical Engineering
Faculty of Science and Technology
Keio University
Hiyoshi, Yokohama 223
JAPAN

IEEE TRANSACTIONS ON INFORMATION THEORY

Volume IT-30, Number 4, July 1984

TABLE OF CONTENTS*

*Subject to change.

Conference Calendar

Date	Conference	Location	Contact
SEPT. 5–8, 1984	INTERNATIONAL CONFERENCE ON DIGITAL SIGNAL PROCESSING	FLORENCE, ITALY	DR. A.G. CONSTANTINIDES DEPARTMENT OF ELECTRICAL ENGINEERING IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY EXHIBITION ROAD LONDON, SW7 2BT, ENGLAND
SEPT. 26–29, 1984	MATHEMATICAL METHODS IN SIGNAL PROCESSING	AACHEN, WEST GERMANY	P.L. BUTZER LEHRSTUHL A FÜR MATHEMATIK AACHEN UNIVERSITY OF TECHNOLOGY 5100 AACHEN, WEST GERMANY
NOV. 5–7, 1984	7TH SYMPOSIUM ON INFORMATION THEORY AND ITS APPLICATIONS OF JAPAN	KINUGAWA, JAPAN	KENKOH UCHIDA DEPARTMENT OF ELECTRICAL ENGINEERING SCHOOL OF SCIENCE AND ENGINEERING WASEDA UNIVERSITY SHINJUKU, TOKYO 160, JAPAN
NOV. 25–29, 1984	GLOBECOM '84	ATLANTA, GA	ALLEN H. CHERIN BELL LABORATORIES 2000 N.E. EXPRESSWAY NORCROSS, GA 30071
DEC. 12–14, 1984	23RD IEEE CONFERENCE ON DECISION AND CONTROL	LAS VEGAS, NV	DR. A.H. HADDAD SCHOOL OF ELECTRICAL ENGINEERING GEORGIA INSTITUTE OF TECHNOLOGY ATLANTA, GA 30332
MARCH 26–30, 1985	INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING	TAMPA, FL	J. ROBERT ASHLEY SPERRY ELECTRONIC SYSTEMS P.O. BOX 4648 CLEARWATER, FL 33518
APRIL 14–19, 1985	SECOND JOINT SWEDISH-USSR INTERNATIONAL WORKSHOP ON INFORMATION THEORY	GRANNA, SWEDEN	ROLF JOHANNESSON DEPARTMENT OF COMPUTER ENGINEERING UNIVERSITY OF LUND P.O. BOX 725 S-220 07 LUND, SWEDEN
JUNE 23–26, 1985	IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS	CHICAGO, IL	JOHN J. JOHANNESON MIDWEST COLLEGE OF ENGINEERING P.O. BOX 1147 (ICC '85) LOMBARD, IL 60148
JUNE 23–28, 1985	**1985 INTERNATIONAL SYMPOSIUM ON INFORMATION THEORY**	**BRIGHTON, ENGLAND**	**P.G. FARRELL ELECTRICAL ENGINEERING LABS UNIVERSITY OF MANCHESTER MANCHESTER M13 9PL, ENGLAND**

IEEE Information Theory Group Newsletter

June 1984 (USPS 360-350) **Editor: J. Martin Borden**

IEEE INTERNATIONAL SYMPOSIUM ON INFORMATION THEORY
Brighton, England, June 23-28, 1985
FIRST CALL FOR PAPERS

The 1985 IEEE Symposium on Information Theory (ISIT85) will be held at the Metropole Hotel, Brighton, England, from the evening of Sunday, June 23rd until mid-day on Friday, June 28th, 1985. The Metropole Hotel has superb conference and social facilities, and is located on the sea-front of the interesting and bustling town of Brighton. Situated 50 miles south of London, Brighton has good road and rail communications with the international airports at Gatwick (20 miles) and Heathrow (70 miles). The cost for full board will be about £185 for a single room and about £155 for a double room (per person). The Symposium registration fee will be about £80. Detailed information about all the arrangements will be included in subsequent mailings.

Papers presenting new results in information theory and related fields are solicited. Areas to be covered include:

- Communication Systems
- Complexity
- Cryptography
- Data Networks
- Detection and Estimation
- Error-Control Coding
- Information Theory Applications
- Multi-User Information Theory
- Pattern Recognition
- Shannon Theory
- Stochastic Processes
- Source Coding and Data Compression

Both long (40 minutes) and short (20 minutes) papers will be accepted. Long papers will be reviewed on the basis of a complete manuscript and the deadline for these is **November 1st, 1984**. Short papers will be reviewed on the basis of a 500 word summary and the deadline for these is **December 1st, 1984**. Manuscripts and summaries should be submitted in triplicate together with a brief abstract suitable for the Symposium record. Authors should indicate the area of their paper, for ease of processing. A manuscript that is submitted for consideration as a long paper but which cannot be accommodated in that category will also be considered in the category of short papers unless the author directs otherwise. Acceptance will be by March 1st, 1985. All manuscripts and summaries should be sent to the program chairman:

Professor Edward C. Posner,
Electrical Engineering Department,
Caltech 116-81,
Pasadena, CA 91125,
U.S.A.

General enquiries about the symposium may be directed to either co-chairman:

Professor Patrick G. Farrell
Electrical Engineering Dept.
The University,
Manchester
M13 9PL U.K.

Professor Robert J. McEliece
Electrical Engineering Dept.
Caltech 116-81,
Pasadena, CA 91125,
U.S.A.

IT Special Sessions

The IT Group traditionally sponsors a session at the IEEE International Conference on Communications (ICC) held in June and at the IEEE Global Telecommunications Conference (GLOBECOM) held in November. The IT Group has a liaison officer in the organizing committee of these conferences to coordinate these special sessions. If you have ideas for sessions or are willing to serve as session organizer in the near future, please contact:

Alberto Leon-Garcia
Department of Electrical Engineering
University of Toronto
Toronto, Ontario M5S 1A4
Canada
(416) 978-5037

BOG Meetings

The next scheduled meetings of the Board of Governors are:

1. July, 1984 in Caesaria, Israel at the 1984 IEEE Information Theory Workshop (July 1-5).
2. October, 1984 in Monticello, Illinois at the Twenty-second Annual Allerton Conference on Communication, Control, and Computing (October 3-5).

New IEEE Journal

The IEEE Robotics and Automation Council announces the forthcoming publication of the *IEEE Journal of Robotics and Automation*, which is intended to become the authoritative journal in the field. Publication is tentatively scheduled to begin in early 1985. It will cover both theory and applications in all the areas of interest of the sponsoring IEEE Societies. IEEE members interested in submitting manuscripts for review and possible publication should contact the Editor:

Professor George A. Bekey
USC Robotics Institute
University of Southern California
Los Angeles, CA 90089-0781

Change of Editor

I would like to begin my Editorship by thanking the outgoing editor, Al Leon-Garcia, for all his help in preparing this issue and for a job well-done. I hope to continue to put out an informative interesting Newsletter. Any suggestions or comments are welcome as, of course, are any contributions, whether they be serious or in a lighter vein.

The deadlines for receiving material for the next two issues are:

Issue	Deadline
September	July 31
December	October 31

Material should be sent to:

J. Martin Borden
Editor, IT Newsletter
Department of Mathematical Sciences
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609
USA

(617) 793-5267

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BOG MEETING MINUTES

IT Group Board of Governors Meeting
September 28, 1983

In attendance:

BOG — J.B. Anderson, R.E. Blahut, P.J. Costello, T.M. Cover, A. Ephremides, T.L. Fine, R.G. Gallager, F. Jelinek, J. Koplowitz, J.L. Massey, R.J. McEliece, J.W. Modestino, E.C. Posner, J.G. Proakis, M.B. Pursley, D.V. Sarwate, R.A. Scholtz, N.J.A. Sloane, D.L. Snyder, J.K. Wolf, A.D. Wyner, K. Yao.

Members and Guests — V. Bhargava, N. Blachman, I.A. Blake, A. Blumer, N. Cot, P.G. Farrell, R.M. Gray, C. Heegard.

1. The minutes of the June 13, 1983 BOG meeting were amended and approved.
2. D. Sarwate gave the Treasurer's report.

   IEEE estimates a surplus of $8,000 for the IT Group this year, however, a somewhat higher figure appears more likely. Our net worth as of Aug. 31, 1983 stands at $251,000.
3. A. Ephremides reported that a $500 surplus is expected from the 1983 IT Workshop. The loan from the IT Group has been repaid.

   The Board thanked A. Ephremides for his organizing of the Workshop.
4. I. Blake and J. Anderson reported on the 1983 IT Symposium. About 340 are registered for the Symposium. The budget is in order and there should be no problem returning the $5,000 loan to the IT Group.

   The Board expressed its appreciation to the organizers of the 1983 Symposium.
5. A. Wyner and J. Wolf reported on the 1984 Workshop.

   It will be held in Caesaria, Israel July 2-5. The site is 1 hour from the airport. Room reservations need to be made by April 1. A proposal will be submitted to NSF for travel support for U.S. participants. The registration fee will be $95. A budget for the Workshop was presented.

   A motion was passed to approve the budget for the 1984 Workshop.
6. P. Farrell and R. McEliece reported on the 1985 Symposium.

   The first call for papers will be February 1984. The regular and last call is scheduled for May and September respectively. The deadline for submission will be October. The four Vice-Chairmen have been chosen. Ed Posner will chair the Program Committee. The Hotel Metropole can accommodate 550 people. The cost will be 37 pounds per day for single occupancy plus meals. Wednesday will be a free day.
7. A. Wyner presented the appointments for the new associate editors and reviewed editorial procedures for the IT Transactions.

   The Board approved the following new associate editors:

   Coding Techniques—D.J. Costello
   Coding Theory—D.V. Sarwate
   Complexity & Cryotography—A.M. Odlyzko
   Pattern Recognition—J. Koplowitz
   Stochastic Processes—S. Cambanis
8. R. McEliece reported that the Awards Committee has difficulty in evaluating Ph.D. Theses for award. The Committee will make recommendations for a change in the award.
9. The Awards Committee presented the nomination for the IT Group Paper Award, which was accepted by the BOG.
10. The following nominations were made for officers of the IT Group:
    President—R. McEliece
    1st V.P.—J. Anderson
    2nd V.P.—D. Costello and A. Ephremides
11. R. Blahut submitted the nominations to the BOG. Nominations were closed with the following 12 candidates:

B. Dickinson	I. Blake
A. Ephremides	D. Carhoun
T. Fine	A. El Gamal
F. Jelinek	V. Poor
R. Scholtz	D. Sarwate
C. Baker	J. Shapiro

12. R. Gray gave the Publications Committee report. The March issue of the Transactions is complete. The special March issue is half complete. The backlog is 1/2 issue and needs to be increased.
    The Board approved a page budget for 1984 of 952 pages.
    A motion was passed expressing the BOG's appreciation to R. Gray who is completing his term as editor.
13. M. Pursley announced that proposals are sought for the next North American IT Symposium. The decision should be made by next year.
14. R. McEliece announced the dates of the 1984 BOG meetings.
    1) March, 1984 in Princeton, N.J.
    2) July, 1984 in Caesaria, Israel
    3) October, 1984 in Monticello, Ill.
15. M. Pursley suggested that the monetary award for the IT Paper Award should be sent to the recipient at the time of selection.
16. N. Blachman reported on the IEEE Standards Committee meeting.

Adjourned.

Submitted,

Jack Koplowitz

data

College of Engineering, University of Washington/February 1984

Preparation underway for college campaign

In order to achieve the objectives it has established for itself for the next five-to-ten-year period, the college is proposing to embark upon a three-year, $15-million-dollar fund raising campaign; and the firm of Brakeley, John Price Jones, Inc., of Newport Beach, California, has been hired to conduct a feasibility study. Headed by John Carter, Jr., the study will involve interviews with more than 40 alumni and other persons in an attempt to determine whether it is possible to raise the money in the specified time and if not, what steps might be taken to make it possible. The study findings will be presented in April to the campaign planning committee, which includes chairman Paul Jennings, Tom Delimitros, Alec Fisken, John Fluke, Jr., Robert Hager, Gerald Harries, Frank Jungers, John Kemper, and Harry Prior; to the college visiting committee; and to college and university administrators.

The four generally stated objectives of the college are to increase quality while expanding enrollment; to expand interdisciplinary programs within the college; to increase research activity and interaction with industry; and to increase access to the college for the practicing engineer. A number of specific intermediate goals in the areas of faculty support, academic support, and student support have also been established. The campaign goal of $15 million was decided upon last year in consultation with department chairmen after they had held information meetings with their departments.

Annual Corporate Associates Day scheduled for April

The second annual Corporate Associates Day is scheduled for Thursday, April 26, on the campus. The purpose of the meeting is to provide an opportunity for direct interaction between corporate representatives and the college.

Discussions will center around mechanisms of industry/university interaction, educational innovations, and the general directions and specific topics of research of interest to participants. Dr. Klaus Mai, president of Shell Development Company and a chemical engineering graduate, will present the keynote speech on 'A Productive Interface between University and Industry.'

WTC design architect appointed

The NBBJ (Naramore, Bain, Brady, and Johanson) Group was appointed design architect for The Washington Technology Center project Friday, January 20, by the UW Board of Regents. The estimated cost of the project is $12.9 million. The Legislature has provided $200,000 to be used for planning purposes in the 1983–85 biennium.

Visiting Committee subcommittees formed

The membership rosters of the newly formed subcommittees of the college of engineering's visiting committee have been tentatively decided upon. The subcommittees and their members are as follows:

The subcommittee to define excellence: Kenneth F. Holtby, chair; Arthur H. Huebner, Willa Wilcox Mylroie, George C. Martin, Donald A. Strombom, Lucien Moncini, William T. Hamilton, John W. Christiansen, Ersel A. Evans.

The long-range strategic plan subcommittee: Klaus Mai, chair; William A. Bulley, Theodore F. Hueter, George E. Solomon, Robert D. Hornbeck, William J. Chase, Donald A. Strombom, Betsy Ancker-Johnson, Harold K. Forsen, James R. Johnson.

The marketing stragegy subcommittee: Robert V. Myers, chair; Alexander M. Fisken, Kent B. Foster, George W. Jeffs, Robert R. Gary.

Engineering Publications, FH-10; Carol Cassinelli, Editor

Flukes contribute $500,000 to Chair; 23 donors join President's Club

Private gifts received by the college in December included contributions of $250,000 each from John M. and Lyla A. Fluke in support of the John M. Fluke Distinguished Chair in Manufacturing Engineering. Tektronix, Inc., donated a microprocessor emulator system worth $25,700 to the department of electrical engineering, and IBM Corporation made a gift of $25,000 to the VLSI and CAD/CAM Development Fund.

Union Carbide Corporation gave $8,000 in support of the chemical engineering affiliate program; and Chevron, Inc., and the General Electric Foundation each donated $5,000 respectively to the dean's engineering fund and to minority/women programs. Other gifts included a donation of $10,000 by Puget Sound Power and Light to the electrical engineering industrial consortium fund and a $5,000 addition made by James H. Jensen to the Jensen Family Endowed Scholarship in Chemical Engineering.

Between July and January, 694 gifts totaling $1,195,186 were received by the college. During the same period, 23 donors became members of the President's Club, a group honoring individuals who contribute $1,000 or more annually to the university, or who make deferred gifts of at least $40,000. Approximately 100 supporters of the college are President's Club members. Following is a list of the new members: Louis Fred Anderson, Richard J. Brooks, Richard C. Corlett, Willa Mylroie Fassett, Charles V. Gibbs, Harry L. Glaze, Richard H. Hadley, Gerald V. Harries, George W. Jeffs, Elmer Jensen, Frank Jungers, Richard H. Lloyd, George C. Martin, Dale D. Myers, Dorothy O'Brien, Rita O'Brien, Gerald H. Pollack, Neil L. Ricker, Patrick J. Russell, George E. Solomon, Edwin B. Stear, Thomas G. Stoebe, and Gerald J. Tolentino.

TIE-ing up first quarter, program looks forward to new developments

The presentation of nine 'messy tie' awards and a brief showing of blooper tapes were highlights of an informal gathering December 9 in the conference room, Loew Hall, to celebrate the successful completion of the TIE (televised instruction in engineering) program's first quarter of operations. Paula Burgan, TV equipment operator, embellished a gaudy necktie with the painted letters MSEE (master of science in electrical engineering) for each instructor. Honorary titles were also conferred: for example, Dean Lytle, professor, EE, was named 'Mr. Cool' for handling a period of technical difficulties during one of the televised sessions with exceptional calm and grace.

With the inauguration of TIE, the university has joined 22 major schools across the country offering televised programs in engineering. During fall quarter, a total of 59 engineers from 7 companies were enrolled in 9 graduate courses in electrical engineering. Thirty-two of the students are working toward master's degrees.

TIE's coordinators look forward to increasing enrollments and to the participation of more companies, as well as to the possibility of offering new courses and degrees in the future.

For further information, call Endrik Noges, professor, EE, and director, engineering extended degree programs, at 5-2242.

Continuing education offers new courses in microprocessors, microcomputer systems

Advanced microprocessors and microcomputer systems are the topics of a new short course and a new seminar to be offered this quarter through engineering continuing education. 'Advanced Microprocessors and Their Applications' will be taught by Yongmin Kim, assistant professor, EE, March 19–23. Designed for engineers and programmers who want a comprehensive introduction to 16-bit microprocessor systems, the course will examine the organization and architecture of the major 16-bit microprocessors available, as well as their instruction sets, hardware designs, supporting chips, and applications. Morning lectures will be followed by afternoon laboratory sessions in which students will have the opportunity to use two microprocessors.

Gregory Zick, professor, EE, and adjunct professor, computer science, will be conducting the seminar on 'Microcomputer Operating Systems,' February 23–25. A lecture and laboratory format will be used to present the structure and function of a microcomputer operating system and the knowledge necessary for the development of application software. Participants will learn to use a personal computer operating system, to develop application packages, and to resolve data structure differences between commercial software packages.

For enrollment information, contact engineering continuing education at 3-5539.

Ratner heads new surface chemistry center focusing on biomedical research

A center for the study of surface chemistry is being established at the university this quarter with Buddy Ratner, research associate professor, ChemE, serving as its director. An electron spectrometer for chemical analysis (ESCA) purchased with funds from the Shell Companies Foundation, will serve as the key tool for the center's research, which will focus on determining the chemical interactions that take place on the surface of both biological tissue and man-made substances.

The National Institutes of Health donated $1.2 million to create the center, known as NESAC/BIO or the National ESCA and Surface Analysis Center. The facility's four major functions will be to serve biomaterials researchers at the university, to provide access to the spectrometer for researchers across the country, to analyze samples sent to the university by other investigators, and to demonstrate the actual and potential uses of the ESCA in medical science.

In addition, the instrument will be used in non-biomedical research within the department of chemical engineering, including studies on solid surface interaction, composite surfaces, and catalytic, photoactive, and adhesive surfaces.

Ishimaru, Meditch, Peden, Marks accept IEEE medals; Peden named vice chair for Army Science Board

In celebration of its centennial year in 1984, the 230,000-member Institute of Electrical and Electronics Engineers (IEEE) is awarding 1,984 centennial medals to individuals it considers outstanding in their exceptional service to the profession. Four members of the electrical engineering department are recipients of these medals, namely Professors Akira Ishimaru, James S. Meditch, and Irene C. Peden, and Associate Professor Robert J. Marks, II.

Professor Peden served as a member of the NSF panel that made the final selections for that organization's 1984 Presidential Young Investigator Awards. She has also been named vice chairperson of the Army Science Board.

Riley attends NSF superconductor workshop; chairs fluid dynamics committee

James J. Riley, associate professor, ME, attended the National Science Foundation workshop on supercomputer usage held in Boulder, Colorado, December 8–9. NSF has decided to considerably improve the access to supercomputers by the university community; and the purpose of the meeting, attendance at which was by invitation only, was to clarify computational needs and identify topics most likely to benefit from use of supercomputers. Information about NSF's plans and a draft of the meeting report can be obtained from Riley, who chaired the fluid dynamics committee.

MS&E hosts visitor from Calcutta

Visiting the department of materials science and engineering December 9–January 12 was Dr. S.K. Guha, assistant director of the Central Glass and Ceramic Research Institute, Calcutta, India. During his visit, which was part of the United States–India Exchange-of-Scientists Program, Guha carried out experimental work and consultations with I. Aksay and O.J. Whittemore of the MS&E department.

Kobayashi presents paper in Beijing; lectures in Beijing, Tianjin, Tokyo

Albert Kobayashi, professor, ME, presented a paper entitled 'Crack Tip Plasticity under Mixed Mode Loading' at the ICF International Symposium on Fracture Mechanics, November 22–25, 1983, in Beijing, People's Republic of China. He then presented a series of invited lectures at the Northern Jiatong University, the Beijing Society of Mechanics, and the Chinese Academy of Railway Sciences, all in Beijing, and at Tianjin University, Tianjin.

Prior to traveling to Beijing, Kobayashi was invited to present a lecture on 'Some Recent Developments in Experimental Techniques in Fracture Mechanics' at the University of Tokyo.

Chu lectures in Taipei

Wen-sen Chu, assistant professor, CE, was invited to Taipei, Taiwan, to lecture on groundwater modeling and parameter identification from January 16 to 25. While there, Chu also discussed a proposed joint groundwater research project undertaken by the University of Washington and National Taiwan University. Other participants in the proposed project are William Yeh, UCLA; Robert Willis, Humboldt State University; and Philip Liu, Cornell University. The joint research proposal is now under review by the International Program of the National Science Foundation.

Engineering council banquet to be held Feb.25

The 26th Annual Engineering Awards Banquet of the Puget Sound Engineering Council will be held February 25, 6:30p.m., at the Seattle Trade Center, 2601 Elliott Avenue in Seattle. Featured speaker of the evening is Professor Edward Wenk, Jr., whose topic will be 'Career Changes in the Engineering Profession.' Banquet tickets are $20 per person if purchased before February 15 and $22 per person after that date. Call Hal Wiren, 3-0740, for reservations or for additional information.

Sladky takes ASME propulsion best paper award

Joseph Sladky, Jr., research associate professor, ME, recently presented two papers based on his research on novel advanced concept propulsion systems. At the joint AIAA, AME, SAE Propulsion Conference held in Seattle last June, he presented a paper, 'Interface Behavior in a Pulse-tube Thrustor,' co-authored with his student Lt. S. Nitaramorn (Royal Thai Navy). At the conference, Sladky accepted the 'best paper' award, presented annually by the ASME propulsion committee.

At the 1984 Winter Annual Meeting of ASME, Sladky presented a second paper, 'Surface Impulse Propulsion for Hovercraft,' which summarized research on an amphibious traction system. Lt. J. Hunn, U.S.N., whose master's thesis formed the basis for this paper, was the co-author.

Kaiser and Koh minority graduate fellowships available

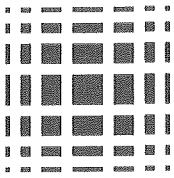
Applications are being accepted now for two graduate fellowships available for the academic year 1984–85 and specifically designated for minority students.

The Kaiser fellowship is a $6,000, one-time fellowship for a minority graduate student in engineering who is, preferably, pursuing an advanced degree in electrical engineering, metallurgical engineering, or chemical engineering.

The Koh fellowship is to be awarded to an engineering graduate student of Taiwanese descent. For further information about either fellowship, contact Amy Maki, 5-2738.

Deadline

Deadline for the March **data** is February 15. Please send or phone in news items to Carol Cassinelli, 361 Loew Hall, FH-10; 3-2520.



College of Engineering
University of Washington

Introduction to Artificial Neural Systems

- Two day course on the rapidly developing technology of artificial neural networks
- For those interested in emerging signal processing and pattern recognition algorithms and architectures, and for those involved in charting new industrial directions
- You will learn about the neurological basis for artificial neural networks, current and potential applications, and implementation of neural networks in various technologies.

September 15–16, 1988
Thursday–Friday
Seattle, Washington

Introduction to Artificial Neural Systems

September 15–16, 1988 University of Washington, Seattle

Course Contents

Technical

- Biological foundation of neural networks
- Neural network autoassociative memories
- Bidirectional associative memories
- Supervised and unsupervised learning
- Signal space interpretations
- Fault tolerance in neural networks
- Synchronous vs. asynchronous operation
- Hierarchical neural networks
- Network design based on energy reduction
- Error back propagation
- Temporal pattern learning
- Hebbian learning
- Signal classification networks
- Pattern extrapolation
- Image reconstruction
- Adaptive resonance theory
- Performance comparisons
- Silicon implementation of neural networks
- Optical implementation of neural networks
- Neural network storage capacity
- Search algorithms

Industrial

- The impact of neural networks on:
  - —future technology
  - —academic and government research
  - —industry
- Other current research in neural networks including a bibliography of historic and recent artificial neural network publications

Simulations

- Hands-on graphical neural net simulations
- Each participant will be given a neural network simulation program package

Who Should Attend

This short course is appropriate for engineers, computer scientists, and technical managers who would like to understand the theory of artificial neural systems and are interested in applying this technology to real world problems.

General Information

Researchers in computing and signal processing have long been intrigued by the computational and fault tolerant properties of the brain. There has recently been a surge of interest in processing architectures which are based loosely on biological neural networks. These artificial neural networks have been implemented successfully both electronically and optically.

Participants in this course will learn the theoretical underpinnings of artificial neural networks and will be presented with the most relevant recent research results. Case studies of the suitability of neural network architectures for several different applications will also be discussed. Interdisciplinary contributions to recent results in artificial neural network research will be stressed.

Applications of artificial neural networks include signal classification, image recognition, speech recognition and optimization. Electronic, optical and hybrid implementations of neural networks will be discussed. There will be in-class computer simulations of neural networks. Participants will be given a personal copy of a neural network simulation software package.

An educational videotape will be made of the instructor (the audience will not be filmed) during this course. This videotape will be available for purchase from Engineering Continuing Education.

Location

The course will be held at the University of Washington campus. Exact location (building and room number) will be printed on your confirmation letter.

Registration Information

The registration fee for this course is $475.00 if received before September 8 and $495.00 after that date. It includes all course materials, one floppy disk, lunch each day, and refreshment breaks. Full refund will be given up to five working days prior to the course. After that, a $25.00 handling fee will be deducted from your refund. The University is not responsible for any cancellation/change charges assessed by airlines or travel agencies.

No on-campus housing is available. However, a list of hotels and motels within walking distance of the campus will be sent upon request. Check the appropriate line on the registration form below.

Participants are encouraged to use public transportation whenever feasible. Bus information may be obtained from Metro Transit at (206) 447–4800. Campus parking is available at an additional cost of $3.00 per day paid at any University entrance.

Course Registration Form

Introduction to Artificial Neural Systems

September 15–16, 1988

☐ by September 8 **$475.00**

☐ after September 8 **$495.00**

Please fill out this form completely to enroll:

Name_____ Position_____

Affiliation_____ Work Phone_____

Company Address_____ City_____ ZIP_____

Home Address_____ City_____ ZIP_____

Send my confirmation to ☐ home ☐ work address.

Payment Method:

☐ Check enclosed payable to the University of Washington.

☐ Purchase order attached: please invoice my company.

☐ Bill my (circle one): **VISA** **MasterCard**

Acct. #_____ Exp. Date_____

Signature on card_____

☐ Yes, send me a list of local hotels and motels. **ANS98**

Mail form with payment to: Engineering Continuing Education, 4725 30th Ave. NE, University of Washington, GG-13, Seattle, WA 98195. For more information, call (206) 543-5539.

09-6623/ANS98

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University of Washington
Seattle, WA 98195

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Introduction to Artificial Neural Systems

September 15–16, 1988

Sponsored by College of Engineering
University of Washington, Seattle

Instructors

Les E. Atlas is an Associate Professor of Electrical Engineering at the University of Washington. His research interests include speech processing, auditory system processing and real time signal processor design. Dr. Atlas was recently involved in the restoration of voice transmissions from Korean Air flight 007. His work in neural networks is supported by a National Science Foundation Presidential Young Investigator's Award and, more recently, by the Washington Technology Center.

Robert J. Marks II is a Professor of Electrical Engineering at the University of Washington. He has published over fifty archival journal papers in the areas of optical computing, detection theory, signal analysis and processing, and neural computing. Dr. Marks is a Senior Member of IEEE and, in 1984, was awarded IEEE's Centennial Medal. He is currently Chair of the Neural Systems and Applications Technical Committee for the IEEE Circuits and Systems Society. His research in neural networks is supported in part by a grant from the SDI/IST's program in ultra-high speed computing and by the Washington Technology Center.

UNIVERSITY OF WASHINGTON

EE News

Published by the Department of Electrical Engineering and the I.E.E.E. Student Branch

March 30, 1987 Volume I, Number 2

From the Editor:

Welcome to Spring Quarter '87 and the second issue of the department's newsletter! I'd like to thank the faculty and staff for their tremendous support thus far in the production of *EE News*. The publication depends on their contributions, as well as the hard work put in by a handful of dedicated students. This quarter, we have in store a total of four issues including this one, with a special edition that will also be distributed to visitors during the Engineering Open House (May 7-9). We need students who are willing to help write and/or type articles. Here is your opportunity to meet fellow EE writers, as well as learning more about our faculty and staff. If you are interested, please leave a short note including your name and phone number in the IEEE mailbox located in the main office. Get involved now!
--- Gloria Chen, editor

Important Dates

APRIL
1...Petitions for part-time status due
3...New students' reception, 9:30 AM
10...Graduation applications due for MS and BS
30...Majors Day

MAY
7-9...Engineering Open House

Welcome New Undergraduates

The department welcomes 82 new undergraduate students this quarter, bringing the undergraduate population to over 500. All new students are invited to attend a special welcoming reception, sponsored by the IEEE Student Branch, at 9:30 AM this Friday, April 3, in the lounge (Room 111). Refreshments will be served, and IEEE officers and other students will be on hand to answer questions and discuss the various activities in the department.

Congratulations and welcome to:

Debra Bailey
Richard Barry
Vamard Boman
Julianne Bortner
John Brank
Edward Chen
YiLing Chen
Albert Cheng
Jon Chinn
Vincent Chung
Han Dang
Tuan Dao
James Daubert
Huyen Do
Linh Do
Vuong Do
Effendy Effendy
Said Elaoud
Stephen Follis
Wai Fu
Carrie Gabriel
Raymundo Garcia
Hollis George
Charles Golden
Eric Hanson
David Hart
Cuong Huynh
David Jackson
Mark Jensen
Marty Jorgenson
Chao-Fu Kao
Marcus Khouw
Hongthanh Khuat
Jeffrey Lam
Bryan Lee
Chang Lee
Sang Lee
Adam Lew
Albert Li
Tin Louie
Sean Luong
Randall Makela
Mandana Mojirsheibani
Michael Murray
Muon Ngu
Cuong Nguyen
Hung H. Nguyen
Hung P. Nguyen
Kim-Anh Nguyen
Loc Nguyen
Man Nguyen
Mylinh Nguyen
Phuc Nguyen
Thuha Nguyen
Tri Nguyen
Vu Nguyen
Teresa-Ho Ninh
Thomas O'Rourke
Chi Ong
Darin Perrigo
Lauren Petrie
Philip Prentiss
Martin Ruatto
Kevin Sarver
Edmund Schneider
Brian Selden
Dale Sieg
Scott Stephen
Joan Su
Steven Surbrook
Bing Teng
Paul Thelen
Khanh Tran
Thien Truong
Michael Uhl
Teresa Ung
Thuy-Lan Vo
Co Vu
Leslie Wang
Deric Williams
David Wu
Larry Yonashiro

Faculty Profile: Prof. R. B. Darling

By Bill Brougher

One of the more recent additions to the EE faculty is Prof. R. Bruce Darling. Prof. Darling joined the department shortly after earning his doctorate in Electrical Engineering from Georgia Institute of Technology in 1985. He earned his BSEE in 1980 and MSEE in 1982 from Georgia Tech also. In two short years, Prof. Darling is already making an impact at the UW by spearheading development of an improved lab for advanced semiconductor device fabrication in Room 120 and by serving as the faculty advisor to the IEEE Student Branch.

Prof. Darling's highly experimental research interests lie in III-V compound semiconductors such as GaAs, and their use in devices such as photodetectors and field effect transistors. He is anxiously awaiting the $150,000 addition of a new sputtering system and an electron beam evaporation system to the lab. When asked why he chose an academic rather than corporate path in the dynamic semiconductor industry, Prof. Darling stressed that it was a "natural" choice for him. The stable markets for III-V experimental research are preferable to the corporate environment, where research must suit the company's needs. Prof. Darling currently advises one PhD candidate and one Master's student, and expects more opportunitites for both post-graduate and undergraduate students when the lab nears completion.

As the IEEE advisor, one of Prof. Darling's goals is to "get students more active" in deciding the direction of the department. He thinks the IEEE can serve as an effective means for students to provide input to the department, and is encouraged by the growth of student activity this year. He encourages students to take advantage of the diversity of topics available at the UW, and to look past the pure science they learn: "You're not done if you're an engineer. Apply that knowledge in labs and with research." When not fabricating photodetectors or strengthening his reputation as an excellent instructor, Prof. Darling retreats to the mountains, where he enjoys biking and rock-climbing.

New IEEE Officers Elected

The IEEE held its officer election on March 9. Although all the candidates ran unopposed, they are an experienced group, having shown their commitment to student activities in their involvements with other campus organizations. At the chair is H. P. Yee, also currently public relations officer for Tau Beta Pi. The vice chair is Ralph Jorgenson, a member of the TKE fraternity and the university's kayak and yacht clubs. Hung Lieu, the Winter Thing juggler and member of the Chinese Student Association, is the representative to the Engineering Student Council. Alison Lytle, secretary, is also active in Tau Beta Pi, Society of Women Engineers, and the AXΩ sorority. Public relations director Myly Do is a member of SWE and the Vietnamese Student Association. Ben Fahy and Karl Mills are old officers wearing new coats: Ben is membership director, and Karl is now treasurer. All of the officers hope to increase student participation in activities and interaction with the rest of the department. We wish them the very best in the year ahead!

Winter *Thing* a Smash

The Winter *Thing* was a hit! Held Friday, February 27, at the Ethnic Cultural Center, it was attended by over 80 people from the department, including several staff members and about a dozen professors. It was great to see such a good turnout, and we were fortunate to have good weather for hauling around ping-pong tables, clocks, etc. The first official activity, the ping-pong doubles tournament, began at 7 PM, with twelve teams participating. At 8:00, with the tournament going full swing, Prof. Rubens Sigelmann gave a slide show and demonstration on clockmaking to over 30 interested viewers. Hung Lieu then gave a 15-minute juggling/comedy performance that kept the audience in stitches. At 9:30, the winning ping-pong teams were announced: in first place was the team of Jan Panasiuk and his partner, Lin; in second were Tsai-Chi Huang and Eason Ho; and in third place finished Jack Tang and Dinh Do. The Pictionary game, which featured two faculty and one staff team, as well as student teams, went to 11 PM, at which point Ralph Jorgenson, Alison Lytle, and Brian Tillotsen were declared the winners.

Everyone had a great time. If you missed it, or you just want to relive it, we suggest you take a glance at the pictures posted on the cabinets in the lounge. We'd like to extend special thanks to the organizers, helpers, and performers who made it possible, especially Prof. Sigelmann, Hung Lieu, Nancy Lee, Saurabh Sonawala, Joe Chauvin, and the IEEE officers. We'd also like to thank everyone who came and participated in the festivities, either actively or as a member of the audience: you were all great!

STAFF -- Gloria Chen, editor; R. B. Darling, faculty advisor; Bill Brougher, J. Ben Fahy, Jim Gee, James Go, Karl Mills.

From Undergraduate Advising...

Majors Day... Student volunteers are needed to man the EE booth for Majors Day on Friday, April 30. If you have a free hour or two between 9 AM and 5 PM, and are willing to answer questions from interested underclass or high school students, please talk to either Joy or Marian in the undergraduate advising office.

Undergraduate Photos... Keep an eye out for further announcements concerning student photographs to be taken in mid-April. These pictures, which are free of charge, will be placed in the students' permanent files. They are helpful to the faculty, especially when a student requests a letter of recommendation for a job or for graduate school long after leaving the campus. All new students are expected to be photographed, and those who missed their opportunity before or who wish retakes should also come.

Deadlines... April 10 is the deadline to file graduation applications for spring quarter graduation. Graduating seniors should make an appointment to see Marian soon. Wednesday, April 1, is the deadline to petition for part-time status. If you are registered for less than 12 credits applicable toward your degree, you must complete and submit the petition form.

Faculty Secretary to Sing Solo in Concert

Electrical engineering energy faculty secretary, Carmen Leon, moonlights as a soloist with the Trinity Episcopal Church Choir and with other professional groups in the area. This spring she will present several recitals and sing the alto solos in J. S. Bach's *St. Matthew Passion* with the Broadway Symphony and Seattle Chamber Singers (George Shangrow, conductor), April 17, 7:00 PM, at the University's Meany Theatre.

IEEE Takes Third in Engineering Week

The IEEE team fared quite well in the annual Engineering Week competition, coming in third place overall, with first place in both the calculator contest and the beer chug, and second in team poker. Engineering Week, which was held February 17-20, is coordinated by the Engineering Student Council with various engineering student societies sponsoring competitions including volleyball, paper airplane toss, bowling, funnelator, and egg drop, in addition to those mentioned before. The first place trophy went to AIChE in the Department of Chemical Engineering, and ACerS came in second. Congratulations to all the participants for a job well done!

HUMM Needs a New Driver

HUMM, the Husky musical robot needs an overhaul in preparation for the Engineering Open House in early May. A video camera digitizes a musical score utilizing an IBM PC which, in turn, drives the robot hand to play a keyboard. The robot hand is at present too slow. Any student interested in redesigning the driver electronics as an EE 499 project should contact Prof. Zick, EEB 302, phone 543-4334.

Engineering Open House in Planning

This year's Engineering Open House, scheduled to take place from Thursday, May 7, to Saturday, May 9, offers a unique opportunity for students of the department to make new friends, learn leadership skills, and be recognized as an interested member of the community. Volunteers are needed to staff a wide range of positions including serving as tour guides, manning exhibits, running the IEEE refreshment stand, setting up, and cleaning up. Participants will be treated to a party on the evening of May 9, and have their contributions officially recognized by the department in the form of a commendation letter to be included in each participant's permanent student record.

Student exhibits are needed also, and these can either be the results of class projects or some hobby activity. There will be awards for the best exhibits, which will be provided by various companies, and are expected to include such things as a tryout on the Boeing flight simulator, as well as other donated products.

Classes will be canceled on Friday, May 8, for the College of Engineering. The department hopes that students will volunteer to help in one activity or another, using the time that has been made free. Interested students should sign up on forms available in the IEEE lounge or in the main office. For further information, please contact Jim Gee in Room 219 or Prof. Dow in Room 312.

Remember the EE News for publicizing EE 499 and 599 projects, as well as vacant Research Assistant, Teaching Assistant, and Student Helper positions.

Submit all necessary information to the IEEE mailbox in the main office. Next deadline is Monday, April 13!

From Graduate Advising...

Deadlines... Students planning to graduate with an MS this quarter must file an Application for Master's Degree form, available in the Student Services Office (Administration Building 230), by April 10. Those who filed one last quarter but did not complete their work do not need to file another one, as they are good for two consecutive quarters. Spring quarter graduates must finish all requirements by May 29, including submitting an acceptable thesis to the graduate school and passing the Master's final examination, in order to attend commencement exercises in June. Students who miss the May 29 deadline have until June 12 to complete everything in order to graduate summer quarter without having to register. Those who finish after June 12 will graduate summer quarter, but must be registered for at least two credits during the summer.

Fees to pay... There is now a $15 binding fee that Master's students must pay when turning in their thesis. PhD students must pay $15 in addition to the current fees when turning in their dissertation. New Thesis/Dissertation Style Manuals are now available from the Student Services Office.

Recent Publications

Afromowitz, Martin A., Gregory S. Van Liew, and David M. Heimbach, "Clinical evaluation of burn injuries using an optical reflectance technique," **IEEE Trans. Biomed. Eng., BME-34**, pp 114-127, February, 1987.

Atlas, Les E., James A. Ritcey, Kwan F. Cheung, and Robert J. Marks II, "Improving the performance of composite matched filters," **J. Opt. Soc. A.**, vol. 3, p. P13, 1986.

Bergseth, F. R. and S. S. Venkata, **Introduction to Electric Energy Devices**, Prentice-Hall, Inc. (The new textbook, which covers the material offered in EE 344, features study exercises for which complete solutions are provided.)

Cheung, Kwan F. and Robert J. Marks II, "Image sampling reduction below that of Nyquist," **J. Opt. Soc. Am. A.**, vol.3, pp. P42-43, 1986.

DeSoto, L. A. and Y. Kim, "Implementation issues of DIN/PACS," **Electronic Imaging 87**, pp. 405-410, 1987.

Fahy, J. B., R. Kaucic, and Y. Kim, "Potential Medical Applications of TAE," **Proceedings from the Sixth Annual TAE User's Conference**, pp. 180-192, 1986.

Green, Charles, Kwan F. Cheung, Les E. Atlas, and Robert J. Marks II, "Performance of conventional and composite matched filters with error correction," **J. Opt. Soc. Am. A.**, vol. 3, p. P13, 1986.

Marks, R. J. II, "Multidimensional-signal sample dependency at Nyquist densities," **J. Opt. Soc. A.**, vol. 3, pp. 268-273, 1986.

Marks, Robert J. II and Les E. Atlas, "Image recognition with inexact processing," **Proc. ICASSP**, pp. 1461-1464, 1986.

Marks, Robert J. II, "Associative memories and projections onto convex sets," **Proc. Boeing Workshop on Optical Pre-Processing Workshop**, Seattle, 1986.

Steiner, A. R., J. W. Chauvin, J. A. Blattenbauer, and Kim, Y., "A versatile biomedical imaging system for personal computers," **Electronic Imaging 87**, pp. 244-249, 1987.

Student Presents Paper at Medical Imaging Conference

J. Ben Fahy, a graduate student and an IEEE officer, presented a paper, "A UNIX-based prototype biomedical virtual image processor," at the SPIE Medical Imaging Conference in Newport Beach, California, February 1-6, 1987. His presentation on the new approach for developing image processing software within distributed computing environments was well received and generated much interest and questions among researchers and engineers present. At the same conference.

Prof. Y. Kim chaired a session on image processing. Prof. Kim also presented two papers at the Electronic Imaging 87 Conference in Anaheim, California, February 16-19, 1987.

UNIVERSITY OF WASHINGTON

EE NEWS

Published by the Department of Electrical Engineering
and the I. E. E. E. Student Branch

Volume I, Number 3
April 20, 1987

From the Editor...

Do you have something going on that is intriguing? Is there research in your lab that the public should know about? The *EE News* is putting together a special edition for the Engineering Open House, and you can be a part of it. The deadline for submitting *typed* articles is Monday, April 27. Early submissions would be appreciated, too. Don't miss out, and don't let public miss out!

-Gloria Chen, editor

Many Thanks to John Schulz for Lounge Remodeling!

The IEEE lounge was recently closed for several days to allow the addition of a new kitchen area. If you haven't yet visited the lounge since it closed, you should! The new blue counter-top and stained wooden cabinets look terrific and contribute significantly to the functionality of the lounge.

John Schulz, department technician, built the cabinets during his own spare time and then spent late evenings performing the installation so that the lounge could be reopened at the earliest date possible. His single motivation was to do something for the students of this department. The IEEE, on behalf of all the students, thanks John for his generosity and care. We really appreciate it!

Staff Profile: Karen Frank

by J. Ben Fahy

Karen Frank arrived at the University of Washington in February, 1986, to take over the EE department's Administrator position from Mary Gray. Born and raised in Youngstown, Ohio, Karen received a degree in sociology with a minor in psychology at Bowling Green State University, later attending graduate school in business management at Ohio State. After completing her formal education, she acquired experience in a great variety of administrative positions, beginning with a one-year term as Residence Hall Director at Bowling Green, followed by 16 years at Ohio State, culminating in her appointment as Assistant Director for Administration in the Office of Residence and Dining Halls. Supervising up to 500 people at one time, she was responsible for such duties as budget development and control, facilities management, administrative personnel, and the maintenance of student residence and dining halls. This diversity and broad range of responsibility was good preparation for the sort of role she has had to assume in our department, wherein basically just about everything business or administratively oriented has to pass beneath her knowing eyes.

Karen moved to Seattle with her family in late 1985 when her husband of 21 years, Larry, took a job as an engineer/manager at Boeing Computer Services. They have two sons of high school age, Peter and Matthew, and the family seems to be united in the opinion that tolerating the rain in beautiful Seattle is a lot more pleasant than shoveling snow in Ohio. Karen enjoys walking, gardening, golfing, and biking as activities. She has also enjoyed meeting and getting to know the students, staff, and professors in the department, which she characterizes as "all in all, a very nice group of people."

As EE Department Administrator, Karen sees her primary duties as lying in the areas of budget development and monitoring, payroll and personnel, building facilities coordination, and serving as an information resource. Staff member Tom Rekdal works with Karen in assisting our faculty in developing and monitoring research budgets, maintaining equipment inventory, and administering key control. Pam Eisenheim is the part of the team concerned with travel, purchasing, petty cash, and book orders. Together, these three people try to satisfy all of our administrative concerns at a local level, serving as a central storehouse of policy information and managerial data. -- *continued on next page*

Karen Frank, continued --

Karen's outlook for the future is very much concerned with the automation of many of the bookkeeping, accounting, and database management procedures now done by hand. She points with pride to Tom Rekdal's success in developing a computer package for putting together and monitoring grant proposal budgets, and would like to see more computerization in the areas of key control, equipment inventory, personnel appointments, and the preparation of forms for exchange with other departments. With all of the work that the administrative team is currently responsible for, she notes that there are some difficult tradeoffs at times between serving immediate needs and developing tools for longer range efficiency. It takes dexterity, patience, and resolve to see beyond the short-term problems and plan for the future, at the same time ensuring that the department is running as smoothly and as efficiently as is currently possible. If anyone is up to this sort of task, it is Karen Frank, and with her at the administrative helm, the department is in very good hands indeed.

Recent Publications

Atlas, Les E., Toshiteru Homma, and Robert J. Marks II, "A neural network for vowel classification," **Proc. of International Conference on Acoustics, Speech, and Signal Processing,** Dallas, TX, April 6-10, 1987.

Shapiro, L. G., R. S. MacDonald, and S. R. Sternberg, "Ordered structural shape matching with primitive extraction by mathematical morphology," **Pattern Recognition**, Vol. 20, No. 1, pp. 75-90, 1987.

Sloane, Thomas H., "Acquisition of small-signal frequency-domain measurements from switch-mode power supplies," **Proc. of IEEE Instrumentation and Measurement Conference**, 1987.

Faculty Members to Chair in IEEE Conference

Professors Atlas and Marks will be co-chairing a session on "Artificial Neural Systems Analysis and Applications" at the 1987 IEEE International Symposium on Circuits and Systems, to be held May 4-7 in Philadelphia, Pennsylvania.

Coming Soon...

A Special Issue of *EE News* for Engineering Open House!

Get your special articles, publications listings, and "ads" in now.

The deadline is Monday, April 27.

IEEE's New Sports Ladder for Students, Staff, and Faculty

All Electrical Engineering students, staff, and faculty are invited to participate in the new racquetball and tennis ladders located in the IEEE lounge. The main goal of these ladders is to provide friendly athletic competition within the department.

Each participant will have a permanent tag with his or her name and telephone number on it. These tags will be initially ordered by skill level, and will change as players from various positions on the ladder challenge other players above them on the ladder. A list of challenge rules will also be mounted alongside the sports ladders in the lounge. If you are interested in participating, please fill out the form below and drop it off in the box in the lounge.

NAME _____

PHONE _____

☐ STUDENT ☐ FACULTY ☐ STAFF

☐ TENNIS ☐ RACQUETBALL

ADVANCED___ INTERMEDIATE___
ADV. BEGINNER___ BEGINNER___

Important Dates...

APRIL
- 22 Secretary's Day
- 24 Undergraduate Photos
- 27 *EE News* Deadline
- 30 Majors Day

MAY
- 6 Teacher/TA-of-the-Year Voting
- 7-9 Engr. Open House
- 23 Spring Picnic

More Welcomes...

The department also welcomes Ben Ong, Dzung Truong, and Dennis Wright, who are new undergraduates this quarter. We apologize for having omitted them in the last issue, and wish them the best in their pursuits.

Undergraduate Photos

All new undergraduate students will be photographed for identification purposes on Friday, April 24, between 9:00 am and 2:00 pm in EEB 420. Please drop by during this time and have your picture taken (no charge) for your student file. Old students who want to update their photo, or who missed out last time, are welcome also.

Engineering Open House Still in Need of Volunteers

Volunteers are still needed for the Engineering Open House on Friday, May 8, and Saturday, May 9. Since all engineering classes have been cancelled that Friday, it is hoped that students will donate two hours of their free time as tour guides or monitors. A party will be held the evening of May 9 for those who help, and a letter of recognition will be submitted to permanent files. Please fill in a sign-up sheet available in the lounge and turn it in to Professor Dow (via the main office) or to any IEEE officer.

Teacher/TA-of-the-Year Selection

The annual, IEEE-sponsored Teacher and Teaching Assistant of the Year selection is coming up soon. Voting, which is open to all EE students, will take place Wednesday, May 6. Do take time to vote, since this is one of the few ways students are able to recognize faculty members and TA's for their outstanding accomplishments in the classroom. The awards will be announced at the Spring Picnic to be held Saturday, May 23, at Lake Sammamish State Park.

Summer Opportunities in Stockroom

Want to learn to read those darned capacitor codes? Desire to memorize the TTL series? Or do you just want people to respect you and think of you as a dynamic and outgoing individual? If any of this sounds interesting, then apply for a summer job at the EE Stockroom! We're looking for a few people to run the Stockroom during the summer and possibly into the regular school year. The only prerequisites are EE 310 and EE 370 (or ENGR 190). A valid Washington Driver's License and knowledge of Lotus 1-2-3 are also desirable, but not necessary. Interested students should contact Dr. Yongmin Kim in EEB 303 (phone 545-2271). Also, you are welcome to stop by the EE Stockroom (EEB 219) and see what we're up to!

Are you interested

in writing,

typing,

or layout design?

Come to
a planning meeting
for the *EE News*

Tuesday, April 21,
at 3:30 pm
in the IEEE Lounge

We will be discussing
the Engr. Open House
special issue.

If you cannot attend,
and would still like to help,
contact Gloria Chen
(via the IEEE mailbox)

STAFF -- Gloria Chen, editor; Bruce Darling, faculty advisor; J. Ben Fahy, Jim Gee, James Go, Karl Mills, David Wu.

UNIVERSITY OF WASHINGTON

EE NEWS

Published by the Department of Electrical Engineering
and the I. E. E. E. Student Branch

Volume I, Number 4
May, 1987

FROM THE EDITOR...

Who is the typical electrical engineer? What kind of things does he or she do? These are questions you may not be able to find answers for in "the back of the book." In fact, ask different people in the EE building, and you're bound to get different replies.

Exploration and discovery are what Engineering Open House is all about for natives and visitors alike. In this special edition of the **EE News**, you'll find profiles, features, and informational articles which might help you in your exploration of EE. To visitors: I hope you enjoy your tour of the "EEB" and the exhibits! To natives: Take this opportunity to discover something new! *◊ Gloria Chen*

STAFF
Bruce Darling, faculty adviser
Gloria Chen, editor
Jill Dever
J. Ben Fahy
Jim Gee
James Go
Ralph Jorgenson
Alison Lytle
Karl Mills
David Wu

ENGINEERING OPEN HOUSE
A Revival of Old Traditions

Prof. Daniel G. Dow, Open House Coordinator

When I was a child growing up in the shadow of the University of Michigan, one of the high points was Engineering Open House. There were arcs and sparks and one year even that amazing new invention called the television. I fell for it all, and eventually became an electrical engineer.

Twenty years ago, when I came to the UW, we held a big open house. Thousands of people visited -- high school students, curious upper campus folks, and lots of families wondering what if their children should be engineers.

Students, faculty, and staff worked hard to make this a resounding success in those years. The visitors wandered from building to building and room to room, gaining some modest impression of the profession of engineering and the life of an engineering student. All of the departments participated, and all of the engineering buildings were open. Ceramic Engineering gave away little bricks in the form of a "W", and the lucky visitors got aluminum belt buckles cast before their very eyes in the Mechanical Engineering shops.

In the decade of the 1970's, Open House was scaled down, and moved to the HUB. This year we are reviving a full blown open house. We hope the visitors will enjoy it, and that all of us, students, faculty, staff, and guests, will become better acquainted for working and visiting together.

In the EE building you will find maps for the various rooms containing exhibits, and the program lists the exhibits by name. There should be students and faculty members within easy hailing distance any time that you have a question.

Welcome to the
Electrical Engineering Building!

Discover Electrical Engineering Today!

The EE News and the Department of Electrical Engineering would like to extend a warm welcome to the visitors of our building and exhibits during Open House, May 8 and 9. In our demonstrations, we are attempting to show you two distinctly different perspectives on electrical engineering: first, we would like to demonstrate our general level of skill with rapidly changing and continually exciting technologies, which have an importance to the future of our state's economy, which cannot be overstressed; second, we are trying to show you a lighter side to the technology, which to us as engineers boils down to just plain fun. The exhibits are meant to be illuminating without being intimidating, and will try to demonstrate in laymen's terms what in some cases are very significant and hot topics of research to engineers. To aid in this effort, we have student and faculty volunteers who will be stationed at each exhibit and in the hallways to answer your questions, and help you in any way possible: please use them! It will make them happy to be of service. In addition, maps and a brief description of exhibits will be made available in each entryway.

The planned arrangement of exhibits is as follows: in room 416 of the electrical engineering building, your visit can begin with a look at microchips under a mircoscope. Here in the Very Large Scale Integration (VLSI) lab, you can see how the most advanced chips are actually fabricated, suitable for placement in your home computer. Taking the stairs or elevator to the third floor, in room 325 you can witness exhibits on computer networking, plus the HUMM-Husky robot music machine, which will actually read and play music for you on a keyboard. In room 315 will be an exhibit on computer communications. Proceeding to the second floor, in room 232 will be a demonstration of machine-vision algorithms for the aid of computer manufacturing. Room 221 will have the most exhibits gathered together in one place: you can observe a variety of unique student computer hardware projects, including image processing systems with exciting applications in medical imaging and remote sensing. Optical fibers will carry your voices with much less noise than conventional wire, and a touchscreen display will be combined with a microprocessor into the "ultimate" computerized auto dashboard. Down the hall to room 213 is the Electrical Engineering Advising Office, where Marian Michener can explain the required preparations for study in electrical engineering, and down one last floor to room 117 will be a demonstration of energy, electric drives and power electronics.

Your last stop on the tour should be the IEEE student lounge, room 111, for some rest, relaxation and refreshments. If you like, you can plan there what other departments in the college to visit, or any exhibits in our department which you would like to see again in more detail. In any case, we would like you to feel welcome and at home, which is the true meaning behind the terminology "Open House." Thank you all for coming, and we hope to see you again next year! ◊*J. Ben Fahy*

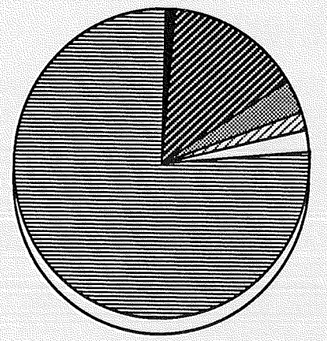
Proposed Computer Engineering Degree Making Good Progress

In the February edition of the **EE News** there was an article on a new degree program being planned by the faculty, BS in Computer Engineering. The proposal has been approved by the Faculty Council on Academic Standards and forwarded by the President to the Higher Education Coordinating Board for their review. The Board is scheduled to consider it at their May 13 meeting. Prof. Moritz, the program coordinator, is hopeful that, if approved by the Board at that time, applications can be accepted for Autumn Quarter admission.

Interested students are encouraged to check with the undergraduate advising office after May 18 to learn the status of the program. Another note for Computer Engineers: anyone thinking about Computer Engineering should consider taking EE 375 Autumn Quarter. This course is *required* of all CompE's and will only be offered Autumn Quarter during the 1987-88 academic year. Don't miss out!

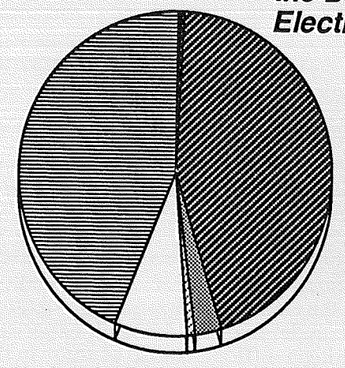
Dr. Robert P. Porter, Chairman

Marian Michener, Undergraduate Adviser
Linda Belanger, Graduate Adviser
Department of Electrical Engineering, FT-10
University of Washington
Seattle, Washington 98195

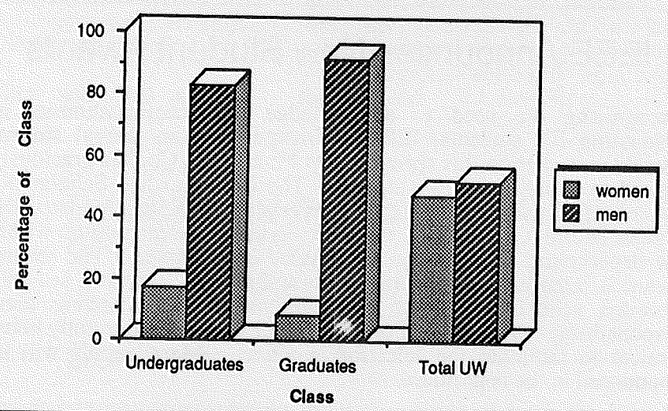


Ethnic Groups at the University of Washington

Ethnic Groups in the Department of Electrical Engineering



Men and Women in the Department of Electrical Engineering



Who Is an EE?

The Department of Electrical Engineering is the largest department in the College of Engineering, with nearly 500 undergraduates and over 200 graduate students.

Ethnic minorities (American Indian, Asian-American, Black, and Hispanics) make up 48.8% of the student population, compared to 21.4% in the University as a whole. 7.4% of the students are foreign students.

Although there are 47.9% female students at the University, women comprise only 17.5% of EE undergraduates and 8.2% of graduate students. The number of female students in the past five years or so has hovered around 15% of the total undergraduate enrollment, so recent figures are actually on the high end.

The EE Department is comprised of a special mixture of students. Statistics aside, each student is a unique and talented individual contributing to the overall dynamics of the department. ◊*Jill Dever*

Special thanks to the undergraduate advising office and the office of the Dean of the College of Engineering for the statistics, and James Go for the graphics.

Student Life...

The IEEE (Institute of Electrical and Electronic Engineers) Student Branch provides services to students within the department. Besides workshops and seminars by professional engineers, the organization also compiles an annual resume book, maintains the student lounge, and organizes various activities and social functions for students, staff, and faculty.

EE students are athletes, musicians, artists, computer hackers, and all kinds of other things. That is, besides sharing a common experience of being an EE student, we are as varied as any other group of 500.

Spring Picnic Promises Food and Fun!

The annual EE Spring Picnic will be held on Saturday, May 23, at Lake Sammamish State Park in Issaquah. Faculty, staff, students, and their families and friends are encouraged to attend the event which will run from noon until dusk.

Numerous activities have been planned, including a student vs. faculty and staff volleyball game, softball, badminton, croquet, frisbee golf, and, of course, a barbeque with food and beverages provided by the IEEE. TA and Teacher of the Year awards will also be presented at the picnic.

The Winter Thing was a great success, and the Spring Picnic will undoubtedly be a smash as well! So get out your shorts and baseball mitts, and get ready for a fun-filled Saturday in the park!

Department Senior Awarded NSF Fellowship

Congratulations are in order for the EE department's Nancy Lee, one of only a handful of UW students who were awarded National Science Foundation Graduate Fellowships to begin in Fall 1987. Initiated by the NSF as a means of aiding the progress of science and engineering in the United States, these fellowships are offered to individuals who, in the words of the NSF, "have demonstrated ability and [a] special aptitude for advanced training," and carry an award of $12,300 per annum for three years. The criteria used to evaluate applicants are based on academic records, recommendations, and GRE scores. In addition, the applicant must be a U. S. citizen or national, and must have completed no more than 30 quarter hours of graduate study.

Nancy Lee has been an outstanding student in our department since her acceptance to the electrical engineering program in the fall of 1984. A strongly self-motivated individual, she participated in independent research projects in the area of power systems with Prof. C.C. Liu in 1985-1986, and in the area of communications engineering with Prof. Jim Ritcey this year. her interest in communications and systems stems back to an introductory course in linear systems theory taught by Prof. Liu, who was himself a recent winner of the Presidential Young Investigator award, as well as a past honoree of the department for his excellent qualities as an instructor. Nancy feels very grateful for the guidance provided her by Prof. Liu, whom she looks upon as her first "mentor," and she feels strongly that undergraduates should take better advantage of the personalized instruction opportunities offered by Profs. Liu, Ritcey, and others in the department. Accepted in the electrical engineering program at MIT in the fall, Nancy feels her undergraduate research experience will help her a great deal in pursuing a difficult course of study in the years ahead.

We would like to offer our sincere congratulations to Nancy, an extremely deserving recipient of this prestigious award. Well done, and keep up the good work! ◊ *Jim Gee and J. Ben Fahy*

IEEE Announces New Student Awards

Recognizing the need to acknowledge the accomplishments of graduating EE students, IEEE is inaugurating an annual student awards presentation this spring. John Fluke Mfg. Co. has graciously agreed to sponsor the two awards. The Distinguished Scholarship Award will be presented to the undergraduate who accumulated the highest overall GPA, which, considering the high competition within the department, is indeed an impressive achievement. The second award is intended to recognize a single individual who has not only excelled scholastically but has demonstrated outstanding civic responsibility. A committee of faculty and students is currently being formed to facilitate the selection process. More details will be announced in the near future.

Students Design Fish Exhibit for Seattle Aquarium

Visitors to the Seattle Aquarium's "Electric Fish" exhibit will be able to acquire information on the creatures and concepts on display with the touch of a finger, thanks to the work of two undergraduates in our department and the generous donations of the John Fluke Manufacturing Company. Seniors Jim Gee and Bill Brougher, both double-majors in Electrical Engineering and Computer Science, spent roughly 100 hours programming three Fluke series 1020 Touch Control Screens. These devices, similar to those used in information kiosks at Expo 1986, respond to touches to the screen on the part of the user, which can be used to select data from up to 25 pages of information on all the fish in the exhibit. Touch screens are becoming very popular for designing simple computer interfaces in manufacturing and other fields, according to Fluke spokesman and project manager Maurice Fuller. This project was conceived of as a way of introducing the touch screen technology to the public in a particularly satisfying way, helping to celebrate the 10th anniversary of the opening of the Seattle Aquarium.

Jim and Bill did all the programming of the touch screens at the John Fluke Mfg. Co. plant in Everett, Wa. over the last Spring break. As student interns, they will receive EE 499 independent study credit for the work accomplished. In addition, however, they both noted the satisfaction of working in a professional engineering environment and were quite enthusiastic about the experience in and of itself. "The student internship program which Fluke is developing with our department is good for all parties involved," noted Jim. "It gives us a chance to apply our formalized coursework training in an area where we can actually see what we have done *used*, and that's a really good feeling."

For anyone who is interested in taking a look at Jim and Bill's handiwork, we invite you to visit the Seattle Aquarium and let your fingers do the walking. For any students who might be interested in other possible projects through Fluke, you are encouraged to contact Maurice Fuller at 356-6324, who forsees future work available in the areas of analog and digital hardware design, as well as software design in a large variety of programming languages and hardware environments. ◊ *J. Ben Fahy*

Deadline for the June 1st Issue of the EE News is Friday, May 22.

Don't miss it!

Visiting Student Returns to China

Chenglie Cui, a visiting scientist from the Academy of Sciences in Beijing, China, returned to her homeland on April 26. Chenglie had been in the States for about three years working with Prof. Cheung both at Case Western Reserve University in Cleveland, Ohio, and here at the University of Washington. She was working on aluminum oxide films by low pressure vapor CVD under Prof. Cheung's guidance.

Chenglie enjoyed her stay in the US. She and her husband visited several cities, including Washington, DC, New York, Los Angeles, and San Francisco. Besides learning to drive a car while in Seattle, she enjoyed the sport of tennis with other members of the Microsensor Laboratory.
◊ *Prof. P. Cheung*

Interested in meeting students, staff, and faculty?

Like to be

in the know?

EE News needs a new editor for the 1987-88 school year (and possibly during the summer, too). Interested students or faculty members should contact Gloria Chen, via the IEEE mailbox in the main office.

IEEE Tennis and Racquetball Ladder Up and Ready to Go

The new sports ladder is up in the IEEE lounge and is ready for action! It has been received well, with more than 30 participants entered. There is still room for interested factulty, staff and students to sign up. Prof. Potter is the first faculty member to sign up, and we hope many more will follow his lead.

Procedures for the sports ladder are as follows:

1) The ladder has been initially ordered by the skill level of each player.

2) To move up the ladder, a player must challenge another player.

3) Challenge matches are to be set up by the challenger and the challengee.

4) A person challenged has seven days to play the match, or an automatic win will be awarded to the challenger.

5) A person who has already been challenged and is set to play within the week is not obligated to accept another challenge until after the match.

6) If the challenger wins, his or her tag will take the place of the challengee and everyone below that spot moves down one place.

7) If the challenger loses the match, there will be no movement on the ladder.

8) Scores of matches should be deposited in the sports ladder box (IEEE Lounge) upon completion of the match.

9) To keep your name on the ladder you must play one challenge match per quarter at the very minimum (Summer Quarter not included).

10) Mostly, *HAVE FUN!*

Faculty Accomplishments

RECENT PUBLICATIONS

Cunningham, George A., and James S. Meditch, "Distributed retransmission controls for slotted nonpersistent and virtual time CSMA," **Proc. IEEE Infocom '87,** San Francisco, CA, March 31-April 2, 1987.

Kim, Y., and H. W. Woo, "A prototype system and reconstruction algorithms for electrical impedance technique in medical body imaging," **Clinical Physics and Physiological Measurement,** Vol. 8, Suppl. A, pp. 63-70, 1987.

Kim, Y., H. W. Woo, T. J. Brooks, and S. O. Elliott, "Electrical impedance techniques in medical imaging: a feasibility study," **Journal of Clinical Engineering,** Vol. 12, pp. 221-231, 1987.

CONFERENCES & SYMPOSIA

Prof. Peter Cheung and Teh-ho Tao presented a paper entitled "Thin film antimony-antimony oxide sensor" at the ISA's Pacific Northwest Instrumentation '87 Conference, April 29-30, at the Sea-Tac Red Lion Inn.

Prof. C.C. Liu was invited to be the keynote speaker at the Seventh Symposium on Electrical Power Engineering in Taiwan in December last year. His presentation was on the state-of-the-art expert system applications to power system problems. Last month, he attended a power system research workshop held by the National Science Foundation in Tempe, AZ. Prof. Liu and another professor from Carnegie-Mellon University were invited to make presentations on future research in the expert system applications area.

Prof. James S. Meditch has been named chair of the IEEE Communications Society's Second Annual Workshop on Computer-Communication Networks, to be held September 21-23, 1987, at the Rosario Resort, Orcas Island, WA. Prof. Meditch will also be chairing the session on "Advances in computer-communications" at the IEEE International Conference on Communications '87 which will take place in Seattle, June 7-10.

Prof. Tom Sloane will be co-chairing a session at the 1987 IEEE Power Electronics Specialists Conference to be held in Blacksburg, VA, during the month of June.

Prof. Greg Zick will be chairing the "Design in EE" Symposium during the 3rd National Conference of Advanced Educational Projects in Boston, MA, this June. Other faculty members attending include Profs. Damborg, Kim, and Soma.

Faculty Profile: Greg Zick, Professor and Associate Dean of Computing

Born and raised on the south side of Chicago, Prof. Greg L. Zick's undergraduate career was spent at the University of Illinois where he received his BSEE in 1970. It was there, also, that he met Marilyn, his wife of 20 years. He continued further studies at the University of Michigan, Ann Arbor, earning his MS and doctorate degrees in the field of bio-medical engineering. Immediately after, in 1974, Prof. Zick joined the EE faculty here at the University of Washington. He is presently a full professor of the department and serves also as an adjunct professor for the Department of Computer Science.

Originally attracted to the UW because of its outstanding bioengineering program, Prof. Zick focused much of his early investigative studies in the area of bio-medical instrumentation. Since 1980, however, with the advent of cost-effective microprocessors, his research efforts have been concentrated in information systems in general and their related concerns. At present, Prof. Zick receives an annual figure of approximately $400,000 in research funding. Current research includes local area networks, expert systems, and database design.

Considering it a privilege to be in the department, Prof. Zick nevertheless admits to being frustrated by the lack of support and funds. In fact, since his arrival, he has worked religiously to augment the inadequate state of funding available for computer-aided instruction labs throughout the entire university. His appointment as program manager for the $8 million Olympus Grant from IBM marked but one of his many contributions toward the advancement of educational resources. As chairman of the College of Engineering Computing Committee, Prof. Zick was instrumental in guiding the establishment of the college's computer network, allowing the college to make significant gains in reaching computing capabilities comparable to that of peer institutions. Because of his leading role in the success of the network, he was appointed to the newly established position of Associate Dean of Computing for the College of Engineering.

Prof. Zick has three children, Damon, Claire, and Ken, ages 12, 14, and 18, respectively. He coaches Damon's soccer team, and enjoys a number of other outdoor interests such as skiing and the mountains. A self-proclaimed "bad musician," Prof. Zick once played electric piano for a high school rock band. Every year in August, he and Prof. Damborg compete as the "EE" rowing crew in the cross-Sound race from Alki Beach to Winslow on Bainbridge Island.

Prof. Zick intends to continue his research and teaching in spite of his added duties as Associate Dean, and hopes to strike a happy balance between the three. He believes strongly that senior faculty members of the school have a responsibility to contribute beyond the products of their own research activity. He feels that they "ought to give something back," and with the many contributions he has made, Prof. Zick has certainly led the way. ◊ *Jim Gee*

Research Awards in EE

Faculty research is supported by private industry as well as government agencies. Listed below are some recent grants.

SPONSOR	RECIPIENT	AMOUNT	TITLE
Army	Ishimaru,Sigelmann	$299,996	Wave propagation & scattering in dense geophysical media
DOE	El-Sharkawi,Venkata	$138,133	15-KV adaptive power factor controller
Boeing	Afromowitz, Darling,Soma	$150,000	WTC GaAs
Boeing	Atlas,Marks	$50,000	Analysis & applications of neural nets
Boeing	Kim	$49,999	Intelligent workstation multifunction processor
Boeing	Somani	$49,997	Development of a fault-tolerant architecture for embedded processor

What is CD ROM?

CD has become a household acronym. These little plastic Compact Discs hold high-quality, digitally recorded music in the form of tiny pits which are read optically by laser light. They are much more "compact" than traditional phonograph records, are not nearly as susceptible to wear and abuse, and offer the advantages of digital precision.

These same discs can just as easily carry digital data like the kind computers are used to. When used in this way, the discs are called CD ROM - Compact Disc Read Only Memory. The amazing thing is that one disc can store over 500 megabytes of data. This is equivalent to 1,500 standard floppy disks! The entire set of Grolier's Encyclopedia consumes only 20% of the disc. The other big advantage is that because the discs are identical to the audio CDs, the manufacturing process is well established and relatively inexpensive.

There are a lot of exciting applications in store for this little disc. In March, Microsoft sponsored the Second International Conference on CD ROM held in Seattle. For the second year it was once again a sellout (well over 1000), attended by "marketing" and "technical" people in this new industry.

Many announcements were made at the conference including formations of new companies, joint ventures, commitments to the technology, and products such as Microsoft's BOOKSHELF which provides instant access to 10 reference materials on a single CD ROM disc (with plenty of room left over).

By far the most exciting announcement was the surprise by GE and RCA. They secretly developed a new technology called DVI - Digital Video Interactive. This was a tremendous breakthrough for the industry because it achieves full-motion video, which was seen as a major limitation, on CD ROM. The night before the announcement, it was predicted that full-motion video would not be achieved for at least another 3 years!

DVI's secret lies in its data compression and decompression techniques. It takes advantage of the fact that data is "burned on" a CD ROM only once. A mini computer is used to compress the video data before it is placed on the disc. Since it must be decompressed every time it is read, two custom VLSI chips were designed to perform this task at very high data rates. The most significant aspect of this technology is the fact that the chips are programmable and therefore their true potential will emerge as programmers learn how to utilize them.

Suddenly, with more data to work with than was previously feasible, developers are dreaming up entirely new types of applications combining text with graphics, sound, and now motion video. This creates new challenges for the software writers.

For example, there are retrieval problems for working with very large data bases and for dealing with graphical, audio, and video data bases. In addition, there are the issues of the human interface to this massive amount of data and combinations of media. Software developers have not adequately explored the most effective ways for presenting and working with various forms of information.

CD ROM may not become a household acronym but we will soon start to see its emergence. We'll see new types of applications, half-height CD ROM drives in PCs, and hear of terms such as "multimedia," "hypertext," and "agents." With this new technology, we'll find ourselves reevaluating the way we perceive and manipulate data. ◊ *Dan Benson*

From Undergraduate Advising...

Marian Michener, adviser
Joy Hirschstein, program assistant
EEB, Room 213

Pre-registration for Autumn quarter begins on Thursday, May 14, and runs through May 29. As usual, graduate students and seniors will pick up entry cards beginning the first day of pre-registration, followed by juniors the next day. All other students are eligible to get entry cards on and after May 18.

Commencement exercises will be held on Saturday, June 13. The College of Engineering will take part in the Gold Ceremony, which will be in the afternoon from 1:45 to 4:00 pm. Students graduating either this quarter or summer quarter are eligible to participate.

UNIVERSITY OF WASHINGTON

EE NEWS

Published by the Department of Electrical Engineering
and the I.E.E.E. Student Branch

Volume II, No. 5
August, 1987

FROM THE EDITOR...

Thanks for all your support!

Lilly Lee, editor

The EE NEWS congratulates Dr. Porter on his appointment to Fellow of the Optical Society of America

Faculty Profile: Akira Ishimaru, Professor of Electrical Engineering and Applied Mathematics

World renowned for his work in the field of Electromagnetics, Acoustics and Optics is Professor Akira Ishimaru who plays a significant role in establishing the University of Washington as among the leaders in E.M. research on both the national and international level. Prof. Ishimaru's interest in E.M. et. al. was instilled by the emergent role of E.M. in World War II, during which its applications in radar and communication became very important, fortifying much research in that area. In 1957, the Russians launched Sputnik into space. Along with the first artificial satellite came a great flurry of interest in the numerous applications of microwave technology crucial to the development of space communications.

Born in Fukuoka, Japan, Prof. Ishimaru received his B.S.E.E. from the University of Tokyo. After a few years of working as a Research Engineer, he obtained the opportunity to study abroad through the Fulbright Scholarship established by the U.S. as part of the effort to rebuild Japan after the ravages of W.W. II. Consequently, Prof. Ishimaru came to Seattle and received his Ph.D. E.E. from the U.W. in 1958. Despite another job offer, Prof. Ishimaru stayed at the U.W. and channeled his knowledge and expertise into the development of U.W.'s young E.M. program. Thus began an enduring and remarkable era in which U.W.'s E.M. program flourished into a force to be contended with today.

Prof. Ishimaru has concentrated his research efforts in several areas of antenna and wave propagation which included pattern synthesis, unequally spaced arrays, leaky waves, periodic structures, anisotropic media and in particular, waves in random media. His past investigative efforts also included research collaboration with the Jet Propulsion Laboratory, in which microwaves were employed to probe the surface of the planet Venus, and also the study of solar wind. Currently, Prof. Ishimaru and Prof. Sigelmann, Tsang and Kuga are conducting research in several areas of E.M. including microwave propagation, optical scattering and acoustic scattering in the atmosphere, the terrain, the ocean and biological media and imaging through various media. He also works with Applied Physics Lab in ocean acoustics.

~continued on pg.2

Prof. Ishimaru continued from pg. 1

Prof. Ishimaru's main focus in research has been on basic studies of E.M., not its immediate applications. He believes that, in the future, the basic studies done now will be more pertinent and useful than the applications. Presently, he is developing a theory on the effects of multiple wave scattering from random media. With the ideal, "research to project ahead to anticipate the problems that lie a few years in the future," he spurs interest in the E.M. field by identifying new problems and finding new solutions.

As a tribute to his outstanding contributions to the scientific community, he was appointed Fellow of both the IEEE and the Optical Society of America. He has received many awards, such as, the IEEE Centennial Medal in 1984 and the IEEE Region VI Achievement Award in 1968. As an active member of many professional societies, Prof. Ishimaru has served as a Member-at-Large of the U.S. National Committee (USNC) of the International Union of Radio Science (URSI), and as both Associate Editor and Editor of **Radio Science.** Presently, he is chairman of Commission B of the U.S.N.C./URSI. In August, he will be representing U.S. Commission B at the URSI General Assembly in Isreal.

Closer to home, his contributions to society as a researcher and as an excellent instructor is an inspiration to his students, many of whom advance to leadership poisitions after graduating. The EE department is fortunate to have Professor Ishimaru as part of the home team. ~Debby Tao and Lilly Lee

EXPERT SYSTEMS

The Artificial Intelligence conference held here in Seattle by The American Association for A.I. a few weeks ago has drawn much attention from the commercial sector, the general public and the academic community. There is definitely interest for artificial intelligence these days. After three decades of hybernation since its "birth" in the early 1950's, A.I. is coming back strong. The reason for this is largely due to useful applications of A.I. such as expert systems. Successful expert systems have been developed in the field of business and medicine. For example, expert systems, such as XCON developed by Digital Equipment Corporation to help configure VAX systems have proved to be profitable to DEC. In medicine, MYCIN was developed to diagnose and give treatment for infectious diseases through interactive dialogues with patients.

What is an expert system? In simple terms, it is a computer program that incorporates the knowledge and inference ability of one or more experts in a particular field. The key characteristic is the inference ability. A major part of an expert system is the "inference engine", which uses huge knowledge bases to make inferences. Furthermore, if a system is designed with learning capability, then this knowledge base can even be updated as the expert system is being used. In other words, expert systems may be able to "learn" new information and use them appropriately. The typical computer programs are merely computational "black boxes", while an expert system is similar to a colleague at work. It can give advice and give reasons supporting its advice with a user-friendly interface.

A real-world example of expert system applications is in power engineering. In the operational environment of a utility company, a large amount of system data are collected and processed by computers in the control center. During a disturbance, many alarms can occur and an automated assistant can help increase the efficiency of the restoration task. An expert system is just this automated assistant. Numerous applications of expert systems are in operation and planning. In operation, the main functions of expert systems are alarm processing, fault diagnosis, remedial control, and system restoration. In planning, real and reactive power scheduling, user-friendly environment , and load forecasting are a few examples.

When it comes to applications of expert systems to power systems, our department has one of the most active research programs in the country. Particularly, there is a research project on the development of an expert system that will serve as an operational aid to power systems. The purpose of the expert system is to help power system dispatchers locate the fault if there is any, and restore customers that were interrupted during the disturbance. This research program is supported by Electric Power Research Institute and Puget Sound Power and Light Company. It is headed by Professor Liu and Professor Damborg with a research team that is comprised of a number of dedicated graduate students. In addition, four senior undergraduates are also participating in the expert system

continued on pg

ert systems continued from pg. 2

research this summer. One team with two students is developing rules that model the behavior of devices on the power lines. The other team is working on rules that can be used to determine the configuration of busbars in the substations. In Professor Liu's opinions, these EE499 projects are intended to expose undergraduate students to research and to develop some tools which may be used by others.

In the long run, Professor Liu believes that a more intelligent, automated assistant will greatly enhance the efficiency of power system operations. With the matching support from National Science Foundation and possibly more from the power industry, he is expecting more students to be involved and more progress to be made. Moreover, the research project described above demostrates the wide applicability of expert systems. Undoubtedly, we will hear much more about them in the years to come.

~ Hung Lieu

Lilly Lee, editor

Bruce Darling, faculty advisor

Ben Fahy
Hung Lieu
Allison Lytle
Debby Tao
David Wu
H.P. Yee

Computer Engineering Degree Offered

On May 13th the Electrical Engineering Department's request to offer a second undergraduate degree, B.S. in Computer Engineering, was approved by the state Higher Education Board. This concluded a process that began late last summer to formalize what had become an unofficial option within the present undergraduate curriculum. President Gerberding gave his final approval on May 27th and the program was formally launched.

The approved proposal anticipates admitting about 40 students per year to the program with the ultimate size being about 100 or 20% of the present EE enrollment. It is important to note that the new program will not result in any additional undergraduate students in the Department.

Initially, students will be admitted to the CompE program directly or by transfer from the B.S.E.E. program. The entrance requirements are similar to those for EE with a few differences. Applicants must have completed ENGR 275 (or ENGR 190) as well as PHYS 131. In addition, the list of acceptable basic writing courses is somewhat more restrictive for CompE than EE. Specifically, one of the following courses must be taken: ENGR 130, ENGL 121, 181, 199, or 271.

The program of study requires earning 189 credits in the following areas: 1). CompE Required - 48 (EE 231, 310, 333, 355, 356, 370, 372, 374, 375, 471, 474, and either 478 or 479; Computer Science 413); 2). CompE Electives - 15 Note that total engineeringdesign credits must equal at least 26); 3). Engr Science - 16; 4). Math - 26; 5). Natural Sciences - 23; 6). Functional Techniques - 14; 7). Approved Non-CompE Electives - 7; 8). Humanities and Social Sciences - 30; and 9). Free Electives - 10. An Undergraduate Handbook for Computer Engineering is available in the Asvising Office.

The professors directly associated with the program are: Haralick, Holden, Johnson , Kim, Lin, Meditch, Moritz, Shapiro, Somani, and Zick. Department Chairman Robert Porter has named Professor Bill Moritz as Associate Chairman for Computer Engineering.

At the present time the CompE program does not have ABET accreditation but a request for accreditation was made in January. A team of ABET reviewers is scheduled to visit the Department this Autumn Quarter. Following their review, final ABET action on our request will be taken in the summer of 1988. ABET approval will be retroactive for one year so that any students completing the degree requirements during the 1987-88 academic year will be considered to have graduated from an accredited program.

Interested students should contact the Advising Office for more infromation. There will be an informational meeting on the program shortly after the start of Autumn Quarter.

The EE News welcomes Sharon Schlittenhard, the new Administrator

Publications

L.E. Atlas, "Auditory Coding in Higher Centers of the CNS," **IEEE Engineering in Medicine and Biology Magazine**, pp. 29-32 (June 1987).

L.E. Atlas, Y. Zhao and R.J. Marks II, "Application of the Generalized Time-Frequency Representation to Speech Signal Analysis," **Proc. IEEE Pacific Rim Conference on Communications, Computers and Signal Processing**, 4-5 June 1987, Victoria B.C., pp. 517-520.

J.B. Fahy and Y. Kim, "UNIX-based Prototype Biomedical Virtual Image Processor," **SPIE Proceedings (Medical Imaging)**, Vol. 767, pp.479-485, 1987.

R.J. Marks II, "A Class of Continuous Level Associative Memory Neural Nets," **Applied Optics**, Vol. 26, pp. 2005-2010 (1987).

R.J. Marks II, J.A. Ritcey, L.E. Atlas and K.F. Cheung, "Composite Matched Filter Output Partitioning," **Applied Optics**, Vol. 26, pp. 2274-2278 (1987).

J.U. Quistgaard and J.A. Ritcey, "An Adaptive Window Median Filter," **Proc. Pacific Rim Conference on Communications, Computers and Signal Processing**, 4-5 June 1987, Victoria B.C.

J.A. Ritcey, "On the Probability of a Maximum Likelihood Mean Frequency Estimator," **IEEE Trans. on Acoustics, Speech and Signal Processing**, Vol. ASSP-35, pp. 579-580 (1987).

J.A. Ritcey, L.E. Atlas, A. Somani, D. Nguyen, F. Holt and R.J. Marks II, "A Signal Space Interpretation of Neural Nets," **Proc. 1987 IEEE International Symposium on Circuits and Systems**, 4-7 May 1987, Philadelphia, pp. 370-376.

A.K. Somani, V.K. Agarwal and David Avis, "A generalized theory for System Level Diagnosis," **IEEE transaction on Computers**, Vol C-36, no. 6 May 1987, pp. 538-546.

A.K. Somani and V.K. Agarwal, "On Diagnosis in Hybrid Fault Situations in the BGM Model and the Unified t-Characteriztion Theorem," **International Journal of Computer Mathematics and Application**, Vol. 13, no. 5/6, pp. 567-576.

A.K. Somani, "Distributed Diagnosis Algorithms for Large-Scale Regular Interconnected Structures," **2nd International Conference on Computer and Applications**, held at Beijing China in June 1986, pp. 661-666.

A.K. Somani and P. Narong, "Compact Neural Networks: Implementation in Regular Structures," **Proc. of IEEE first Intl. Conf.** on neural nerworks held at San Diego, CA. in June 1987.

CONGRATS
AUGUST 1987
BSEE
GRADUATES!

Dana Biermanski

Tai Cao

Melanie H.T. Dang

Ngoc-Tuyen Duong

Jim Gee

Erik Godo

Joe Green

Hai Ho

J. Nikko Kelly

Steve Lee

Ming Louie

Sujen Luu

Michael Meigs

Karl Mills

Thuan Nguyen

Trang Nguyen

Tu Nguyen

Jack Poon

David Rubens

Gary Thompson

Long Tran

Lien Vu

Van Vuong

Kong Hung Yu

continued from pg. 4

Other Faculty Activities

Prof. Les E. Atlas was an invited participant at a workshop on neural networks at the recent AAAI conference in Seattle. At the workshop, he presented a paper entitled "Neural Networks for Pattern Generalization."

Prof. Liu was invited to give a short course on the state-of-the-art of expert system applications in power system engineering at the 1987 Power Industry Computer Applications in Montreal, Canada.

Prof. Robert J. Marks II has recently been asked to chair a newly formed Technical Committee on Neural Systems and Applications for the IEEE Circuits and Systems Society.

Prof. Arun K. Somani was invited to present two lectures on "Fault tolerant computer architectures" and "Design for testability" at Delta Graphics, Seattle.

Prof. Arun K. Somani was invited to present a talk on "Fault diagnosis in multiprocessor environment" at Jaon Tong University, Shangai, China.

Prof. Arun K. Somani was invited to present a series of lectures on "Fault tolerant computer architectures" at I.I.T. Delhi, India.

NEW LOCAL SECTION OF THE OPTICAL SOCIETY OF AMERICA

Applications of optics which Electrical Engineers are concerned with include fiber communication, remote sensing, scattering, photonic computing and display. For the benefit of those interested in optics, IEEE often teams with the Optical Society of America (OSA) in sponsoring conferences and workshops. The **Journal of Lightwave Technology** is coordinated by both the IEEE and the OSA.

Those of you interested in optics will be excited to know that a new local section of the OSA has just formed in the Puget Sound area. The *Puget Sound Section* of the OSA, formed in May, is the only local section that boasts of having a student officer elected by the student members. The purpose of the local section is to familiarize local academia and industry with each other. Dinner meetings are held every other month. These meetings provide an excellent opportunity for students to make contact with local industry and to listen to local, national and international optikars. Student members pay a reduced price for the dinners.

If you want to find out more about the new OSA local section, talk to Shira Broschat (the student representative), Prof. Tsang or Prof. Marks. All have offices in the EE building. Yellow membership application forms can be found in front of Prof. Marks' door.

New Sports Ladder Rules

The IEEE is re-starting the sports ladder with some new rules, the most important being that you have to challenge somebody at the bottom of the list to get on, and you can only challenge up tothree slots above your own. Also, the ladder will be moved to the main entrance display case outside the department office. These changes were motivated by the stagnation evident on the ladder last quarter.

The burden of accepting a challenge is now on the "challengee" instead of the "challenger." To issue a challenge, you need only write your name, phone number, the date, and who you want to challenge on a piece of paper, and deposit it in the IEEE "Wonder Box," located in the IEEE lounge, room 111. The challenges will be posted next to the sports ladder in the display case, and challengee will have a maximum of one week to respond to the challenge. Responding means calling up the challenger and arranging a time to play the match. Not responding to a challenge within one week will result in an "automatic punitive forfeit" and the challenger will change places on the ladder with challengee.

To have your matches recorded on the ladder, you should write the names of the players involved, the date of the match, and score(s) on a piece of paper and deposit it in the Wonder Box.

~Ben Fahy and
Alison Lytle

UNIVERSITY OF WASHINGTON

EE NEWS

Published by the Department of Electrical Engineering and the I.E.E.E. Student Branch

Volume II, Number 3
November, 1987

FROM THE EDITOR...

This month the EE News is presenting the first in a series of articles profiling the various engineering student groups which may be of interest to EE students. This month's article is about the Society of Women Engineers and was written by their Executive Vice President, Ashok Kumar. Future articles will profile the Engineering Student Council, Tau Beta Pi, and, of course, the IEEE.

Everyone hang in there—midterms are almost over!

- The Editor

Staff Box

Editor
Gilman Wong

Writers
Ashok Kumar
Bill Moritz
David Yee

Faculty Advisor
Bruce Darling

Staff Profile: Sharon Schlittenhard, Business Administrator

by David Yee

Sharon Schlittenhard, our newest Business Administrator, arrived at the Electrical Engineering Department just three months ago. She was hired over the summer after Karen Frank left with her family for Washington, D.C.

Because of her strong desire to work with people, Sharon decided on a career on Business Administration. She attained her education here at the University of Washington and then stayed on at the UW to acquire her "on the job training." Sharon has worked for the UW since 1972, when she started working for the Medex Division of the School of Public Health. She remained there for thirteen years before transferring to the Pediatrics Department of the School of Medicine. As their business manager, she was responsible for budget management, personnel, and building coordination. She feels that working with the large number of faculty and residents at both University Hospital and Harborview Hospital has helped her become adept at budgeting her time wisely. It is an ability which will serve here well, given the hectic pace of the EE department.

Sharon's initial impressions of the department were quite positive. She sees the department as "a busy and and bustling place", yet the people there have found the time to make her feel comfortable and welcome. However, she was somewhat surprised at the large number of students here, having worked mostly with faculty at her previous jobs. She is undaunted though and looks forward to interacting with all of the students.

continued on page 2

Schlittenhard, from page 1

As the EE department's Business Administrator, Sharon's duties are numerous. Her tasks include: maintaining the payroll, hiring personnel, coordinating building use, and budget development and management. She is also responsible for scholarship and fellowship disbursements, workstudy appointments, and TA/RA room assignments. Assisting Sharon with her duties are Tom Rekdal and Pam Eisenheim. Tom works with Sharon in the area of budget management while Pam is in charge of purchasing, travel, TA/RA room assignments, and building key control. Together, these three people comprise the business office of the EE department.

During her short time here, Sharon has aggressively hired more students into workstudy positions. This benefits not only the student, but also the staff by reducing their workload. In addition, this gets students more involved within the department, something Sharon hopes to see more of. Still familiarizing herself with the department's operations, Sharon praises the staff on the whole as "a great group...that has been both helpful and supportive."

A native Seattlelite, Sharon prefers the Northwest to any other place in the world. She cites Seattle's moderate climate and variety of outdoor recreation as reasons for her preference. Hiking, fishing, and "just walking along the beach" are just some of the outdoor activities Sharon enjoys. Closer to home, her interests include gardening, sewing, and playing bridge. Sharon has two sons, John and Jeff, both of whom are attending the University of Washington as graduate and undergraduate civil engineering students, respectively.

Sharon's primary goal as Business Administrator is to "work with the faculty, staff, and students to help make the EE department run smoothly" or at least "have (her) desk cleared by the end of the day!" She hopes to find "creative ways to meet the departments needs, while staying within the budget."

I hope you will join with us in welcoming Sharon Schlittenhard to our department and wishing her the best of luck in getting her desk cleared.

Computer Engineering Student/Faculty Party
First "Virtual" CompE Degree Awarded

The newly created Computer Engineering degree program kicked off the new year with a student faculty get-together on October 16th which was hosted by the 11 Department faculty associated with the program. All currently enrolled students were invited and all but one was able to attend. Staffer Helge Nason arranged for a table full of goodies and did yeoman service in getting out the invitations.

The purpose of the party was to introduce the faculty to the students and to provide an opportunity for both groups to get acquainted. The new advising system was also explained and student-faculty assignments were distributed.

The highlight of the afternoon was the awarding of the first "virtual" degree in the program. Prior to being accredited, it is necessary that at least one student complete all the requirements for the degree. Last year a frantic search was carried out to find someone in the EE program whose transcript could satisfy those requirements. After hours of transcript analysis, a handful of candidates were identified. Only one was willing to take the extra course or two required.

In recognition of his contribution to the development of the program, the faculty granted, bestowed, and conferred upon Gilman Kuey Wong the VIRTUAL degree of Bachelor of Science in Computer Engineering. A certificate commemorating his achievement and signed by the faculty was presented to Gilman by Bill Moritz, Associate Chairman.

- B. Moritz

(Editor's note: the following is the first in a series of articles about the different engineering student groups which are on campus—besides are own I.E.E.E.!)

Society of Women Engineers

by Ashok Kumar
SWE Executive Vice President

The Society of Women Engineers (SWE) is a non-profit organization of men and women that encourages engineering and science students to attain high levels of educational and professional excellence as well as providing a variety of career-related information. The University of Washington chapter has a dedicated group of officers who are committed to providing a variety of developmental opportunities and maintaining a standard of excellence that enabled them to win the "Best Student Chapter" Award in this region last year.

SWE sponsors a variety of events that benefit students such as their annual resume book, Spring Break Trip, workshops, seminars, tours, and outerviews.

"Outerviews" are information sessions given by companies recruiting on campus. They offer students a chance to gather information about a company in an informal atmosphere. Tours are also arranged periodically to prominent engineering firms in the Seattle area. Both outerviews and tours are open to all students and are free of charge.

The Spring Break Trip is an annual event. Last year SWE went to San Francisco; this year the club will be making its way to Los Angelos! Tours of engineering firms are scheduled for the mornings, with the afternoons reserved for recreational outings. The trip is scheduled for March 19-26. The cost is $100 for members and $125 for non-members (a $10 non-refundable deposit is required to reserve a space for the trip).

Another annual tradition is SWE's "Evening with Industry" which will be held on Wednesday, January 27, 1988 at the Meany Tower Hotel this year. The evening begins with a career fair during which students may meet with representatives from industry followed by a catered dinner. After dinner there will be a presentation by the keynote speaker, Dr. Irene Peden of our own EE Department, as well as a awards presentation honoring selected students for outstanding academic achievements.

Other interesting activities include their "Shadow an Engineer for a Day" and High School Outreach programs. In the former, students are matched with a professionals in industry willing to take a few hours to show the type of work they are involved with. In the latter, several engineering students travel to area high schools to talk to the students about engineering and answer any questions they might have.

In addition to the activities, members receive a bi-monthly magazine as well as a monthly newsletter published by the local chapter. Students interested in joining may pick up applications from the SWE office located in the basement of the engineering library. All engineering, science, mathematics, and computer science students (male and female) are encouraged to join. There are plenty of opportunities for involvement, so get involved and participate!

Don't Forget...

The next EE News deadline is November 30, 1987!

Professors--this is a perfect opportunity to publicize
EE 399 and 499 projects for Winter Quarter!

Faculty Publications

K. F. Cheung, L. E. Atlas, J. A. Ritcey, C. A. Green and R. J. Marks II, "A Comparison of Conventional and Composite Matched Filters with Error Correction," Applied Optics, vol. 26, pp. 4235-4239, 1987.

M. I. Dadi and R. J. Marks II, "Detector relative Efficiencies in the Presense of Laplace Noise," IEEE Transactions on Aerospace and Electronic Systems, vol. AES-23, pp. 568-582, 1987.

A. Ishimaru and H.-W. Chang, "Beam Wave Propagation and Scattering in Random Media Based on the Radiative Transfer Theory," Journal of Wave-Material Interaction, vol. 2, no. 1, pp. 41-69, 1987.

R. J. Marks II, "A Class of Continuous Level Associative Memory Neural Nets," Applied Optics, vol.26, pp. 2005-2009, 1987.

R. J. Marks II, L. E. Atlas and K. F. Cheung, "A Class of Continuous Level Neural Networks," Proceedings of the SPIE, vol. 813, pp. 29-30, August, 1987.

R. J. Marks II, J. A. Ritcey, L. E. Atlas and K. F. Cheung, "Composite Matched Filter Output Partitioning," Applied Optics, vol. 26, pp. 2274-2278, 1987.

IEEE Student Branch Announcements

Fall Welcoming Party

The Fall Welcoming Party, held at the beginning of the school year, was a great success! The HUB games area was rented for an evening of bowling, ping pong, pool, and foosball. The IEEE would like to thank Dr. Porter for the talk he gave earlier in the afternoon before the party as well as the department for the donation that helped to fund the whole affair. Be sure to watch for the other two annual IEEE events—the Winter Thing and the Spring Picnic.

EE Sweatshirts are Back!

The EE Department sweatshirts which were so popular last year are back in again in all new fall colors! The sweatshirts will be available in small, medium, large, and extra large sizes; colors are white lettering on blue and red lettering on white. In addition, the IEEE is receiving another shipment of last spring's purple on white long-sleeve T-shirts. The sweatshirts are $15.00 for members and $20.00 for non-members; the T-shirts are $12.00 for members and $15.00 for non-members.

Donut Invasion

Due to popular demand, donuts and coffee are once again available in the IEEE lounge. Donuts are $0.35 each; coffee will be $0.25 a cup.

New IEEE Officers

The IEEE has several new officers this year. Grace Bartoo takes over as Treasurer for Karl Mills who is now working in Oregon. Chris Zavadlov is taking Ben Fahy's place as Membership Officer. Ben, who has been an IEEE officer for over a year and a half, resigned as Membership Officer a few weeks ago citing burnout. However, Ben just couldn't stay away and soon accepted the newly created position of Operations Officer. The Operations Officer's responsibilities include the maintenance of the IEEE lounge and the vending machines.

- G. Wong

Faculty Activities

Prof. Alistair Holden visited Leningrad, USSR in August of this year and delivered two papers to the Automation Institute of the Leningrad Academy of Sciences as part of the "exchange scientist" program sponsored by the Academies of Science of the USA and USSR. Prof. Victor Alenandrov from Leningrad visited the UW previously under this program.

Prof. Akira Ishimaru was invited to attend the Space Future Forum held in Moscow, October 2-4, sponsored by the Soviet Institute of Space Research celebrating the 30th anniversary of the launch of Sputnik I. Also, Prof. Ishimaru was elected to a three-year term on the Administrative Committee of the IEEE Antennas and Propagation Society. Furthermore, he has recently received a research grant from the U.S. Army Corps of Engineers for "Laser Scene Generation" of $321,143.

Prof. Robert J. Marks II was an invited participant at the 1987 Gold Lake Workshop in Optical Artificial Intelligence held outside of Boulder Colorado on August 2-5. The workshop was sponsored by the AFOSR, NSF, and ONR. Prof. Marks chaired a group involved with Perpetual Processing.

Prof. Irene C. Peden received the Department of the Army's Outstanding Civilian Service Award upon completion of her term as Chair of the Army Science Board during 1987. Dr. Peden was cited for her "significant technical contributions to the Army Science Board in many areas of study," including the organization of its laboratory review methodology which she modeled after the criteria and procedures of the Accreditation Board for Engineering and Technology (ABET). Prof. Peden was also recently elected 1988 Vice President and President-elect of the IEEE Antennas and Propagation Society. Finally, Prof. Peden was selected by the Kellogg National Fellowship Program as one of six advisors to the Group VIII Fellows. The 42 outstanding mid-career professionals who constitute KNFP Group VIII began their 3-year leadership program in June of 1987.

Prof. James A. Ritcey presented a paper, "Applications of Order Statistics Filtering to Radar CFAR Detection", to the 27th Annual Midwestern Conference on Circuits and Systems at Syracuse, N. Y. during August 17-18, 1987.

Prof. Linda Shapiro will chair a technical session at the 1987 Workshop on Computer Vision: Representation and Control in Miami, November 20 - December 2. Prof. Shapiro and Prof. Steve Tanimoto, an adjunct professor in our department, organized the program for the first of this series of workshops in 1982.

UNIVERSITY OF WASHINGTON

EE NEWS

Published by the Department of Electrical Engineering and the I.E.E.E. Student Branch

Volume II, Number 4
December, 1987

FROM THE EDITOR...

Merry Christmas everyone!
Enjoy the holidays!

- The Editor

Staff Box

Editor
Gilman Wong

Writers
Brenna Chow
Bill Moritz
The Advising Staff

Faculty Advisor
Bruce Darling

Faculty Profile: Professor Robert J. Marks II

by Brenna Chow

After leaving his office, I had in my bag a complimentary copy of "Addended Chortles", a cartoon booklet, and a cassette tape entitled "Theatre of the Ears: Much Ado About Shakespeare," a radio play whose plot revolves around a physicist resurrecting "The Bard" (William Shakespeare). Side B of the cassette contained thirty minutes of original songs written and produced by the same man in his home recording studio. This gentleman also worked his way through college as a disc jockey and talk show host on a 50,000 watt FM radio station. Wait! This doesn't sound like the profile of a logical and reserved EE professor!

On the contrary, cartooning, songwriting, and audio playwriting are just some of the hobbies of Professor Robert J. Marks II, a member of the Electrical Engineering department's faculty since 1977. However, while his hobbies may seem a bit whimsical, his research is pursued with a steady earnestness.

His current research projects deal with neural networks, optical processing and detection theory. Artificial neural networks are computers whose architectures are modelled after the human brain. They consist of connected nodes or elementary processors which are assigned a state or number depending on what its neighbors are doing. Neural networks can solve problems such as the classic "Traveling Salesman Problem" in which the computer is given the task of finding the shortest path which will allow the salesman to visit each of cities within his or her territory. They are also used as associative memories. For example, humans can easily recognize the Mona Lisa by seeing only her smile. The computer's associative memory, like a human's, doesn't need the entire painting to

continued on page 2

Marks, continued from page 1
recognize the Mona Lisa. The best thing about neural networks though is that, rather than being rule based, performance is based on example training data.

Together, Professors Marks and Les E. Atlas are working to train neural networks in submarine detection and speech recognition. Professor Marks is specifically interested in implementing a neural network on an optical computer. By using optical processing, which substitutes photons in place of electrons, increased speed and highly parallel architectures can be realized.

His work in optical computing has received support from the Strategic Defense Initiative via the Office of Naval Research. His work in neural networks, in a joint project with Prof. Atlas, has been funded by the Boeing High Technology Center and the Washington Technology Center. Presently, he's commanding a troop of six Ph.D. students.

On a more administrative level, Professor Marks has been involved with the MITE/MESA program which encourages minority students to excel in math and engineering. He believes that equal opportunity should be practice and enforced. He has strong doubts, however, about the effectiveness of affirmative action.

His research and administrative accomplishments have earned Professor Marks awards such as the IEEE Centennial Medal and Certificate and the IEEE Outstanding Branch Counselor/Advisor Award. He is also Chairman of the Technical Society on Neural Systems and Applications in the Circuits and Systems Society as well as the co-Founder and current President of the Puget Sound Section of the Optical Society of America.

Though born in Sutton, West Virginia, Prof. Marks was raised in Cleveland, Ohio. About his hometown Marks commented, "People make jokes about Cleveland...and the jokes are justified!" After receiving his BS and MS in EE from Rose-Hulman Institute of Technology in Terre Haute, Indiana, Professor Marks went to work for the US Navy. He received his Ph.D. in EE from Texas Tech University in Lubbock, Texas and promptly accepted his position at the UW. The collegiality and camaraderie among the EE faculty members impressed Professor Marks and convinced him to come here. Professor Jim Ritcey, one of Professor Marks' colleagues, said that not only was Marks pleasant to work with but that he was most impressed by Marks' ingenuity—his ability to come up with novel ideas in a broad array of areas.

Though he has a busy career, Professor Marks maintains a jovial Kris Kringle face and sense of humor by balancing the time he spends at work with the time he spends with his family. As a Christian, Prof. Marks considers his faith in Christ to be the most important part of his life. He participates in a weekly Bible study with other Christian EE students and faculty.

Along with research and family, Professor Marks still finds time for his own pleasures whether it's sketching cartoons during faculty meetings or putting together a trivia book on the old radio and T.V. Gunsmoke series. Hmm...if his book is ever published, maybe we'll see Professor Marks autographing books on the Ave in between graduate student appointments!

Don't Forget!
The next EE News deadline is January 4, 1988!

Marks, continued from page 1
recognize the Mona Lisa. The best thing about neural networks though is that, rather than being rule based, performance is based on example training data.

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Computer Engineering Accreditation Visit Completed

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Finally, best of luck with finals and have a memorable holiday season! See you next year during registration!

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UNIVERSITY OF WASHINGTON

EE NEWS

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Volume II, Number 4
December, 1987

FROM THE EDITOR...

Merry Christmas everyone!
Enjoy the holidays!

- The Editor

Staff Box

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Gilman Wong

Writers
Brenna Chow
Bill Moritz
The Advising Staff

Faculty Advisor
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Faculty Profile: Professor Robert J. Marks II

by Brenna Chow

After leaving his office, I had in my bag a complimentary copy of "Addended Chortles", a cartoon booklet, and a cassette tape entitled "Theatre of the Ears: Much Ado About Shakespeare," a radio play whose plot revolves around a physicist resurrecting "The Bard" (William Shakespeare). Side B of the cassette contained thirty minutes of original songs written and produced by the same man in his home recording studio. This gentleman also worked his way through college as a disc jockey and talk show host on a 50,000 watt FM radio station. Wait! This doesn't sound like the profile of a logical and reserved EE professor!

On the contrary, cartooning, songwriting, and audio playwriting are just some of the hobbies of Professor Robert J. Marks II, a member of the Electrical Engineering department's faculty since 1977. However, while his hobbies may seem a bit whimsical, his research is pursued with a steady earnestness.

His current research projects deal with neural networks, optical processing and detection theory. Artificial neural networks are computers whose architectures are modelled after the human brain. They consist of connected nodes or elementary processors which are assigned a state or number depending on what its neighbors are doing. Neural networks can solve problems such as the classic "Traveling Salesman Problem" in which the computer is given the task of finding the shortest path which will allow the salesman to visit each of cities within his or her territory. They are also used as associative memories. For example, humans can easily recognize the Mona Lisa by seeing only her smile. The computer's associative memory, like a human's, doesn't need the entire painting to

continued on page 2

Marks, continued from page 1
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After receiving his BS and MS in EE from Rose-Hulman Institute of Technology in Terre Haute, Indiana, Professor Marks went to work for the US Navy. He received his Ph.D. in EE from Texas Tech University in Lubbock, Texas and promptly accepted his position at the UW. The collegiality and camaraderie among the EE faculty members impressed Professor Marks and convinced him to come here. Professor Jim Ritcey, one of Professor Marks' colleagues, said that not only was Marks pleasant to work with but that he was most impressed by Marks' ingenuity—his ability to come up with novel ideas in a broad array of areas.

Though he has a busy career, Professor Marks maintains a jovial Kris Kringle face and sense of humor by balancing the time he spends at work with the time he spends with his family. As a Christian, Prof. Marks considers his faith in Christ to be the most important part of his life. He participates in a weekly Bible study with other Christian EE students and faculty.

Along with research and family, Professor Marks still finds time for his own pleasures whether it's sketching cartoons during faculty meetings or putting together a trivia book on the old radio and T.V. Gunsmoke series. Hmm...if his book is ever published, maybe we'll see Professor Marks autographing books on the Ave in between graduate student appointments!

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EE NEWS

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Volume II, Number 5
January, 1988

FROM THE EDITOR...

Well, here it is finally--the first issue of the EE News this year! I have one brief announcement to make. For the rest of the school year, instead of one issue per month, there will be two issue per quarter. It was just too difficult getting the last issue printed before finals. Never again!

Also, at deadline the following item came up: Engineering Week is coming up February 22-26. Let's win again this year!

-The Editor

Staff Box

Staff
David Wu
Mike Ishimitsu

Special Writers
Bill Moritz
R. J. Marks II

Editor
Gilman Wong

Faculty Advisor
Bruce Darling

UW IEEE STUDENT CHAPTER TO HOST SEATTLE SECTION PIZZA FEED

The UW IEEE Student Chapter will host the 1988 IEEE Seattle Section Student Pizza Feed on Tuesday, January 26, 1988. The event will be held from 6:30 pm - 9:00 pm in the HUB East Ballroom of the University of Washington Campus. The student chapters represented at the Pizza Feed include Seattle University, Seattle Pacific University, and the University of Washington.

Several presentations will be given while the pizza and drinks are served. Scheduled topics include an overview of the purpose and opportunities in IEEE as well as a summary of the past year's activities by each of the student chapters. The program also includes a series of discussions with various industrial representatives. In addition, the night's activities will culminate with the presentation of this year's recipients of the IEEE awards. This year's special guest is Charles Ittner, a retired engineer with over 50 years of experience applying engineering with minimal impact on the environment.

The price of admission is $1.00 for students (both members and non-members) and $5.00 for all others. Tickets may be purchased from IEEE officers prior to the event or at the door.

EE to Computer Engineering Transfer Applications Deadline: February 1st

When the B.S. in Computer Engineering degree program was created we anticipated that some presently enrolled EE majors might wish to transfer to the CompE program. Transfers are processed at the same time as direct admission to both EE and CompE. This means that the deadline for Spring Quarter is February 1. The Advising Office has copies of the one page Transfer Request form available now. A current transcript showing all graded work must also be provided.

Students interested in applying for transfer into CompE must satisfy the same requirements as students applying for direct admission. While most of the requirements are the same as for EE, there are a few differences that currently enrolled EE students need to be aware of. For instance, CompE requires PHYS 123, 131 and ENGR 275 prior to admission. (Alternatives to ENGR 275 are EE 371 or AUTUMN QUARTER ENGR 190 at UW.) Also, the list of courses satisfying the basic writing requirement is somewhat more restrictive than for EE.

Each transfer request will be individually evaluated to determine the applicant's potential for success in Computer Engineering. Such factors as academic record, work experience, and other information provided by the student will be considered.

Additional information is available in the Advising Office.

- B. Moritz

Donut Service Discontinued

The donuts which have been delivered every morning to the IEEE lounge by the campus bakery will no longer be making an appearance. The service has been discontinued because too many people have failed to pay for them.

"Our profit margin (on the donuts) is so low that if even 3 or 4 people fail to pay, we are only breaking even!", complained Karl Mills, IEEE Treasurer. As it was, the IEEE was losing money on the venture, so it was decided to terminate the program.

When asked if the IEEE might bring the service back, Karl replied, "Not in the near future. With all the new furniture in the lounge, we can't afford the losses!" He later added, "We may give you guys another chance later though."

EE 478 Students Collect Aluminum!

Last quarter, the students of Professor Kim's EE 478 class (Design of Computer Subsystems) collected 414 aluminum cans which they donated to the IEEE. The cans were collected throughout the quarter as the students slaved away in the 478 lab working on their labs and projects.

The cans were donated by placing them in the office of graduate student and IEEE chair, H. P. Yee late one night. When asked to comment, H. P. said, "Kill the Bums! Seriously, though, I was impressed by the initiative of these students. Four hundred fourteen is an impressive number of cans - especially when they are all in my office!" H. P. added this advice for anyone else donating aluminum cans: "Make sure to crush the cans you donate - the recycling centers will not accept them otherwise." This also applies to the aluminum can collector located in the IEEE lounge.

Gleason's Approximation

by Professor Robert J. Marks II

When I was a lowly graduate student in the great state of Texas, a colleague of mine, Hector Gleason (not his real name) was faced with an impossible task due to the carelessness of a professor. On a take home examination in plasma physics, the professor gave the students the answer to the first problem which turned out to be one gauss. Unfortunately, the professor had miscalculated and the correct answer was two gauss. Poor Gleason worked the problem from three different approaches and in each case came up with an answer of two gauss. After thirty-six hours of frustrating sleeplessness, on the bottom of the test, he scribbled

$$= 2 \text{ gauss} \approx 1 \text{ gauss for small two}$$

We shall therefore refer to the equation:

$$2 \approx 1$$

as *Gleason's Approximation.*

Interestingly, *Gleason's Approximation* has recently attracted much attention from both the mathematical and engineering communities. Indeed, theorists have shown that in certain situations, *Gleason's Approximation* can be shown to be an equality. I have collected proofs for four such cases and will take my remaining space to share them with you.

Proof #1: As any student who has taken EE 333 knows,

$$\exp(j2\pi) = 1.$$

Take the natural logarithm of both sides, divide both sides by j2 and add one to both sides. The result is the equality form of *Gleason's Approximation.*

Proof #2: Clearly,

$$(d/dn)n^2 = 2n \qquad (1)$$

Also,

$$n^2 = n \cdot n$$

$$= n + n + \ldots + n \text{ (n terms)}.$$

continued on page 4

UW Ph.D STUDENT TAKES FIRST PLACE IN PAPER COMPETI-TION

Shira L. Broschat, Ph.D Student, captured first prize in the 1988 Student Prize Paper Competition at the National Radio Science Meeting in Boulder, Colorado earlier this month. Her prize winning paper was entitled "The Phase Perturbation Technique Versus an Exact Numerical Method for Random Rough Surface Scattering."

The competition was open to all Ph.D students from universities throughout the United States. Second and third prize went to an MIT student and a University of Rochester student, respectively. For taking first place, Broschat received $1000 as well as travel expenses.

Broschat is completing her Ph.D under Professor Ishimaru and is currently working with Eric Tharsos of Applied Physics Labora-

continued from page 3

Differentiating each of these n terms individually gives

$$(d/dn)n^2 = n.$$

Equating this with the equation (1) and simplifying gives our final result.

Proof #3: Here is an illustration of application of *Gleason's Approximation* in a real world situation. Three tired salesmen who met on an airplane arrive at a budget hotel. Blanche, the lady at the hotel's registration desk, charges each ten dollars for the night's lodging. After the salesmen have retired to their rooms, Blanche remembers that the hotel is having a Memorial Day Special: three rooms for twenty-five dollars. On the way to their rooms to refund their money, Blanche is hit with the realization that five does not go into three evenly. Motivated by this mathematical impossibility and her basic dishonesty, Blanche pockets two dollars and gives each salesman back only a dollar each. Let's audit the situation thus far. The salesmen paid nine dollars a piece for their rooms. Right? (Right!) Blanche kept the other two. Right? (Right!) Three times nine is twenty-seven plus two is twenty-nine. Question: What happened to the other dollar? Answer: an exact manifestation of *Gleason's Approximation* i.e. since 1 = 2, it follows that 29 = 30.

Proof #4: This proof is due to my friend and colleague, Professor Mohamed El Sharkawi. Note that

$$(x^2-y^2) =$$

$$x\,[x-(y^2/x)] = (x+y)(x-y) \qquad (2)$$

Let's set

$$x-y^2/x = x-y \qquad (3)$$

so that equation (2) can be written as

$$x = x+y. \qquad (4)$$

Solving equation (3) gives

$$x = y.$$

continued on page 5

IEEE Buys New Furniture For Student Lounge

The IEEE officers have executed the next phase of their plan to improve the IEEE Student Lounge in Room 111. Officers Alison Lytle and Karl Mills purchased three cream colored leather loveseats to replace the dilapidated couches in the IEEE lounge. With the help of fellow officer Ralph Jorgenson, they moved the new furniture into the lounge during the weekend between the first and second weeks of the quarter. These, along with two recliners donated by Professor Moritz, have been arranged to form a pleasant sitting area on the east side of the room.

The reaction of students to the new furniture has been positive. "I can't wait to fall asleep here some night," quipped one tired graduate student. "They could almost make graduate school bearable," he added a little later. "The new couches seem to make the room bigger. The IEEE did a great job!" enthused another. "Anything is an improvement," was the comment of a somewhat less enthusiastic student .

Other improvements include the installation of the cabinets and sink by John Schultz, the EE

continued on page 5

Winter *Thing* Scheduled

This year's **Winter *Thing*** will be held from 7:00 P.M. to 12:00 Midnight at the South Campus HUB on Friday, February 26, 1988. The purpose of the activity-filled evening is to bring the faculty, staff and students together in an informal and relaxed atmosphere. By interacting with each other during the scheduled games and demonstrations, the participants can foster a friendlier relationship than just working associates.

Last year's successful **Winter *Thing*** included activities as diverse as a ping pong tournament to a demonstration of clock making. It was widely attended by the students, staff, and faculty of the EE Department. While no definite events have been arranged yet, expect more of the same this year!

Admission to the **Winter *Thing*** is FREE! Make sure to reserve a slot in your schedule for the **Winter *Thing***.

continued from page 4

department's technician, who generously donated his time and skills to the project.

Future plans for the lounge include the acquisition of a carpet for the new sitting area.

continued from page 4

Substituting into equation (4) gives 1 = 2 and our proof is complete.

I'm certain that Hector did not realize the mathematical rigor that his approximation would attract. I've tried to contact him to tell him of his fame but have thusfar been unsuccessful. The last I heard, he was a Congressional Economist in charge of generating large federal, social and military spending agendas. I understand that, in light of the deficit, he is using a corollary of his approximation to justify the spending.

Advising Office Announcements

Application for Admissions
For those seeking to enter the EE Department: applications for admission to the Electrical Engineering Department and the Computer Engineering Program are due by February 1, 1988.

Scholarship Deadline
College of Engineering scholarship applications are available in the Advising Office (EEB 215). Deadline for submission of applications is March 1, 1988.

MSEE Deadlines
In order to graduate this quarter, the March 1st deadline for completing MSEE requirements (final and thesis) must be met. To graduate Spring Quarter without having to register, the deadline is March 18, 1988.

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Though he has a busy career, Professor Marks maintains a jovial Kris Kringle face and sense of humor by balancing the time he spends at work with the time he spends with his family. As a Christian, Prof. Marks considers his faith in Christ to be the most important part of his life. He participates in a weekly Bible study with other Christian EE students and faculty.

Along with research and family, Professor Marks still finds time for his own pleasures whether it's sketching cartoons during faculty meetings or putting together a trivia book on the old radio and T.V. Gunsmoke series. Hmm...if his book is ever published, maybe we'll see Professor Marks autographing books on the Ave in between graduate student appointments!

Don't Forget!

The next EE News deadline is January 4, 1988!

Computer Engineering Accreditation Visit Completed

A team of 4 visitors reviewed the recently created Bachelor of Science in Computer Engineering (CompE) degree program during an accreditation visit that was held on November 9th and 10th. The visit is a critical part of the 18 month process required to have new degree programs accredited.

In January 1987, the University made a formal request to the Accreditation Board for Engineering and Technology (ABET) for a review of the program. A written report on the University, the College of Engineering, and the CompE program was prepared by the College and submitted in May. The team, which was selected during the summer, reviewed the report and then conducted a two day visit during which they talked with administrators, faculty, and students. Samples of student work from virtually all EE courses were available for examination. In addition, they also toured the labs and visited the libraries and the support departments (e.g. math and physics).

The team will now prepare a report on what they found and a recommendation on whether or not to accredit. The University will receive a draft copy of that report in February at which time we can correct any factual errors. Finally, next summer the Engineering Accreditation Commission of ABET will meet and make the final decision on whether our program will be accredited.

While we will have no official word on the outcome of the process until next July or August, the indications during the visit were that they did not find any major problems. Assuming that we are accredited, any graduates of the program from Autumn 87 through Summer 88 will be considered to have graduated from an accredited program.

Associate Chairman Bill Moritz would like to thank all those who assisted in preparing for the visit. We get to do it all again in two years when the EE program will undergo its next periodic review.

- B. Moritz

IEEE Student Branch Activities

IEEE Resume Book Off and Running

The 1987-88 IEEE Resume Book has been submitted for printing. About 200 copies will be made and sent to industry. The student response to the book was very good with about 60 resumes turned in. The IEEE would like to thank Puget Sound Power and Light Company for their support of this project.

Winter*Thing* Creeping Up

Nothing concrete has been set yet, but the 1988 Winter*Thing* is fast approaching. It is tentatively set for the third week of Winter Quarter. The Ethnic Cultural Center and the South Campus Center are the leading candidates for the Winter*Thing* Site this year. The Winter*Thing* was first conceived as an event during which students, staff, and faculty could interact in an informal setting for an evening of fun, games, and food.

Yes, Its a REAL X-mas Tree!

As you can probably tell from the pleasant aroma, we have a REAL Christmas tree in the IEEE lounge! Special thanks to Ralph Jorgenson and Allison Lytle who took the time to get and trim the tree over the Thanksgiving Holiday. Please feel welcome to leave gifts to the IEEE (like old exams for the IEEE test file) under the tree!

- G. Wong

Faculty and Graduate Student Activities

Professor Les Atlas presented a paper by R. Marks, L. Atlas, and J. Ritcey entitled "The performance of convex set projection based neural networks" to the IEEE conference on Neural Information Processing Systems in Denver, CO, during November 8-12.

Larry A. DeSoto, a Ph.D. student, and Professor Yongmin Kim participated in the Siggraph '87 (July 27-31, 1987 in Anaheim, CA) and COMDEX '87 (November 2-6, 1987 in Las Vegas, Nevada) and demonstrated in both conferences the image processing system (UWGSP#1) developed at the Image Processing Systems Laboratory of the Department of Electrical Engineering.

Ph.D. student Toshiteru Homma presented a paper, "An artificial neural network for spatial-temporal binary pattern: Application to phoneme classification," by T. Homma, L. Atlas, and R. Marks, at the IEEE conference on Neural Information Processing Systems in Denver, CO, during November 8-12.

Professor Yongmin Kim gave research seminars at the IBM Palo Alto Scientific Center (Palo Alto, CA) on November 13, 1987 and at the BBN Laboratories (Cambridge, MA) on November 16, 1987 and presented two papers at the IEEE EMBS Ninth Annual Conference held in Boston during November 13-16, 1987. He also gave a talk on "Development of educational digital image processing systems," at the IBM Conference on Academic Computing at the University of California-Berkeley on November 14, 1987.

Prof. Irene C. Peden was the recipient of the IEEE 1988 Haraden Pratt Award "for leadership and outstanding contributions to the IEEE in education, technical activities, and Institute boards. Congratulations, Prof. Peden!

Dean A. Verheiden, a Ph.D. student, gave a presentation on "An advanced multifunction workstation architecture," at the Electronic Imaging '87 conference held in Boston during November 2-5, 1987.

Ph.D. candidate Hok-wai Woo gave a presentation on "Determination of the current density distribution under the electrode," at the IEEE EMBS Ninth Annual Conference held in Boston during Nov. 13-16, 1987.

From the Advising Office:

EE 374 will be offered both Winter Quarter '88 and Spring Quarter '88. If you are interested in taking this course Winter Quarter, please see the Advising Office right away!

The new, consolidated Advising Office (Graduate and Undergraduate) will be open for the New Year! Thanks to the superior decorating firm of Damborg, Moritz & Noges, and the combined efforts of various window washers, carpenters and lighting technicians, we will be open for "business as usual" after the Christmas break at our new location in EEB 215. Come check us out!

Finally, best of luck with finals and have a memorable holiday season! See you next year during registration!

- The Advising Staff: Eddie, Joy, Libby, and Linda

Faculty and Graduate Student Publications

P. V. Budak, L. A. DeSoto, D. A. Verheiden and Y. Kim, "An advanced multifunction workstation architecture," Electronic Imaging '87, pp. 804-808, 1987.

K. Cheung, L. Atlas, and R. Marks, "Synchronous vs asynchronous behavior of Hopfields CAM neural net," Applied Optics, vol. 26, no. 22, pp. 4808-4813, 1987.

Y. Kim, R. S. Miyaoka and H. S. Choi, "Review of low-cost image processing systems for biomedical applications," IEEE EMBS Ninth Annual Conference, pp. 1342-1344, 1987.

A. E. Luedtke, H-W. Woo and Y. Kim, "Electrical impedance tomography for noninvasive detection of DVT in human calf," IEEE EMBS Ninth Annual Conference, pp. 1431-1434, 1987.

P. H. Schimpf and Y. Kim, "Spectral analysis and digital filtering with 16-bit fixed point hardware," IEEE EMBS Ninth Annual Conference, pp. 832-833, 1987.

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as *Gleason's Approximation.*

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continued on page 4

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With the mild winter we had this year, it's kind of hard to tell, but Spring is definitely here and that means three things:

1. rain with periods of sun,
2. hay fever, and
3. finals.

We can't do to much about any of this; we have no choice but to survive as best we can. However, take solace in the fact, like high fiber, this to will pass!

- The Editor

P.S. It should be obvious that I was zonked out on antihistimines when I wrote this. (Ahchoo!)

Staff Box

Writers
Hung Lieu
David Wu

Editor
Gilman Wong

Faculty Advisor
Bruce Darling

Faculty Profile: Dr. Yongmin Kim

by Hung Lieu

If anyone were to listen to typical gossip among EE undergraduates in this department, they would note that the most popular topic of discussion is that of past, present, or future horror classes that are available in the curriculum. Although everybody has their subjective opinion as to the ultimate boot camp, EE 478, Computer Subsystems Design, is notorious for being the most intensive and time consuming EE course anybody can take. Yet, even more notorious than the course itself is its creator, Professor Yongmin Kim.

Born in Korea, Dr. Kim came to this country after attaining the BSEE degree from Seoul National University in 1976. He joined the EE/Comp E graduate program at the University of Wisconsin-Madison and finished the MSEE and Ph.D. degrees in 1979 and 1982, respectively. Out of 13 offers from 16 interviews with universities around the country, Prof. Kim decided to join the faculty at the UW. It was Prof. Moritz who solicited him to the Northwest. Dr. Kim cites the close collaboration that the College of Engineering has with UW's top ranked medical school as the main influence on decision. He also felt that the UW's EE department could offer him a nurturing environment in which he could do research and develop new courses.

When asked why he chose academia as opposed to industry, Prof. Kim responded quite definitely that he loves to teach. In addition, academia allows the chance to pursue independent research. Dr. Kim aspires to do research that he **wants** to do and not research he **has** to do. In the 6 years that he has been with this department, he has developed numerous

continued on page 2

Kim, from page 1

courses. Among them are EE 564 (Parallel computers), EE 568 (Imaging computer systems), 2 sections of EE 590 (advanced microprocessors, and computer image generation), and of course EE 478. Encouraging students to achieve their full potential is an important goal to Dr. Kim. The best way to accomplish this, he feels, is to provide the students with enough rigorous work and challenge. This philosophy is reflected in EE 478 where his attitude toward EE 478 students is that "You don't like it now. But, you will be very glad when it is over!". To his graduate students, he is probably best characterized as a very diligent pusher.

Developing and teaching classes comprise only a small fraction of Prof. Kim's busy schedule. His research endeavors lie in the field of Biomedical imaging. The Image Processing Systems Laboratory (IPSL) was established by Dr. Kim in 1982. Ever since, it has been bustling with research activities. Dr. Kim has a total of over 30 graduate students, known collectively as the "K-Team," under his direction. At the IPSL, the "K-Team" conducts research in the area of Biomedical applications of engineering. The research projects going on include 3-D finite element computer modelling, 3-D image reconstruction, impedance imaging, image processing workstations, and pattern recognition. The IPSL collaborates closely with the Radiology and Pathology Departments of the UW Medical School on many of these projects.

Currently, Dr. Kim resides in North King County near Mountlake Terrace with his wife and three children. A devoted Christian, Prof. Kim is an active member of his church. Kim notes that even though he rarely has time for hobbies ever since he became "Dr." Kim, his "goof-off" activities include tennis, ballroom dancing, and golf. He commented that he came to enjoy these activities while being a graduate student in Wisconsin (when he had the time!).

In general, Prof. Kim thinks he made an excellent decision in coming to the UW. In his opinion, the faculty has been "like family" to him. The academic environment is certainly supportive and nurturing for his endeavors. And as long as students keep applying for EE 478 and other "K" courses, he will continue to churn out quality graduates.

From Advising

BSEE Graduation Deadline
The deadline to apply for a BSEE for June 1988 is **April 1, 1988**. Please come in to the Advising Office to fill out graduation forms before that date.

Welcome, Marilyn Kramp!
Please stop by and meet our newest staff member in the Advising Office—Marilyn Kramp! I am sure you will join us in making her feel welcome here.

Energy Scholarship Applications
Energy scholarship applications are available in the Advising Office. There are two schoalarships for undergraduates and a fellowship for graduates available. The application deadline is March 15th.

- The Advising Staff

Industrial Affiliates Annual Review

The Department of Electrical Engineering at the UW will hold its Industrial Affiliates Annual Review on Tuesday May 10, 1988. Key presentations from industry, the Department faculty and administrators, and invited eminent scholars will address the Department's educational and research activities. The day-long Review will also include a poster session on recent research accomplishments.

Reserve this date on your calendar and come participate in the Review! For further details, see future issues of Datalink or call Ms. Barbara Foster at (206) 543-8114.

IEEE Student Branch Stuff

IEEE Victims of Crime

On Wednesday, February 24, 1988, it was discovered that the main showcase on the second floor of the Electrical Engineering building had been robbed. The perpetrators first attempted to dismantle the case by removing one of the glass panes. When this proved unsuccessful, they instead forced open the lock. Items stolen from the case were the IEEE readerboard and three IEEE sweatshirts. "I don't know what the stupid ¶#@¥ who did this is going to do with the readerboard! I mean, we still have the keyboard for the darn thing! They can't use it without the keyboard!," said H.P. Yee, the IEEE Chair. Yee also indicated that the stolen items would not be replaced.

Winter *Thing* - Whee!

This year's Annual Winter *Thing* was a great success! Held February 26 at the South Campus Center, the event started at 6:00 pm and lasted until 12 Midnight. Events included ping pong (singles and doubles), pool, and pictionary tournaments. There was also a potluck dinner with a cake for Prof. Bruce Darling thanking him for his service as IEEE Faculty Advisor.

IEEE Student Pizza Feed Awards

Several awards were bestowed by the IEEE Seattle Section at the Student Pizza Feed held January 26 in the UW HUB. Recipients of the $500 Grant-in -Aid awards were Karen M. Tang for the UW, Craig McDonald for SPU, and Mike Riley for SU. Other honorees included the Student Advisors of the represented Universities: Prof. Patricia Daniels (SU student advisor), Prof. Donald Peter (SPU student advisor), and Prof. Bruce Darling (UW student advisor). Prof. Darling was also named Student Advisor of the Year at the event. Charles Ittner, the guest of honor, was awarded for over 50 years of service as a professional Electrical Engineer. Mr. Ittner worked on many power engineering projects in the Seattle area and abroad. He is noted for successful completion of many electrical engineering projects with a minimum of environmental impact on the area.

Student Professional Awareness Conference

The Student Professional Awareness Conference (SPAC) will be held this year at Seattle University on March 30, 1988 from 1:00 pm to 8:00 pm. The conference hopes to increase student awareness of the non-technical aspects of engineering and aid in the transition from academia to industry. There will be four speakers giving presentations on subjects such as communication skill in the workplace and what to expect your first year out of school. There will even be a vice-president of Rainier Bank, Andrew Williams, who will talk about financial planning for the new graduate. The cost of the conferencce include a banquet. Tickets are $5.00 for student member of IEEE and $13.00 for non-members. If you join now as a new member, you are entitled to a FREE ticket. Students interested in attending should contact Prof. Darling (3-4703) or Mike Riley (296-5970).

IEEE Officers Elections

The IEEE Officers Elections for next year will be held during the first week of Spring Quarter! There are eight positions that need to be filled: Chairperson, Vice-chair, Treasurer, Secretary, Operations Manager, Publicity, Membership, and ESC Representative. If you are interested in running for any of these positions, applications are available in the IEEE Lounge.

The next EE News deadline is April 8, 1988!

If you would like to include anything in the next issue, please keep this date in mind.

Electric Energy Industrial Consortium - Overview and Activities

October 1, 1987 marked the fifth year of the Electric Energy Industrial Consortium's existence. Founded in 1983, the EEIC is a collaborative program between the University of Washington and industry which benefits both the UW's Electric Energy program and the growth and development of industry at all levels. Its main focus is on excellence in technological innovation and professional education for engineering practice. These two objectives are realized through industry-university cooperation, joint research activities, and graduate and continuing education programs for practicing engineers. In addition, the EEIC seeks basic financial support from industry member companies for the purposes of strengthening the electric energy program through such means as student scholarships/fellowships and visiting scholar honoraria.

The EEIC sponsors numerous activities which each serve a part in accomplishing its purpose. These include R & D workshops, department visits, research reports, and industry site visits at plants of member companies (currently there are six member companies: Avtech, Bechtel, Chevron, ESCA, Puget Sound Power & Light, and Seattle City Light). The EEIC also aids in coordinating between the university and industry in full, part-time, and co-op employment of energy students and encourages industry engineers to seek temporary faculty appointments.

The more prominent activities conducted by the EEIC are the Annual Review, Industry/Student Dinner, and Northwest Meter School.

The 4th Annual EEIC Review meeting was held on November 6, 1987. Among its purposes are the reporting of major accomplishments in the UW energy program and a general overview of undergraduate and graduate projects and research in the energy specialty. Highlights of the meeting this year were the presentation of the 1986-87 Annual Report by Prof. Venkata, faculty presenta-

continued on page 5

EE 478 Students Build Nordstrom Security System

Due to increasing theft experienced by Nordstrom, Professor Yongmin Kim was asked by security manager Susan Drasgol to design and build a security system. During the summer, Professor Kim and Susan set out to write the basic requirements for the system. Professor Kim then proposed the challenge to his Autumn 1987 EE478 students to design and build the system from the requirements. A team of three students, Sei Fujikawa, Tsai Huang, and Lawrence Yapp took on the challenge.

The design process consisted of weekly meetings with Professor Kim, store visits to Nordstrom, phone calls to various vendors, and countless hours spent in the lab. The security unit was implemented with Intel's 80186 microprocessor, along with a micro printer, display, and keypad. In addition to the hardware, a substantial amount of time was devoted to writing the software needed to drive the unit. The project was completed just in time for the final class demonstration.

In January of this year, Professor Kim and the students gave a presentation of the prototype to Nordstrom's Vice-President and section managers. Presently, the prototype is being reviewed by Nordstrom, and if it passes, they would like 3000 units to be used in their stores. The decision is expected to come by this May.

- S. P. Younit

EEIC, from page 4

tions, and discussion on industry/ university cooperation in regards to the energy curriculum.

Following tradition, the 5th Annual Industry dinner was held the day after the Review. The dinner is a chance for EE students to learn about the department's energy program and available career opportunities. Students and faculty received complimentary admission. A two-hour Energy Systems Lab open house was held before the dinner. After the dinner, recent graduates now working with companies like Chevron and Seattle City Light shared their experiences in the energy industry with the attendees.

In addition, undergraduate scholarships of $400 per month for the 1987-88 school year were presented to Kenneth Dearing, James Hannigan, Barry Keys, and John Siemion at the dinner. An EEIC graduate fellowship of $700 per month plus tuition was presented to Lawrence Wong, and Hemanth Marathe received an ESCA graduate fellowship of similar amount.

As part of the EEIC's continuing education program, the 33rd Annual Northwest Meter School was held from September 21-25. This year, 208 utility personnel took classes from five different levels of offerings in the week-long program. Graduate education is also supported, generally with both coursework and research being conducted by a industry-faculty-student team. Televised Instruction in Engineering (TIE) and more formal off-campus instruction leading to the MSEE degree are offered for the convenience of EEIC members.

The strength of the Consortium is largely dependent on the quality of the UW Energy program, which in turn rests on the depth and excellence of the energy faculty. The high caliber of our faculty was recognized in some of the honors they received last year - Professor C.C. Liu received one of the 200 Presidential Young Investigator's Awards given by the National Science Foundation in 1987. Prof. Liu's unique contribution to Expert Systems Applications to Power Systems prompted the bestowing of this prestigious honor. Also, many may remember that Professor T.H. Sloane was voted EE Teacher of the Year for 1986-87.

Students interested in energy should be aware that the combination of the EEIC and the strong Electric Energy program at the UW makes the energy specialty especially promising. Prof. Venkata, Director of the EEIC, said that the field of energy itself is not a highly sought after one, but the present demand for energy graduates does exceed the supply. About 15% of the graduates from our department, or roughly 30 students per year, are in energy, and about 18% of sponsored research in EE, or an average of $800,000 each year, is in the energy area.

- David Wu

Get involved -- become an IEEE Officer (and don't forget to *VOTE*)

Positions available:

Chairman	*Vice-chair*
Treasurer	*Secretary*
Publicity	*Membership*
Operations Manager	*ESC Representative*

If you are interested in running for one of these positions, applications are available in the IEEE Lounge!

Faculty/Graduate Student Activities

Four Ph.D. students (Ben Fahy, Larry DeSoto, Grace Bartoo and Hwan Choi) and a visiting scholar (Ikuo Tsukagashi) from the Image Processing Systems Laboratory (IPSL) as well as Prof. Yongmin Kim attended the SPIE Medical Imaging Conference that was held in Newport Beach, CA from January 31 to February 5, 1988. Mr. Fahy and Ms. Bartoo presented a paper, "A consistent DIN/PACS workstation interface based on MUVIP virtual image processing architecture," and "Mathematical morphology techniques for image processing applications in biomedical imaging," respectively. Mr. DeSoto demonstrated a PC-based radiological imaging workstation developed at IPSL.

On January 28 and 29, Prof. Yongmin Kim was invited to the University of Virginia to give a campus-wide colloquium on on Biomedical Imaging and to meet a number of faculty members, researchers, and students in Electrical Engineering, Biomedical Engineering, Computer Science, Biology and Radiology.

EE graduate student H.P. Yee presented a paper entitled "SPICE Models for Power MOSFETs; An Update," at the IEEE Applied Power Electronics Conference held in New Orleans, LA, February 1988. Prof. P. O. Lauritzen, who co-authored the paper with Yee, commended H. P.'s performance and professionalism during the presentation.

A front-page interview of Prof. Martin A. Afromowitz appeared in OE Reports, the International Newspaper of Optical and Optoelectronic Applied Science and Engineering, of the International Society for Optical Engineering (SPIE). The occasion was precipitated by a paper delivered at a conference on Medical Imaging in Newport, CA, organized by SPIE. The paper's title is "Multispectral Imaging of Burn Wounds," by Martin A. Afromowitz, James C. Callis (Chemistry), David M. Heimbach (Surgery), Larry A. DeSoto (EE grad student) and Mary K. Norton (former BioE grad student). The paper was presented by Ms. Norton at the conference. The story was picked up by UPI and broadcast across the country.

Prof. Martin A. Afromowitz gave a paper at the New Orleans Optical Fiber Sensors conference, sponsored by the Optical Society of America, entitled, "Fiber Optic Polymer Cure Sensor."

Prof. S. S. Venkata was invited by the Central Board of Irrigation & Power to deliver a keynote address on "Expert Systems Application to Distribution Automation" at the Diamond Jubilee celebrations held

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EE Stockroom

Student Helper Wanted

The EE Stockroom needs a new part-time student helper for next quarter. Responsibilities include tracking inventory, ordering new parts, and assembling student lab parts kits. Hours are flexible and are arranged around your calss schedule. Qualifications: EE370 (ENGR190) and/or laboratory experience; driver's license a plus.

If interested, please contact Dr. Kim in EEB 303 (5-2271).

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during December 17 - 20, 1987, in Calcutta, India. He also chaired a session there. During his visit, he also found time to visit the Central Power Research Institute in Bangalore, India, where he presented two invited lectures on "Wind Energy Conversion Systems" and "Distribution Automation" on January 8, 1988. He also delivered a paper in Bangalore on "Where Are We Heading in Transmission Protection" at an International Symposium on Power System Protection organized by the Institution of Engineers (India) during January 11-13, 1988. The paper was co-authored by Prof. M. J. Damborg and Dr. A. K. Jampala. Finally, he presented a seminar on "CCAE Software for Transmission Protection" to the Electrical Engineering faculty and students of the Indian Institute of Technology, Delhi on January 14, 1988. Congratulations, Prof. Venkata, for surviving what has to be the busiest trip of the year so far!

Prof. S.S. Venkata has been elected as Region 6 North (Pacific Northwest Region) Chapter Representative of IEEE Power Engineering Society for a 2 year term starting January 1, 1988.

Prof. Leung Tsang gave an invited talk at the Department of Electrical Engineering and Computer Science of the University of Michigan at Ann Arbor on February 2, 1988. The title of the talk was "Radiative Transfer Theory and Its Applications to the Study of Volume Scattering Effects in Microwave Remote Sensing."

Faculty/Graduate Student Publications

S.L Broschat, L. Tsang, A. Ishimaru, and E.I. Thorsos, "A Numerical Comparison of the Phase Perturbation Technique with the Classical Field Perturbation and Kirchoff Approximations for Random Rough Surface Scattering," J. of Electromagnetic Waves and Applications, vol. 2, no. 1, pp. 85-102, 1988.

K.F. Cheung, R.J. Marks, and L.E. Atlas, "Neural net associative memories based on convex set projections," Proceedings of the IEEE First International Conference on Neural Networks, San Diego, pp. III245-252, June, 1987.

A. Ishimaru and L. Tsang, "Backscattering enhancement of random discrete scatterers of moderate sizes," J. of Optical Society of America A, vol. 5, no. 2, pp. 228-236, 1988.

L.G. Shapiro, R.M. Haralick and M.J. Goulish, "INSIGHT: A Dataflow Language for Programming Vision Algorithms in a Reconfigurable Computational Network," International J. of Pattern Recognition and Artificial Intelligence, vol. 1, no. 3-4, pp. 335-350, December 1987.

T.H. Sloane, "Acquisition of Small-Signal Frequency-Domain Measurements from Switch-Mode Power Supplies," IEEE Trans. on Instrumentation and Measurement, vol. IM-36, pp. 898-901, December, 1987.

UNIVERSITY OF WASHINGTON

EE NEWS

Published by the Department of Electrical Engineering and the I.E.E.E Student Branch

Volume II, Number 7
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FROM THE EDITOR...

Well, this it it. In your hands you hold the last issue of the EE News in which I am editor. Starting with the next issue, your new editor will be none other than the irascible David Wu. A senior in EE, Wu has had previous experience as co-editor of his high school literary magazine and as assistant and photography editor of his high school yearbook. Please give David all the support you can and volunteer to help with the EE News. An artist's conceptual drawing of David is shown below. Don't mess with him.

- The Editor

Faculty Profile:
Dr. Irene C. Peden

by Brenna Chow

Dr. Irene C. Peden is one of two female professors at the University of Washington's Electrical Engineering department. In addition to her position at the UW, Dr. Peden's other achievements include the IEEE 1984 Centennial Medal, the U.S. Army's Outstanding Civilian Service Medal in 1987, and the IEEE 1988 Haraden Pratt Award "for leadership and outstanding contributions to the IEEE and education, technical activities, and Institute Boards." Dr. Peden is on the Board of Directors of the BDM International Corporation, is a member of the National Science Foundation's Engineering Advisory Committee, is 1988 Vice-President and President-elect of the IEEE Antennas and Propagation Society, and was the former chair of the Army Science Board. Dr. Peden also serves as a member of the Defense Science Board, which advises the Joint Chiefs of Staff and the Secretary of Defense on policy and technology issues.

When asked how she succeeded in engineering, a traditionally male-dominated field, Dr. Peden responded that she has always had a tendency toward science and engineering. In addition, she cites the influence of her mother, a former math teacher, who enjoyed her studies and who let her daughters know that they could do anything they wanted.

Dr. Peden was one of thirty women in the College of Engineering at the University of Colorado. World War II brought more income to U.S. families and, since the sons were fighting abroad and unable to take advantage of the extra capitol, the daughters were able to enter college. After she received her BSEE, Dr. Peden married and moved to Delaware

continued on page 2

Peden, from page 1

where her first job was with a power and light company in that state. Career opportunities for women were limited then and Peden admits that she was extremely lucky to get a job. From Delaware, Dr. Peden moved to California where her husband was accepted for graduate studies at Stanford University. While there, she worked at the Stanford Research Institute (now SRI International). However, she eventually became bored with making measurements and calculations for graduate students. Faced with the tedium of a job that she had already mastered, Dr. Peden decided to further her education. Even though she had been out of school for ten years, Peden applied to and was accepted by Stanford. She received her Masters and Ph.D. degrees in 1958 and 1962, respectively. After graduation, Dr. Peden decided to stay in education.

Since coming to the UW in 1961, Dr. Peden has performed well in all positions ranging from administrative to academic. She has served terms as both Associate Dean of the College of Engineering and Associate Chair of the Department of Electrical Engineering.

At the research level, Dr. Peden is interested in remote sensing—the use of electromagnetic techniques to detect remote objects. At this time, she is particularly interested in the application of remote sensing to detect the presense of underground tunnels. Subsurface radar in the 30-300 MHz range is the primary tool used in tunnel detection. The signal must radiate out and maintain enough energy to return and inform the investigator that it has detected something out of the ordinary. This is a difficult challenge when trying to detect objects located beneath the earth. Earth is a lossy, dispersive medium and is difficult to focus energy into. This challenge requires sophisticated antenna designs and advanced signal processing techniques.

Dr. Peden's work is being applied by the U.S. Army and the Army of the Republic of Korea to look for man-made, deep, dormant tunnels that North Korea is suspected to have excavated underneath the Demilitarized Zone (DMZ). Though funded by the U.S. Army, Dr. Peden's work is not classified and a booklet of the findings has been published. Her work has taken Dr. Peden to Korea twice already and she is planning to return again this spring.

With her heavy workload, Dr. Peden doesn't have much time for hobbies except for occasional boating trips in the summer with her husband and family. Although Dr. Peden has no children of her own, she has two stepdaughters whom she loves and considers her own.

This Spring, you'll find Dr. Peden teaching EE 467 (Antennas and Remote Sensing) jointly with Dr. Leung Tsang. She covers antennas while Dr. Tsang is responsible for remote sensing. The pair trade off so each can juggle travel commitments along with class meetings. As you read this, Dr. Peden is again out and about conquering new engineering challenges.

Time For The Annual IEEE Spring Picnic!

Stressed out from midterms? Burning the midnight oil too much lately? Well, here's a chance to forget about academics for one fun-filled afternoon...come to the 1988 IEEE Annual Spring Picnic!!! It will be held on Saturday, May 7th at Ravenna Park from 12 Noon until dusk. Your new IEEE officers will cook and serve a barbecue **feast** (FREE for all!). Planned activities include student versus faculty/staff volleyball, softball, croquet, waterballoon toss, and many other crazy and fun things EEs **love** to do. In addition, awards for Favorite Teacher and TA will be presented at the picnic. Keep on the lookout for flyers and posters concerning the picnic and make sure not to miss the fun!

Do your career a favor and...

JOIN IEEE!

An unpaid service announcement

From the Your Neighborhood Advising Office...

New Office Hours

Beginning Monday, April 18, the EE Advising Office will have new and improved office hours. The office will be open to students between 8:00 - 10:30 a.m. (in the mornings) and 1:00 - 4:00 p.m. (in the afternoons), Monday through Friday. During pre-registration and the first two weeks of each quarter the office will be open 8:00 a.m. - 5:00 p.m.

Majors Day

EE student volunteers are needed to help at the EE Department table during Majors Day. Majors Day is an opportunity for entering students to survey the different majors offered by the UW. The event will be held May 5th in the HUB. In addition, Prof. Potter would like to set up a display of some exciting student projects to enhance our presentation. Students wishing to volunteer their assistance or who have a project they would like to display should contact either Prof. Potter (Rm. 201) or the Advising Office.

New Continuation Policy

(Pay attention because this is ***important!)*** As before, full-time students must take 12 or more credits per quarter applicable to their degrees (otherwise, a part-time status petition must be filed). However, those students who are admitted with ESL requirements must enroll in one ESL course per quarter starting with their first quarter in the BSEE program and continuing until all ESL requirements are completed. These students must also take 10 credits in non-ESL courses that apply toward their degree each quarter they are enrolled in an ESL course.

April 29th is Picture Day!

It's picture time for the undergraduates! Both new and old students are to have their pictures taken for their files. It's a good way for your professors to remember you in the future when they are writing recommendations for you. Please drop by EEB 420 on April 29th from 10:00 a.m. - 1:00 p.m. Your participation is encouraged and it's **FREE**!

Announcing...
The New (and Improved) IEEE Officers!

The following people were nominated and appointed as the new 1988-89 IEEE Student Chapter Officers:

Radwan Faraj	Chair
Tom Jordal	Vice-chair
Camilla Thomas	Treasurer
Debby Tao	Secretary
Ashok Kumar	Membership
Yiling Chen	Publicity
Debra Briley	ESC Representative
Hsi Jung Wu	Operations

At the time of this writing, the new officers are busily planning their first big event, the 1988 IEEE Spring Picnic. The Spring Picnic will be held this year on May 7th at Ravenna Park from 12 Noon to dusk (see article this issue for more details). The new officers were unavailable to comment on their future plans for the IEEE. However, these good people need your help! No matter how dedicated the officers, student involvement is required for a successful year, so get with it and pitch in!

Staff Box

Writers
Brenna Chow
David Yee

Editor
Gilman Wong

Faculty Advisor
Bruce Darling

Status Report:
Professor Helms and Stewart Wu in Taiwan

During the Spring vacation, Professor Helms and Stewart Wu traveled to Hsinchu, Taiwan where they presented a one-week seminar on "The Design of Analog Integrated Circuits using a Silicon Compiler." They were invited by Dr. Che-Ho Wei, the Chairman of the Institute of Electronics and Department of Electrical Engineering of the National Chaio-Tung University located in Hsinchu, Taiwan, R.O.C.

Over one hundred graduate students and young professionals congregated at the beautiful new auditorium located on the National Chaio-Tung University campus to attended the seminar, "Silicon Compilation for Analog Integrated Circuits". The five day seminar consisted of three hours of lecture in the morning for each of the five days and three hours of demonstrations in the afternoon for the last three days. A projection unit enabled students to easily see the screen output of the Mentor workstation. Attendees showed great interest in the silicon compiler and most of the designers expressed the desire to develop their own modules. Silicon compilers facilitate the design of semiconductor I.C.'s by automating the design process. Given the specifications of a device, the compiler produces the physical layout of the semiconductor independent of the fabrication process. Thus, if the fabrication process used to produce a device is changed, the silicon compiler can automatically produce a new physical layout—the engineer does not need to redesign the device.

While in Taiwan, Helms and Wu were invited to visit the Industrial Technology Research Institute of ERSO (Electronics Research and Service Organization) by Wen-Fu Yang, the manager of the Design Section of the Analog I.C. Department at ERSO. ERSO, a government agency charged with the task of developing new electronic technology and transferring it to industry, employs about 1800 workers, of which 700 are designers. Regrettably, a similar agency does not exist in the United States.

After the ERSO visit, the pair rushed to the Taiwan Semiconductor Manufacturing Company (TSMC) to meet with Process Engineering Department Manager Charles Kao. TSMC is a fast growing new production fabrication facility with approximately 50,000 six-inch wafer starts per month. They have 2 micron and 1.5 micron two layer metal processes in production and are working on a 1.2 micron process. A second, larger facility is being planned.
In addition, Helms and Wu visited United Microelectronics Corporation (UMC), Taiwan's largest fabricator. They have 3 micron two layer poly, 2 micron and 1.5 micron two layer metal processes in 24 hour production. About 30% of their business is with Application Specific Integrated Circuits (ASIC). They work with U.S. fabrication customers through NMC in California and have a design capability both in Taiwan and in California through Unicorn Corporation.

Professor Helms praises the exceptionally able and enthusiastic support given by Seattle Silicon Corporation and Mentor Graphics Taiwan. Seattle Silicon provided a demo copy of their CONCORDE silicon compiler and the assistance of their Asian applications engineer Matsuhiro Suzuki. Mentor Graphics Taiwan provided the assistance of two able applications engineers and a Mentor 3000 node for the auditorium.

Professor Helms thought that the seminar was be very successful and raised a lot of interest in silicon compilers. In general, he found the level of enthusiasm in Taiwan now in electronic circuit design is at least as great as it was here ten to twenty years ago. Students proudly wear T-shirts with "I.C. Designer" and "Electrical Engineering" logos. There is an enormous electronics market in

Helms & Wu, from page 4

Taipei where every type of component parts, subsystems, computer boards, are available at low prices, indicating a high level of electronics expertise and interest. Helms notes that the fabrication facilities he saw were modern, state-of-the-art facilities with rapid construction of additional plants. Their universities have more modern CAD equipment than ours, at least in comparison with the UW. Additionally, government support of engineering design research seems much greater than here in the United States, where most goes to science. Helms is convinced that Taiwan may soon rival Japan in electronics and that we in the United States need to rededicate ourselves to electronics circuit design or we will be left in the dust.

$$$ Job Opportunities $$$

Need some cash? The following student positions are now available:

Kirsten Wind Tunnel

A student helper is needed to work up to 19.5 hours per week at the Kirsten Wind Tunnel. If you are expected to graduate after June 1989 and are familiar with electronics and professional soldering techniques, you are qualified. The job requires good troubleshooting skills and the use of standard electronic equipment. You must be a U.S. Citizen and enrolled in the College of Engineering. Interested students should inquire at the Kirsten Wind Tunnel Office (543-0439) or contact Bob Gratton (543-0337).

EE Stockroom

Two student helpers are needed to run the EE Stockroom during the summer quarter and break. Responsibilities include maintaining the stockroom inventory, preparing student laboratory kits, providing technical advice, and running occasional errands for the business office staff. Hours are flexible. Requirements are EE310, troubleshooting skills, and a general knowledge of electronic components (what you don't know, you'll probably soon learn!). Interested students should contact Prof. Yongmin Kim (EEB 303, 545-2271).

Faculty and Graduate Student Activities

Hwan Choi, a Ph.D. student in the Image Processing Systems Laboratory (IPSL), and Prof. Yongmin Kim attended the National Computer Graphics Association (NCGA) Conference in Anaheim, CA, March 20-24, 1988. At the conference, they participated in the Pegasus User's Group Meeting (PIXAR Image Computer Users in biomedical imaging supported by Philips Medical Systems, Inc.) by presenting biomedical imaging research and development activities at the University of Washington.

Ben Fahy, a Ph.D. student in the Image Processing Systems Laboratory (IPSL), attended an American National Standards Institute (ANSI) committee meeting March 28th in Anaheim, CA, concerning a proposed software standard for image processing (X3H3.SD-3). At this meeting he was named to the Architecture Proposal Team, for which his duties will include surveying the current state-of-the-art in imaging standards and participating in the creation of a mathematical model of imaging. Prof. Yongmin Kim, director of IPSL, is also serving as a member of the ANSI imaging committee. When a standard is developed (expected early 1990), the IPSL will produce prototype implementations for several different image processors, including the PIXAR 2, a state-of-the-art image computer, as well as several image processors developed within IPSL.

Prof. Yongmin Kim was an invited speaker at the IEEE Computer Society of United Kingdom and Republic of Ireland Chapter Meeting on Computing in Medicine on March 3, 1988 in London, England. He also met

continued on page 6

Activities, from page 5
a number of faculty members and researchers at the Imperial College and the National Heart and Chest Hospital.

Prof. Kim also attended the Electronic Imaging '88 Conference in Anaheim, CA, March 28-30, 1988, and presented a paper entitled, "PC-based floating point image processing system," on March 29, 1988.

Prof. Yasuo Kuga presented two papers, entitled "Backscattering Enhancement by Randomly Distributed Particles of Different Sizes" and "Imaging of an Object Behind Randomly Distributed Particles," at the SPIE 1988 Technical Symposium Southeast on Optics, Electro-Optics, and Sensors held in Orlando, FL, April 4-8, 1988.

Dr. Robert Porter has been invited to serve as a member of the Naval Research Advisory Committee (NRAC). NRAC is an independent civilian scientific advisory group dedicated to providing objective analyses in the areas of science, research and development. It is the senior scientific advisory group to the Secretary of the Navy, the Chief of Naval Operations, Commandant of the Marine Corps and the Chief of Naval Research. Membership to this committee is limited by law to 15 members who are preeminent in the fields of science, research, and development, with one member specializing in medicine. Members are selected from industry, academia and research institutes, and non-DoD government agencies, and are appointed by the Secretary of the Navy to a two-year term.

Prof. Arun Somani presented two papers in March. The first, entitled "Rendezvous Type Protocols without Acknowledged Packets," was presented at the 1988 Phoenix Conference on Computers and Communications held in Phoenix during March 16-18, 1988. The second paper, "Potential Problems and Design Methodology for Distributed Fault Tolerant Computer Architecture," was presented at the ISED workshop held at the Glendale Club in Bellevue, WA during March 21-22, 1988.

Prof. Leung Tsang has recently been appointed as an Associate Editor of the journal Radio Science. Presently, he is also an Associate Editor of the IEEE Transactions on Geoscience and Remote Sensing and is on the Editorial Board of the Journal of Electromagnetic Waves and Applications

Faculty and Graduate Student Publications

P. Chinn, R.M. pier, L.A. DeSoto, H.G.M. Zieber, D.A. Verheiden and Y. Kim, "PC-based floating point image processing system," Electronic Imaging '88, pp. 233-238, 1988.

M.A. El-Sharkawi, S.S. Venkata, N.G. Butler, R.J. Yinger, "The Adoption of High Technology to 15-kV Adaptive Power Factor Controllers," presented at the **IASTED International Conference on Energy**, Phoenix, AZ, March 1-3, 1988.

S. Oh, D.C. Park, R.J. Marks II and L.E. Atlas, "Error detection and correction in multilevel algebraic optical processors," **Optical Engineering**, vol. 27, pp. 289-294, 1988.

UNIVERSITY OF WASHINGTON — *Department of Electrical Engineering*

EE News

September 1988 Volume 3, Number 1

Search Underway for New Chairperson

Endrik Noges Named Acting Chair

At the end of Spring Quarter Professor Robert Porter resigned his position as Department Chair. Professor Porter became Chairman in October 1985 following Professor Meditch who had served for eight years. Professor Porter remains on the faculty although he will be on leave this year.

Dean J. Ray Bowen has appointed Professor Endrik Noges as acting chair until a permanent replacement is named. Professor Noges has been on the faculty since 1958 and most recently served as Associate Chairman for Curriculum and Undergraduate Studies. Professor Noges has served the department in many capacities during his career here including a three-year term as the first director of the Televised Instruction in Engineering Program (see related story on page 7). His main technical area is linear and nonlinear controls.

A committee has been appointed by the Dean to search for a new chairperson. Members include professors Kermit Garlid (Nuclear Engineering Chairman), Irene Peden, Yongmin Kim, Chen-Chung Liu, Les Atlas, Bruce Darling, and Mark McDermott (Physics). The committee is eager to have any input members of the department would care to give.

—Bill Moritz

Dr. Endrik Noges

In This Issue:

Computer Engineering Program Accredited

Following an intense effort by the faculty, staff, and students of the department, we were notified in early August that the B.S. in Computer Engineering degree program has been accredited by the Engineering Accreditation Commission of ABET. This follows the action of the state Higher Education Coordinating Board in May of 1987 which permitted the department to offer the new degree program.

The accreditation process began in January 1987 with a request to ABET. A detailed "self-study questionnaire" was submitted in May and last October a team of four visitors from off-campus spent two days examining our program. This examination included meetings with faculty, students, and adminstrators as well as tours of the laboratories. Course materials including samples of student work were also reviewed. A preliminary report of the team's findings was received during Winter 1988. The final action was taken by the Commission in July.

Our program joins approximately 40 other accredited Computer Engineering programs in the U.S. and is the first (and we believe only) such program in Washington state. A list

(continued on page 7)

Hessla Appointed to IEEE Seattle Section Chair

Recently Erling Hessla, a practicing engineer at Shute Engineering in Seattle, has replaced C.V. Chung of Puget Power as the IEEE Seattle Section Chairperson. Realizing that most EE students (and possibly some faculty) know little to nothing about the Seattle Section, EE News requested and was granted an interview with the new chair. Most of our questions were directed toward how the local student branch interacts with the professional section, whether that relationship can be improved, and how.

The Seattle Section is a smallish professional organization with nearly twenty officers, consisting of the Chair, Vice-Chair, Secretary, Treasurer, PACE Chairman, four Members-at-Large, and officers who represent various societies. An example of the latter is our own Prof. Chen-Chung Liu, who is chairman of Power Engineering Society PE-31. Hessla was appointed Section Chair by an executive committee, based on his previous experience as Secretary and Vice-Chair in previous years. He has been serving in this capacity since July 1.

The fundamental purpose of the Seattle Section, according to Hessla, is "to provide technical information" to those who require it, and to promote growth among the local societies and University Sections. He pointed out that for most engineers, IEEE is the only means of keeping current on new technologies after graduation. His own personal experience illustrates this need quite well. Hessla has been an IEEE member for 41 years, obtaining his BSEE at the University of British Columbia long before the invention of the transistor, the computer revolution, and many other significant technical innovations. Through IEEE conferences, publications and professional meetings, he has been able to stay up-to-date.

Besides the focus on engineers who have already obtained their degrees, the Section is committed to serving the needs of those up and coming. They partially or wholly sponsor the university student branches at UW, Seattle University, and Seattle Pacific University. One of Hessla's personal goals is to reach down into the high school and even junior high school level, to encourage students to obtain adequate technical backgrounds as early as possible. Otherwise, as he pointed out, by the time they get to the university, they may be too far behind to compete effectively. This concern especially applies to minority students. Jose Bolanos, the education member-at-large, is interested in setting up a program for professional engineers and university students to visit high schools, encouraging blacks, hispanics and indians to consider engineering as a career. Students interested in participating in such a program can contact Bolanos at 394-3566.

Hessla believes the Section should move away from the "allowance model"

The relationship between the Section and the Univer-

(continued on page 4)

Student Conference Organizer Needed

Prof. Kim is seeking a student to help in organizing an IEEE conference of 1,200 to 1,500 attendees which will be held here late next year. The workload will be variable, beginning at ~10 hours per week with a peak around March—June at ~20 hours per week. Responsibilities will include managing and organizing a database of ~860 papers and interacting with people over the phone. Sophomores or juniors are preferred. Apply to Prof. Kim in EEB 303, 545-2271.

Marilyn Kramp New Undergrad Advisor

Among the other changes taking place this summer was a changing of the guard in the Advising Office. Joy Hirschstein, who has served most recently as Undergraduate Advisor, is planning to reduce her workload to about half-time in the fall. Joy will remain in the office as the Assistant Advisor.

Last year the department was fortunate to be able to hire Marilyn Kramp to work in the Advising Office. She now has been appointed as Undergraduate Advisor. Marilyn has been at the UW for 10 years and came to us from the Department of Materials Science and Engineering where she was program assistant in charge of the Mineral Institute. Prior to that she worked in the Dental School as the Graduate Program Assistant in Periodontics. Marilyn is looking forward to working with the undergraduates. We all wish her well in this somewhat difficult position.

—Bill Moritz

51 New EE Students Admitted Autumn 88

During the summer a committee of the faculty struggled with one of the most difficult admissions cycles in recent times. Confronted with 158 qualified applicants, the Admissions Committee was originally charged with selecting the best 50 for admission to the EE/CompE programs. The small number of openings resulted from a reduction in the size of the undergraduate program. From the spring total undergraduate population of approximately 510, the Department will be trimming that number back to about 450 over the next couple of years to bring our headcount more into line with our resources.

Following yeoman work by the Advising Staff in checking all the applications and preparing various compilations, the committee attempted to select those students most qualified to successfully complete the program. Having picked 50 after a day and a half, the committee felt that they could not reject all of the remaining 108 applicants. It returned to the faculty and got authorization to take 10 more. Five students were also accepted under minority requirements, for a total of 51. When the dust clears we expect to have about 485 undergraduates starting Autumn Quarter — still 35 more than our target.

In any case, the faculty wishes to welcome the following 48 students into the EE program. The remaining 14 were admitted to CompE (see related article on this page).

—Bill Moritz

New Computer Engineering Students Welcomed

During the summer admissions cycle a total of 18 students were admitted into the Computer Engineering degree program. Fourteen of these were new students and four transferred from the BSEE program.

Total enrollment now stands at 43 with our first graduate expected at the end of Autumn 1988. A complete list of those currently enrolled is posted on the CompE bulletin board on the second floor. The program is projected to grow to about 90-100 students in the next year or two.

—Bill Moritz

(Editor's Note: See somewhat related but interesting graphs on Page 6)

EE Advising News

We'd like to welcome back all old students and also say welcome to the new.

Undergrads: You must file by October 7. Make an appointment with Marilyn in the Advising Office (EEB 215).

Grads: You must fill out an application for Master's Degree in the Grad school by October 7.

The sooner you do this, the better.

Also... EE 474 will be given Winter 1989. There is a strong possibility that it will not be taught Spring 1989 so make your plans accordingly. Make sure you check the board in the Advising Office for further details.

Come by and see us if you have any questions and *best of luck this quarter!*

—Joy, Marilyn, and Linda

Autumn 1988 Undergraduate Admissions

Electrical Engineering

Mark Ausmus
Sharon Barnes
Frank Betts
Kenneth Bjorkelo
Troy Briest
Jimmy Chang
Kraig Danielson
Michael Dong
Ba Duong
Robert Emery
Jimmy Eng
Phillip Escobar
Kenneth Fung
Voltiare Ganchorre
Jeff Gellner
Luis Gomez
Matthew Gordon
Karl Griep
Alemayehu Gulelat
David Guthrie
Xiao Huang
Yao-Long Huang
Mark Jarcola
Raymis Kim
Kok-Ming Koh
Darwei Kung
Ching Lee
Khanh Lee
Tracy Lewis
Stephen Locke
Tomas Lopez
Richard Mallonee
Derrick McClinton
Daniel Mioller
Diane Milton
Kai Neumann
Thuan-An Nguyen
Edward Peck
Tu Phan
Carey Schenck
Davorit Siek
Todd Stewart
Senait Telahun
Vu Tran
Hung Vo
Qian Wen
Brian Wilson
Dale Wilson
Wilfred Wong
Lee Yang
Erick Zimmerman

Computer Engineering

Chris Aarke
Darren Anderson
Troy Anderson
Kraig Brockschmidt
Douglas Ferry
Christopher Fleming
Linda Fosberg
Eka Ginting
Terri Howe
Chris Kauffman
Shawna Kraght
Viet Mai
Chuong Nguyen
Tuan Phan

Professors Sloane and Lin Resign

Two of our junior professors resigned their faculty positions during the last couple of months. Tom Sloane announced his resignation at the end of Spring Quarter when he was offered a position at Bucknell University in Pennsylvania. Known for his dedication to his students, Tom was twice the recipient of the EE Teacher of the Year Award. His interests are in power electronics but he taught a wide range of courses during his three years in our department. He reports that Lewisburg, Pennsylvania, is a far cry from Seattle. For example, he says he cannot get fresh ground coffee and that the best breakfast place in town is Mr. Donut.

Recently Paul Lin announced that he was leaving to take a position at Bell Communications Research in Piscataway, NJ. Paul also joined the faculty in 1985 and while here taught courses in distributed computing, operating systems, data structures and communications. Paul left at the end of September. He too is finding that things are different away from Seattle — particularly as he and his wife try to buy a house!

The faculty, staff, and students will miss these two fine professors and wish them the very best in their new environments.

—Bill Moritz

(Hessla, from page 2)

sity branches has historically been subject to ups-and-downs, often depending on the interest of the local faculty advisor, who serves as the main source of communication between the Section and the Branch. Enthusiastic advisors coupled with highly-motivated IEEE student officers can lead to an excellent, cooperative relationship. Hessla believes the Section should move away from the "allowance model," in which the student branches simply fill out a budget every year as their only form of interaction with the Section. Hessla would much prefer that the student branches "come up with good projects which require a capital investment, and draw good student participation." He said that such projects could be highly experimental (fun) in nature, and wouldn't be judged so much by what is accomplished, but rather, by the learning and interest which results from the attempt.

Hessla pointed to the recent surge of interest at Seattle University as a good example

Hessla pointed to the recent surge of interest at Seattle University as a good example of how the University branches and Section can cooperate. A couple of years ago, Seattle U found that as a result of toughening admission requirements to the UW Electrical Engineering program, their own enrollment was increasing dramatically. Seattle U is much smaller than UW, with only about 120 EE students. Prof. Gary Erickson of Seattle U teamed up with his IEEE Student chair, Mike Riley, and came up with the idea of putting in a satellite dish at Seattle

(continued on page 6)

The Solid-State Laboratory

My research deals with all aspects of optoelectronic integrated circuits (OEIC's) — design, fabrication, characterization, and testing, and as a result, our research group utilizes the resources of numerous laboratories on campus. Principal among these is the Molecular Beam Epitaxy laboratory, run by Prof. Kuhn, although most of the actual device fabrication occurs in the Solid-State Laboratory, Room 120 in EEB.

Due to increasing questions of "just what is going on in Room 120?," I thought that a short description of my research would be an appropriate answer.

Integrated optoelectronics is the combing of optical devices such as photodetectors, modulators, waveguides, and emitters (LED's and lasers) with standard integrated circuit devices such as field-effect transistors, diodes, and the like, all on the same monolithic (single crystal) substrate. The substrates used are all compound semiconductors, chiefly GaAs although from time to time InP is used, with epitaxially-grown doped layers of these compounds or their alloys, such as (Al,Ga)As or (In,Ga)As, on top. Compound semiconductors offer more favorable electrical and optical properties than standard silicon for optoelectronic and high-speed devices, although the fabrication of these devices is somewhat more difficult.

At present, about six dedicated Ph.D. students are investing the

(continued on page 10)

Fall Welcome Party On Oct. 3

As you reluctantly drag yourself back to the confines of the good old EEB this fall, you're probably reminiscing about the warm, sun-drenched beaches, the cool breeze ruffling your hair, and the tan acquired through many afternoons dozing beneath the golden sun. Well, *it's over*, and school has begun. However, do not despair, because there's one last chance for a good time before the academic crunch... The Fall Welcome Party!!! This fun and exciting IEEE-sponsored event to welcome all students, old and new, will take place on Monday, October 3, starting at 5:00 in EEB 321 and moving to the lounge and eventually the HUB Games Area.

During the course of the event, you will get the opportunity to enjoy the recreational facilities provided in the HUB Games Area *free of charge*, which includes bowling, pool, ping-pong, foosball, darts, and other activities. Several multi-talented members of the faculty, including professors Zick, Marks, and Darling, are scheduled to demonstrate the proper techniques for playing these games. and are certain to be the hit of the party. In addition, pizza and pop will be served. As a prelude to the party, Dr. Noges, the new EE Chairperson, will speak briefly about the Electrical Engineering department,

Again, that's FREE PIZZA

and students are encouraged to ask questions.

Again, that's **FREE PIZZA**, free fun, and the opportunity to mingle with the academic elite within a completely social atmosphere. Don't miss out on "THE" social event of the quarter and watch for posters with more details. See you there!

—Debby Tao

IEEE Student Branch Activities

Sweatshirts

Attention, everyone! The *all new* EE sweatshirts are *now available* for purchase through any IEEE officer. In addition, they will also be sold at the Fall Welcome party on October 3rd. The prices are $18 for IEEE members and $20 for non-members. Available in two great colors, grey and sea-mist, these sweatshirts will certainly add status and character to your fall/winter wardrobe.

Test File

Starting this Fall, there will be a test file available for student use in the lounge. The tests currently available include all 300-level EE courses and many of the 400-level classes as well. The procedure for utilizing the test file will be posted in the lounge, and the test file should be in operation by the third week of this quarter.

Reminiscences on Being an IEEE Officer (Part I)

by J. Ben Fahy, Former Membership, Public Relations, and Operations Officer

The purpose of this article is to answer some questions people may have about what IEEE is, why you should or shouldn't get involved in it, and how the whole thing is put together and works. The information is based on my two years as an IEEE officer, first as Public Relations Officer, and second as Membership/Operations Manager. I've been out of the game for about six months now, so I think I can give a fairly sober, unbiased rendition of what the whole experience was like. also, most of my fellow officers have graduated and left the university, so I can afford to be blunt where necessary. I'll talk about such things as why people join IEEE, why some become officers, what they do as officers, how it relates to Seattle Section, and some of the nitty-gritty details of IEEE duties. The presentation will be mostly historical, and the style somewhat rambling. If I do my job right, this will give you some appreciation of the poor souls who are currently occupying the various offices, and also give you information on how best to take advantage of what's available.

The Early Days

I joined IEEE about three years ago, mostly for the reason that I thought it would look good on my resume. Three years later, this is still the single best reason I can come up with for joining, mostly because I think it's true — it **does** look good on your resume. It also gets you a cheaper price on sweatshirts and some other IEEE stuff, but that usually isn't enough to make up the price of membership, with one exception: if you subscribe to IEEE publications, such as IEEE Transactions, it can

(continued on page 7)

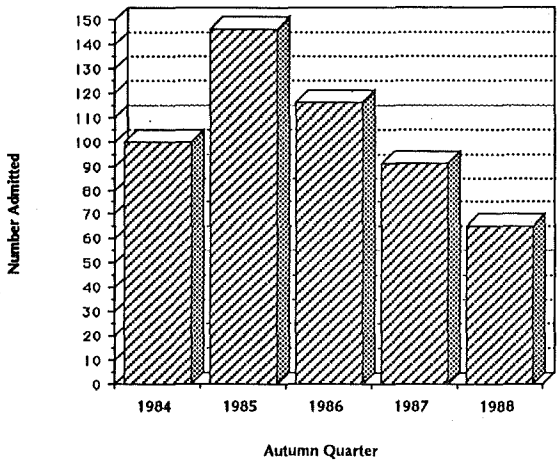
(Hessla, from page 4)

University to beam in IEEE programming such as conferences and meetings from the East coast. They laid out a thorough plan for where the dish would be stored, obtained use of a classroom for showing the programs, and presented the project plan to the Section. The Section was impressed by the proposed amount of student participation, requested the right to use the room and dish for their own meetings on an irregular basis, and funded the project. The results? Mixed. Because the IEEE charges more to transmit a program than the Section has been able to raise from attendance, it has been a consistent money loser. Yet Hessla and the rest of the Section still consider the project a success, because student participation and enthusiasm were both high, and they hope this experience will encourage other student groups to come up with innovative projects in the future.

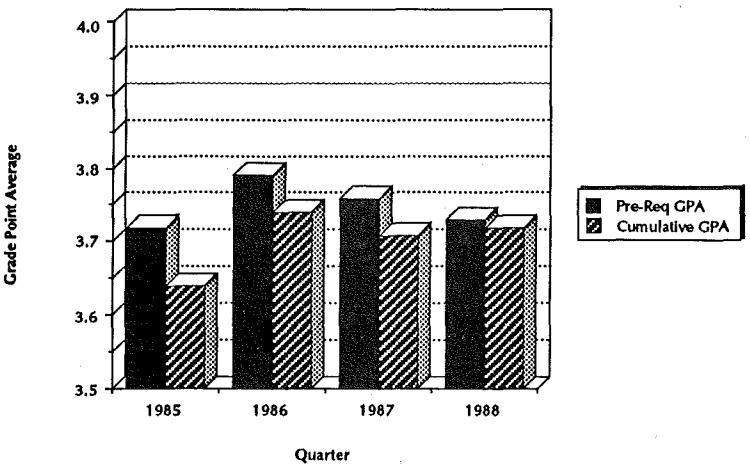
Right now, according to Hessla, the relationship between the Seattle Section and the three student branches seems to be on an upswing. The present faculty advisors at the three universities, Prof. Erickson at Seattle University, Prof. Daniels at Seattle Pacific, and our own Prof. Darling, have all been very responsible and have devoted much time to keeping the links well-established. He expressed concern over the issue of how Seattle Section can maintain communication as good advisors burn out, and new ones are possibly appointed who don't have the same time, energy, or commitment. He said that the Section is very open to new ideas and project proposals, but he emphasized that the impetus and motivation will have to come largely from the students themselves. The goal is not to hold the students' hands, but rather, to give them the opportunity to follow through on their own initiative.

—J. Ben Fahy

Five-Year Trend: Autumn EE Admissions



Five-Year Trend: GPA of Entering Students



(CompE Accredited, from page 1)

of schools accredited prior to the summer of 1988 is posted on the CompE bulletin board on the second floor. A more recent list which would include UW has not yet been received from ABET.

Accreditation is very important because it demonstrates that our program meets certain criteria. Many companies restrict their hiring to only those programs that are accredited. Additional information can be obtained from the Advising Office, Room 215.

Many companies restrict their hiring to only those programs that are accredited

—Bill Moritz

Noges: Man of A Thousand Years

Faculty Profile

Few of today's students could imagine the depth of Dr. Endrik Noges' experience in electrical engineering, both here at the UW and elsewhere. Dr. Noges joined the department Christmas 1958, along with professors Hsu, Ishimaru, and Lytle. He was a Fulbright lecturer in Finland in 1963-64 and then served as Assistant Dean of the UW College of Engineering from 1965 to 1971. Dr. Noges was Secretary-Treasurer of AIEE the year that IRE and AIEE joined to form IEEE, and subsequently was the Chairman of the Seattle Section of IEEE. In 1972-73 he was a visiting professor at the University of Karlsruhe in Germany. In 1982 Dr. Noges was appointed the first Director of the Televised Instruction in Engineering (TIE) program and was instrumental in setting up the program. He was the TIE Director until Autumn of 1985, and in January of 1986 was appointed to Associate Chairman for Curriculum and Undergraduate Studies in the Electrical Engineering department. Following Dr. Porter's resignation as Chairman, Dr. Noges became Acting Chair effective July 1, 1988.

As a co-op student he had personal contacts with both Shockley and Norton

Born and brought up in Estonia, Dr. Noges finished his last year of European high school, Gymnasium, in Germany, and attended the Technical University at Karlsruhe for two years. He then spent two years at Denison University in Ohio before transferring to Northwestern. He received a Bachelor of Science, Master of Science, and Ph.D. degrees in Electrical Engineering at Northwestern. In his bachelor's program he was a co-op student and worked at Automatic Electric Company and at Bell Telephone Laboratories, a research arm and one of the foremost electrical engineering research laboratories at that time — transistors were invented there. As a co-op student he had personal contacts with both Shockley and Norton. Dr. Noges is married and has three children; all are involved in engineering or academia. One is a graduate of the Chemical Engineering Department and is a senior process engineer at an oil refinery in Tacoma; one is a Mechanical Engineering graduate, working for the Boeing Commercial Aircraft Company in hydraulics, and one is teaching the clinical portion of a nursing program in Wenatchee College.

Dr. Noges' field of specialty is automatic control; he has taught most senior elective and graduate courses in that area. Last Spring Quarter he taught EE 583, nonlinear automatic control, and he typically has been teaching the televised version of EE 446. His research areas include pulse frequency modulated control systems and discriminate function analysis applied to a problem based on radar signatures. He is also involved with guidance and navigation research.

When asked for a few words of advice for the students, Dr. Noges pointed out that general principles have more lasting value than detailed procedures. If one understands the physics of a device, for example, one can adapt to a new device and its basis of operation. If one learns only the characteristics of a device, one can only deal with that particular device. This principle can also be applied to signal processing, controls, computer languages, and so on. Dr. Noges also has noticed that some students learn by "compartmentalization;" they know how to do various things, but they don't know how they fit together. He would like to see professors encourage students to develop more global understanding of their material.

(Reminisces, from page 5)

save you a ton. I subscribe to four, besides the mandatory Spectrum: *Transactions on Biomedical Engineering*, *Pattern Analysis and Machine Intelligence*, *Medical Imaging*, and *Computer*. So I save about two tons. If you are interested in trying out one of the journals, or you need that extra line in your resume under "Organizations, Member Of," then joining probably makes sense. Otherwise, by all means, put it off for a while. All IEEE events are open to everybody in the department anyways, and nobody is going to give you any pains for not being a member. It's written in blood in the student section constitution.

I want to make it very clear from the beginning that my motivation for becoming an IEEE officer had nothing to do with altruism, idealism, or even wanting to be perceived as a "good guy." I originally ran as a lark, with a couple of other members from my lab, because we noticed the day before the election that there were several offices open with-

(continued on page 8)

(Reminisces, from page 7)

out anybody running for them. I ran unopposed for Public Relations Officer on the platform that I was good at making posters, which was a lie. A friend, Jerry Stone, was elected Secretary after giving a stirring campaign speech consisting entirely of, "if elected, I promise to join IEEE." This also proved to be a lie, at least for a quarter or two: he hadn't joined by the time he left office. In those days, there wasn't much competition for positions, and I don't think it has changed much today. The second year I ran, we ALL ran unopposed, and we specifically negotiated in advance which offices each of the six people "running" would assume. The moral here is that if you want to participate in IEEE later this year, and you're worried about winning some horrible election, relax — you're a shoe-in, whether you have the slightest qualifications or not. Now doesn't that make you feel better?

Besides the sheer lunacy of entering the political fray the day before an election and running unopposed, my only other reason for running was that if I were elected, I would have an excuse to introduce myself to every pretty girl in the department. Like I said before, altruism was about the last thing on my mind. So sue me, I like pretty girls. Other people had less slimy reasons for getting involved. Joe Chauvin, who ran for Vice-Chair, sincerely wanted to class up IEEE's act, bringing in speakers from industry to talk about our potential jobs as career engineers, etc. Jim Gee, the Chair, was on a mission to cure EE students of being nerds. He spent amazing amounts of energy organizing dances and other things nobody showed up to, before he realized he was starring in Mission: Impossible, and was forced to re-evaluate his objectives. Peter Jurgens was a fairly good Treasurer, partly because his girlfriend (now his wife) had been an officer the year before and would give him good advice, and partly, I think, because he coveted touching the money. I'm not saying he ever took any of it; I just think he liked to fondle it. Some people are simply "that way," and they make the best treasurers. If you have any doubts on this subject, hold up a dollar bill in front of Camilla Thomas, the current Treasurer, and watch her eyes widen and her pupils dilate. I believe it's a genetic trait common to all IEEE Treasury Officers.

A friend, Jerry Stone, was elected Secretary after giving a stirring campaign speech consisting entirely of, "if elected, I promise to join IEEE"

Of the remaining officers, Andrea Olsen, Membership, and Stephen Cheng, Student Council Rep, probably had good reasons for running, though I never ascertained them. I'm fairly sure that Jerry's main reason was curiosity. Plus, he was probably very eager to deliver his brilliant campaign speech, which worked well enough to get him elected (he too ran unopposed). All in all, we were a fairly motley crew, and the most important thing I can stress here is that we knew nothing, absolutely NOTHING, about what it was we were supposed to do, after we came into office. We had a brief meeting with the old officers, we got our keys, we learned how to make coffee, and that was about it. Maybe Jim and Peter knew what was going on, I don't know to this day. Our "faculty advisor" never showed up, and we got no information at all from Seattle Section.

The coffee machine became an object of hatred and loathing for a majority of the officers fairly early in the game. All that was bad in IEEE, and there was a lot at first, was symbolized by the coffee machine. You had to carry it into the men's bathroom to fill it, since there wasn't a water outlet in the IEEE lounge in those days (this was back when the lounge was on the second floor, in room 222 which is now a classroom). Since the coffee machine wouldn't fit in the sink, you had to stick a hose over the faucet to redirect the water flow, leaving great puddles of water on the floor in the process (the hose leaked). That wouldn't have been a problem, except you had to pick up eighty cups of water in your arms in walk through the puddles on your way back out the bathroom, which was a harrowing experience at times. Miraculously, nobody was ever injured, and even more astonishing, I don't think anyone ever asked Andrea what she was doing walking in the men's bathroom with a coffee pot in her arms late at night. People don't question things much in our department, I guess.

The most important thing I can stress here is that we knew nothing, absolutely NOTHING, about what it was we were supposed to do after we came into office

The main problem with our being inexperienced and having no one to guide us was that Spring Quarter has traditionally been the busiest time for IEEE officers. there is the Spring Picnic, majors Week, Talk to the

(continued on page 9)

Noges: A Look at the Upcoming Year

The Electrical Engineering Department has 42 faculty members, around 30 teaching assistants, and a large number of research assistants and staff. Normal day-to-day operations and some minor changes in the organizational structure of departmental governance are taking much of Dr. Noges's time. In addition, a few major happenings are anticipated for the 88-89 academic year:

■ The ABET accreditation is coming up next year, which is a high priority item for faculty attention. An accreditation team will visit the department in Autumn 1989. The program has been accredited in the past and there is optimism about the upcoming review; the faculty just has to make sure that all documentation is appropriate. Both Electrical Engineering and Computer Engineering will undergo an accreditation review since both have already been accredited. ABET would like synchronize the accreditation review process so that EE and CompE accreditation evaluation will occur at the same time. Typically an ABET accreditation review comes around every six years or so.

■ During this biennium some of the space in the basement will be converted for use as a computer laboratory. The TAs/RAs officed in the basement will be moved to a more cheerful environment in Room 315. In addition to this change some improvements of the existing undergraduate labs will be made. There will be some construction during the academic year , that hopefully will not be too disruptive to normal academic activities.

■ A past member of the national board of directors of Eta Kappa Nu , Chairman Noges is working to establish an Eta Kappu Nu chapter in the EE department. Eta Kappa Nu is a national electrical engineering honor society that is particularly active on the east coast. There is a chapter of the national engineering honor society, Tau Beta Pi, at the UW, but Tau Beta Pi is a general engineering honor society that does not distinguish between the various engineering disciplines.

(Reminisces, from page 8)

Kiddies Day (I forget the real name), plus Jim sponsored two dances and Joe brought in a speaker. In other words, we had plenty of things to do, we just had not idea how to get it done. We tended to be late with everything and were continually disappointed. Both dances flopped, which is not surprising when you consider there are nine guys for every girl in EE. We only had one professor show up to the Spring Picnic for the Student/Faculty volleyball game, which was more than a little disappointing. It hadn't occurred to us we had to ask the professors to come — we thought they would just show up on their own. It didn't help, of course, that it was raining in the area that day, though it was fairly dry at the picnic site. also, I was very late in getting the posters up, which we have since discovered is crucial to getting good participation at IEEE events. I had them up about a week in advance, and it turns out it's better to have them up for at least three weeks. People in EE are very busy, and busy people need to be able to plan well in advance if they are going to blow a whole day at something as "unproductive" as a picnic.

We only had one professor show up to the Student/Faculty volleyball game

All in all, everything that first quarter went wrong. It's not that we didn't try, and it's not that we didn't spend a lot of time on things. It's just that nothing worked. Jim began grumbling that he needed a better set of officers (he did most of the dance stuff by himself, because most of the officers thought it was a ridiculous idea), and the rest of us started wondering why in the world we had **volunteered** for these horrible positions... toward the end of the quarter, when the dances and the picnic and everything else was over, all we had left to do was make coffee, which we didn't exactly find inspiring. And even that turned into a relative disaster, because some of us made it strong and others made it weak, and people started complaining that it was too weak AND too strong! I think it was at this point we all recognized something needed to be done, but we didn't know what. Nothing was fun, everything was a burden, and we were getting absolutely no rewards for all of our labors. Luckily, the quarter ended, Jim went away to Fluke to work for the summer, and we all had time to brood and think about what to do in the Fall. Best of all, we had three months not to make coffee, which for me at least was the answer to one of my fondest dreams.

. . . to be continued

(Solid State Laboratory, from page 4)
long laboratory hours necessary to develop these materials, devices, and circuits. A considerable amount of training, usually about 2-3 years, is required for a student to use the lab safely and knowledgably enough to produce functional devices, yet this area is a very rapidly moving research field which is impacting many areas of electrical engineering. Students who are interested in this area are encouratged to take any of the Senior level electives such as EE 484, 485, 486, 487, or at the Graduate level, EE 529, 530, 531, 533, 539, or 579.
—Bruce Darling

Summer Volleyball

Entitled to some fun while taking summer classes, working, or both, a coterie of EE students warranted participation in the IMA summer volleyball league. Team members Ed Chen, Tuan Dao, Radwan Faraj, Glenn Fontelera, John Gilbert, Lilly Lee, Daniel Ma, John Rivard, Debby Tao, Wei-Chi Wang, David Wu, and Hsi-Jung Wu called themselves the Flip-Flops. Despite losing all six pre-playoff games, the Flip-Flops managed to reach the quarter-finals of the round robin double elimination playoff.

In a league without any division of beginning and advanced skill levels, the Flip Flops fared well and had a lot of fun, despite the loss of dedicated player John Gilbert who broke his foot during a game. Volleyball is just one of several intramural sports that the IMA offers during the school session. If one can afford the time, participating in IMA team sport competition is a great way to meet other fellow classmates.
—Lilly Lee

EE 499 Project Opportunities

•Developing a programmable motion controller to control the movement of motors to guide a test object in three dimensions along a pre-programmed path. Will be used with the X-ray CT scanner.
•Development of various electronic assistive devices to aid the physically and mentally handicapped at Fircrest School (15230 15th Ave. N.E.) or the Experimental Education Unit of the University of Washington. Requires either strong software or hardware background.

Contact Prof. Kim in EEB 303, 545-7911 for more information.

•Writing SPICE and SABER circuit simulation programs for several examples of non-linear inductors and/or transformers.

Contact Prof. P. Lauritzen for more information.

•The Xerox machine in the IEEE student lounge was given to the IEEE student chapter by the EE Department but currently needs repair before it can be utilized. Prof. Darling is currently looking for a few EE 499 students who would be interested in both fixing the existing unit (relatively minor) and also designing a coin-operated switch that would make the unit accessible to all students in the department. This is a hands-on project for anyone who wishes to earn EE 499 credit and help out their fellow students and the IEEE student branch.

Contact Prof. Darling in EEB 403 for more information.

The Fall Welcome Party

All Electrical Engineering Students,
Faculty, and Staff
Are Cordially Invited To Attend

5:00 pm Chairman Endrik Noges EEB 321
~5:30 pm Pizza Feed in IEEE Lounge EEB 111
~6:00 pm Free Recreation in HUB Games Area

Sponsored by the IEEE Student Branch
and the Department of Electrical Engineering

Ben Linder to be Honored by IEEE Society

The IEEE National Society on Social Implications of Technology (SSIT) has selected UW graduate Benjamin Linder to posthumously receive an Outstanding Service in the Public Interest (OSPI) Award. Linder, while not an Electrical Engineering Graduate, was cited the award "in recognition of Linder's courageous and altruistic effort to create human good by applying his technical abilities... in developing small hydroelectric (power) stations to supply peasant villages" in Nicaragua.

A controversy has emerged with regard to the presentation of this award, stemming from Linder's cooperative position with the Nicaraguan Sandinista government. Although described as an "apolitical" by friends and family, Linder was killed in a war zone, allegedly by the Contras. According to some accounts, he was wearing a Nicaraguan uniform and carrying a weapon. To opponents of American involvement in Nicaragua, Linder has taken on a martyr status, whereas supporters of the Contras have characterized Linder as being either very foolish at best, or at worst, a traitor. The SSIT originally had planned to have the Seattle Section of IEEE present the citation to Linder's parents at Northcon (October 4—6), but both the Northcon organizers and the local section were wary of the political implications of presenting the award, and denied the SSIT's request. Thus, the SSIT is currently considering other forums for making the presentation. One of the initial possibilities the SSIT was considering was to make the presentation through our own IEEE student branch at the UW. At the time of writing the student officers had not yet committed themselves to any course of action regarding the award.

The SSIT originally had planned to have the Seattle Section of IEEE present the citation to Linder's parents at Northcon

The Outstanding Service Award was created in 1979 to honor three engineers who were fired from San Fransisco's Bay Area Rapid Transit (BART) agency for protesting improper engineering practices. Among other complaints, the engineers, Robert Bruder, Holger Hjortsvang, and Max Blankenzee, claimed that the computer sensors which controlled the trains' actions were defective, that doors would open and close spuriously, and that occasionally trains would miss their stops. This last point was inadvertantly demonstrated in practice when one of the trains missed its last station, ran completely off its track, and crashed into a building. IEEE was so impressed by the self-sacrifice of the engineers in putting their careers on the line for the sake of engineering integrity that they established the OSA in their honor. There have been two other recipients of the award before Linder.

—J. Ben Fahy

New Secretary Chris Biggart

Yet another smiling face has begun to grace the halls of the EEB — Chris Biggar has taken over secretary Eddie Wildy's position since this summer. Chris came to the EE Department from an administrative group in Childrens' Hospital, and says she likes it here very much. She has been in Seattle for four years, coming frrom a private design college in Los Angeles after earning her B.A. in Design there. Her artistic background proves useful in her three small companies, especially "Handmaiden, Seattle" (get it?), which produces items such as greeting cards and t-shirts. Chris has used her skills at work as well, bringing in some artwork for the office and repainting some bookshelves. She supports eleven professors, but away from the U, one may find her designing for her business or traveling to Europe if she has the time. Her favorite saying? "Ohm Sweet Ohm," of course. "Ohm on the Range" and "There's No Place Like Ohm" pull a close second and third.

What the Heck Is IDSL?

The Interactive Systems Design Laboratory consists of two faculty members (Profs. Atlas and Marks) and fourteen graduate students. The research areas in this lab include signal analysis and synthesis, neural networks for automatic speech recognition, and optical processing. For more information about these research projects (and the possibility of research assistantships), be sure to attend the first ISDL seminar on Wednesday, Sept. 28 in Room 108.

Faculty and Graduate Student Activities

Prof. L.E. Atlas gave an invited presentation titled "Neural networks for speech recognition" at *Neural Networks: Machines That Think (A seminar on Neural Network Theory)* held at Simon Fraser University, Burnaby, B.C., April 28-29, 1988.

Prof. L.E. Atlas gave an invited presentation titled "What the auditory system suggests about the design of neural networks for speech recognition" at the National Science Foundation Grantees Meeting held at Phoenix, Arizona, June 29, 1988.

Prof. L.E. Atlas gave a presentation titled "Network learning modifications for multi-model classification problems: application to EKG patterns" (coauthored with R.J. Marks II and J.W. Taylor) at the International Neural Network Society First Annual Meeting held at Boston, Massachusetts, Sept. 6-9, 1988.

Patty Chinn and Karl Mills, EE graduate students, and Prof. Yongmin Kim demonstrated the new floating-point PC-based image processing workstation (UWGSP#2) developed in IPSL by them at the Siggraph '88 Conference in Atlanta, GA, Aug. 2-4, 1988.

Larry DeSoto, a Ph.D. student in the Image Processing Systems Laboratory (IPSL) was the first place winner of the poster contest at the Electrical Engineering Industrial Affiliates Annual Review on May 10, 1988, and won a $100 cash prize.

Prof. Yongmin Kim gave 11 research seminars on three different topics (image processing and DIN/PACS, parallel computer architecture, 32-bit microprocessors) during his three-week visit to Korea and Japan early this summer, three seminars at ETRI (Electronics and Telecommunications Research Institute in Korea), and one each at Seoul National University Department of Computer Engineering, Yonsei University, Seoul National University Hospital, KAIST (Korean Advanced Institute of Science and Technology), POSTECH (Pohang Institute of Science and Technology), Gold Star Central Research Laboratory, SONY Research Center in Tokyo, and Toshiba Medical Engineering Laboratory in Otawara, Japan. In particular, SONY is interested in sponsoring UW EE graduate students who can spend one year in Japan working on a SONY project with their engineers. If you are interested in this unusual opportunity, please see Prof. Kim.

Prof. R. J. Marks II has been awarded the first Honorary Membership in the Puget Sound Section of the Optical Society of America for "his efforts in founding the Puget Sound Section and his excellent performance as the section's first president." The award was made by current President Dr. R. Aaron Falk (Boeing Aerospace) at the Section's bi-monthly meeting on August 2, 1988.

Prof. R.J. Marks II was elected Secretary of the IEEE Neural Networks Committee at the 1988 International Conference on Neural Networks (ICNN) held in San Diego, July 1988. The responsibilities of the committee include coordination of the ICNN which this year drew nearly two thousand attendees. The committee is governed by ten IEEE Societies whose specialties relate to the developing field of artificial neural networks. Prof. Marks represents the IEEE Circuits and Systems Society where he is the current Chair of the Neural Systems and Applications Technical Committee.

Prof. R.J. Marks II gave a presentation titled "Generalization in layered classification neural networks" (coauthored by L.E. Atlas and S. Oh) at the 1988 IEEE International Symposium on Circuits and Systems held at Helsinki, Finland, June 7-9, 1988.

Prof. R.J. Marks II gave an invited presentation with H. Philipp titled "Microprocessor based light bridge sensors" at the Proceedings of the International Symposium on Optical Engineering and Industrial Sensing for Advanced Manufacturing Technologies held at the Dearborn Hyatt, Michigan, June 26-30, 1988.

Prof. R.J. Marks II gave an invited presentation titled "Homogeneous and layered alternating projection neural networks" (coauthored by L.E. Atlas and J.A. Ritcey) at The International Symposium on Optical Engineering and Industrial Sensing for Advanced Manufacturing Technologies held at the Dearborn Hyatt, Michigan, June 26-30, 1988.

Prof. R.J. Marks II gave a presentation titled "A signal space interpretation of neural network associative memories and classifiers" at the University of Duisburg, W. Germany, May 31, 1988.

Prof. R.J. Marks II gave a presentation titled "Effects of clock skew in interative neural network and optical feedback processors" (coauthored by S. Oh, L.E. Atlas, and D.C. Park) at The IEEE International Conference on Neural Networks held at San Diego, California, July 24-27, 1988.

D.C. Park gave a presentation titled "The effect of stochastic interconnects in artificial neural network classification" (coauthored by R.J. Marks II, L.E. Atlas, and S. Oh) at The IEEE International Conference on Neural Networks held at San Diego, California, July 24-27, 1988.

Prof. A.K. Somani visited Rome Air Development Center at Rome, New York, Air Force Base at Dayton, Ohio, and NASA Langley Research Laboratory at Hampton, Virginia, and made presentations on the new fault-tolerant computer architecture being developed at the University of Washington.

Prof. A.K. Somani and Farid Mamaghani presented a paper titled "Efficient Parallel Implementable Algorithms for Line of Sight Visibility," at the International Conference on Parallel and Vector Processing held at Tromso, Norway, June 6-10, 1988.

Prof. A.K. Somani and Phyllis Rostykus presented a poster paper titled "Evaluation of Hyper-Cube Based Compact Neural Networks," 2nd IEEE Second International Conference on Neural Networks, held at San Diego, California, July 1988.

Prof. A.K. Somani and Phyllis Rostykus presented a poster paper titled "Hyper-Cube Compact Neural Networks, at the INNS First Annual Meeting held at Boston, Massachusetts, September 6-10, 1988.

Faculty and Graduate Student Publications

L.E. Atlas, T. Homma, and R.J. Marks II, "An artificial neural network for spatio-temporal bipolar patterns: application to phoneme classification," Neural Information Processing Systems, pp. 31-40, Dana Z. Anderson, editor, American Institute of Physics, New York, 1988.

L.E. Atlas, R.J. Marks II and J.W. Taylor, "Network learning modifications for multi-modal classification problems: application to EKG patterns," Neural Networks, Vol. 1, Supplement 1, p. 4, 1988.

Bartoo, G. T., Kim, Y., Haralick, R. M., Nochlin, D. and Sumi, S. M., "Mathematical morphology techniques for image processing applications in biomedical imaging," SPIE Medical Imaging 88 Conference, Vol. 914, pp. 466-475, 1988.

R.B. Darling, "High-Field, Nonlinear Electron Transport in Lightly-Doped Schottky-Barrier Diodes," Solid-State Electronics, Vol. 31, No. 6, pp. 1031-1047, June 1988.

R.B. Darling, "Multisubband Electron Transport in GaAs-$Al_xGa_{1-x}As$ Quantum Wells," IEEE J. Quantum Electronics, vol. 24, No. 8, pp. 1628-1640, August 1988

Fahy, J. B. and Kim, Y., "A consistent DIN/PACS workstation interface based on MUVIP virtual image processing architecture," SPIE Medical Imaging 88 Conference, Vol. 914, pp. 911-919, 1988.

Kim, Y., Fahy, J. B., DeSoto, L. A., Haynor, D. R. and Loop, J. W., "Development of a PC-based radiological imaging workstation," SPIE Medical Imaging 88 Conference, Vol. 914, pp. 1257-1264, 1988.

G.N. Koskowich, R.B. Darling, and M. Soma, "Effect of first-order phonon-assisted scattering on near-infrared free-carrier optical absorption in silicon," Phys. Rev. B, Vol. 38, No. 2, pp. 1281-1284, July 1988.

R.J. Marks II, L.E. Atlas, J.J. Choi, S. Oh, K.F. Cheung and D.C. Park "A performance analysis of associative memories with nonlinearities in the correlation domain," Applied Optics, Vol. 27, pp. 2900-2904, 1988.

Faculty and Graduate Student Publications (continued)

R.J. Marks II, L.E. Atlas and K.F. Cheung "Optical processor architectures for alternating projection neural networks," Optics Letters, Vol. 13, pp. 533-535, 1988.

R.J. Marks II, L.E. Atlas and K.F. Cheung, "Architectures for a continuous level neural network based on alternating orthogonal projections," Proceedings of O-E/LASE '88 Conference on Neural Network Models for Optical Computing, SPIE Vol. 882, pp. 90-92, Los Angeles, January 1988.

R.J. Marks II, L.E. Atlas, J.J. Choi, S. Oh and D.C. Park, "Nonlinearity requirements for correlation based associative memories," Proceedings of O-E-/LASE '88 Conference on Optical Computing and Nonlinear Materials, SPIE VOL. 881, pp. 179-183, Los Angeles, January 1988.

R.J. Marks II, L.E. Atlas and S. Oh, "Generalization in layered classification neural networks," 1988 IEEE International Symposium on Circuits and Systems, pp. 503-506, Helsinki, Finland, June 7-9, 1988.

R.J. Marks II, L.E. Atlas, D.C. Park and S. Oh, "The effect of stochastic interconnects in artificial neural network classification," Proceedings of the IEEE International Conference on Neural Networks, Vol. II, pp. 437-442, San Diego, July 24-27, 1988.

B. Nabet and R.B. Darling, "Implementation of Optical Sensory Neural Networks by Simple Discrete and Monolithic Circuits," Neural Networks, Vol. 1, Supp. 1, p. 396, 1988 (abstract). This paper was presented by Bahram Nabet in Boston on Sept. 8, 1988 at the International Neural Network Symposium.

Nelson, A. C., Kim, Y., Haralick, R. M., Anderson, P. A., Johnson, R. H. and DeSoto, L. A., "3-D display of magnetic resonance imaging of the spine," SPIE Conference on Three-Dimensional Imaging and Remote Sensing Imaging, Vol. 902, pp. 103-112, 1988.

S. Oh, D.C. Park, R.J. Marks II and L.E. Atlas, "Error detection and correction in multilevel algebraic optical processors," Optical Engineering, Vol. 27, pp. 289-294, 1988.

S. Oh, L.E. Atlas, R.J. Marks II and D.C. Park, "Effects of clock skew in iterative neural network and optical feedback processors," Proceedings of the IEEE International Conference on Neural Networks, Vol. II, pp. 429-436, San Diego, California, July 24-27, 1988.

W.S. Wu, K.F. Cheung and R.J. Marks II "Multidimensional projection windows," IEEE Transactions on Circuits and Systems, Vol. 35, pp. 1168-1172, 1988.

NEWS STAFF

Contributors

Advising Office
Bruce Darling
J. Ben Fahy
Lilly Lee
Bill Moritz
Debby Tao

Editor

David Wu

FROM THE EDITOR

Hello Again.
EE News would like to congratulate the new students on their entrance to the EE/CompE programs and wish them the best of luck. Yes, you'll need it. Heh. One item of late-breaking news is in order — I will be unable to serve as editor during the Autumn/Winter quarters, due to the call of the Big Blue Yonder (aka the Lilly Lee Trick). New student Kai Neumann will be taking the helm; by all means do give him the support he needs.
Thanks, and bye for now.

UNIVERSITY OF WASHINGTON — *Department of Electrical Engineering*

EE News

June 1989 Volume 3, Number 3

Investigators Search for an Arsonist

EEB Plagued by Rash of Fires

A FULL INVESTIGATION is under way after a series of four fires that occurred within the last month at the EE building. UW authorities now have little doubt that an arsonist is at work. The fires may have cost over $900,000 in total damages to equipment alone and will directly affect the activities of many graduate and undergraduate students.

The first fire broke out on the morning of April 24 and was reported a little after 5:00 a.m. The

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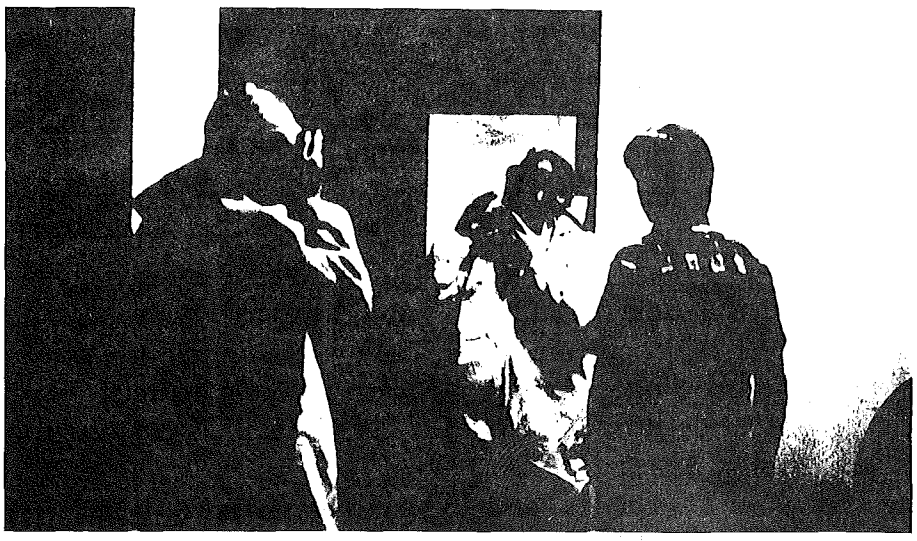


Karl Mills and Larry DeSoto don protective gear to survey the damage in the lab.

In This Issue:

CompE and CompSci to Merge

AFTER A LONG SERIES of negotiations, the College of Arts and Sciences, the Department of Computer Science, the College of Engineering, the Department of Electrical Engineering, and the Office of the Provost have agreed on a plan to consolidate the programs of Computer Engineering and Computer Science into a single department. Supporting this merger is the similarity between the two programs and the growing need to combine and to develop new resources. It is also hoped that a more effective, more intense, and more diverse academic program will result from the combined efforts of the faculty from the existing programs.

Along this line, faculty members associated with the computer engineering program will have the option to transfer from the Department of Electrical Engineering to the new Department of Computer Science and Engineering. The reorganization is to

(continued on page 5)

EE Forum Highlights Student Concerns

GRIPE, GRIPE, GRIPE, complain, complain, complain. No EE student can deny that he or she has not encountered something "inconvenient" in the EE Department. With a department as large as ours, it is impossible to think that a system could be established to satisfy everyone. However, on Friday, April 28, the EE administration and students met at the first-ever student forum. The brain-child of former IEEE officer Ashok Kumar, it was a time for students to raise questions and state observations and a chance for the administration to explain the reasons behind some of their policies.

Included in the panel of faculty and administration members were: Dr. Endrik Noges, Acting Chairman of the department; Dr. William Moritz, Associate Chair for Curriculum, Instruction, and Undergraduate Programs; Dr. Mark Damborg, Associate Chair for Graduate Programs and Awards; Marilyn Kramp, Program Assistant; and Joy Hirschstein, Assistant Advisor.

... it was a time for students to raise questions and state observations ...

Ashok Kumar began the forum by addressing each panel member with a specific question that EE students frequently ask but seldom get an answer for. Questions were also taken from the floor. The following represents a summary of the main topics and the questions and answers presented do not necessarily represent the actual, quoted dialogue.

Question: Many students have complained that commitments made to them by Marian Michener, the previous advisor, were later not honored by the Advising Office. Students relied upon these promises and the failure to uphold them has often forced students to take additional classes and even delay graduation. What went wrong during the transition process and why were no attempts made to clear up these matters?

Joy Hirschstein: There were too many cases to follow up on, and even if Marian Michener was contacted, she probably wouldn't be able to remember the individual circumstances of each case. To prevent this problem from reoccuring, the advisor should write down any commitments involved. The student should remind the advisor to make a note on the record sheet in the student's personal folder.

Question: The advising office makes available every spring a schedule of courses to be taught the following year. This is used by many students to plan their schedule in the fall. In the past, however, this schedule has been inaccu-

(continued on page 9)

Department Gets Equipment Grant from H-P

THE DEPARTMENTS of Electrical Engineering and Mechanical Engineering are going to share a grant from Hewlett-Packard valued at $5.5 million. The grant comes as a result of the work done by a committee made up of Greg Zick, Bill Moritz, and Mani Soma from the EE Department and Jens Jorgensen and Joe Garbini of the ME Department. The EE Department in particular is to receive 70 HP workstations over the next 3 years. Greg Zick, Associate Dean of Computing Services, said he expects the first of the workstations to arrive in the middle of June 1989 and that they will be ready for student use in the fall. He added that many of the workstations will be set up in the 310 lab while space will be made available for additional stations in the basement and probably other locations in the building.

The HP 340 workstation is one of the newest computer-based circuit analysis lab stations available from HP. It runs on the Unix operating system, is controlled by a 68030 Motorola chip, and provides 1024 by 780 pixel color graphics. The workstation runs a program called "Analog Workbench" which allows the user to

(continued next page)

Eta Kappa Nu Chapter Established

THE EE DEPARTMENT at the University of Washington will soon have a chapter of Eta Kappa Nu, the International Honor Society for Electrical Engineers. Dr. Endrik Noges, Acting Chair, has been working with students Ashok Kumar and Kristi Rodenheiser since last summer to establish a chapter on this campus. HKN, as the group is often referred to, has over 100,000 members and 200 branches around the world, including chapters in over half of all the engineering schools in the United States.

Eta Kappa Nu was founded in 1904 at the University of Illinois for electrical engineering students not just to stimulate and reward scholarship, but to assist and encourage its members to grow professionally throughout their entire lives. HKN invites into membership students in their junior year of study who rank in the upper quarter of their class and senior year students who rank in the upper third. Graduate students and distinguished professional engineers are also eligible.

(continued on page 5)

IEEE Student Branch Activities

NEW STUDENT LEADERS

The IEEE student branch underwent a change of officers Spring Quarter. The following students will be carrying out activities for the 1989-90 school year:

Chair	Allen Hooper
Vice Chair	David Wu
Treasurer	Linda Lee
Secretary	Paul Pong
Operations	David Smith
Publicity	Monica Caoili
Membership	Eric Olson
Editor	Ming Koh
ESC Rep.	Donny Wise

We look forward to an exciting year providing students with social events, career information, and other services. This is a transition period at IEEE. The goals for our student branch need to be worked out. There is a mailbox called the "Wonderbox" in the student lounge where you can voice suggestions. Officers will be in the lounge to answer membership questions and sell T-shirts from 10:30 a.m. to 12:30 p.m. daily during the rest of Spring Quarter.

-Allen Hooper

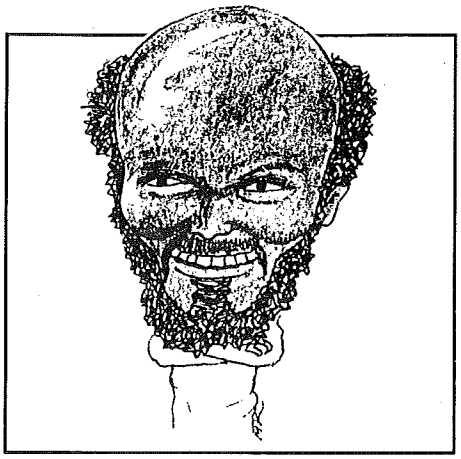
(H-P Grant, from page 2)

draw a circuit on the screen and simulate its operation. The workstation will be able to provide desired information such as frequency response, voltages, and currents. If the unit has external meters connected to its IEEE data bus, the user can test any circuit built in the lab and plot its responses on the screen. One can then compare the circuit model with the actual constructed circuit. One other important feature is the ease of modifying the circuit modeled on the workstation which will allow the user to quickly see the results of any changes to the circuit. The will help in finding the optimum design for a complex circuit.

EE students can also expect a definite change in the departmental curriculum with the arrival of the workstations. There may be new courses added and existing courses will be revised to introduce students to the operation and applications of the new equipment.

-Steve Stemple

Soma Voted Teacher of the Year



DR. MANI SOMA, Assistant Professor, has been voted as the 1989 Teacher of the Year by the students. A two-time winner of this award, the previous award having been presented in 1983, Dr. Soma considers teaching an integral part of his time, insisting that "teaching is a key thing that we [as professors] must do." His teaching philosophy is to work hard to get the point across to his students so that the ten-week effort will be worthwhile.

It is not immediately obvious how teaching could be a very beneficial exercise for a professor whose research is the state-of-the-art design and testing of integrated circuits. However, this does not bother Dr. Soma, who teaches because "it's fun." Moreover, Dr. Soma firmly believes that students, even those in some of his lower level classes, can bring fresh ideas to his research; in fact, among his favorite anecdotes is one in which a probing question in one of his undergraduate classes led to a train of thought that resulted in a journal paper.

Outside of teaching and research, Dr. Soma is an avid participant in all kinds of folk dancing. Back in his Stanford days, he went dancing as often as three or four nights a week. Although his dancing frequency his dropped to one lesson a week, he claims that folk dancing is still a great way to meet people; he proudly admits that he met his wife in a dancing group while he was in New York.

Dr. Soma is originally from South Vietnam. He completed his undergraduate studies in California State University at Fresno and went on for his masters and doctorate degrees at Stanford University. He started as an engineer for GE in New York but left industry because professorship is "more fun."

His vision for UW is to foster an environment for academic growth in which the faculty and students work together as a group and "have fun."

-Hsi-Jung Wu

Tarng and Quistgaard Share TA of the Year Award

THE AWARD for the outstanding TA this year was a dead-even tie between Chao-Li Tarng for the infamous data structures class (EE 374) and Jens Quistgaard for the equally infamous microprocessor class (EE 372). It is not hard to discern what makes these individuals outstanding TA's: both have a reputation of putting in extra hours to help students, both show a genuine concern that the students achieve a good understanding of the basic material covered in the course, and both have a solid protege of students that would swear by their names.

Chao-Li Tarng is a Ph.D. candidate working for Dr. Meditch on fast-packet switching and Broadband Integrated Service Digital Network (B-ISDN). He received his bachelor's degree at the Chiao Tung University in Taiwan and completed his Master's Degree at Oklahoma State University in Computer Engineering. Since he has been here at the University of Washington, he has TA'd many classes, including Operating Systems (EE 474) and Electrophysics Lab (EE 312). Chao-Li emphasized that he really enjoys being a TA, and when asked why, he replied, "Mostly because I like to work with people." Outside of teaching and research, Chao-Li has been actively involved in orchestral and vocal music. He is an expert on the flute and the piccolo (the first chair in the military orchestra in Taiwan) and was the choral director for the ASUW Chinese Social Betterment Society for some two and a half years. He and his wife are expecting their first child this summer.

Jens Quistgaard is a back-to-back winner of this award. He is

(continued next page)

(TA of the Year, from page 4)

a Ph.D. candidate under Dr. Ritcey and is studying morphological filters for signal processing. He attended the Stanford University for an undergraduate degree in applied mathematics and received his master's degree in electrical engineer here. He admits to being confused in his undergraduate program, having started in pre-med, then moving toward computer science, and finally deciding to study mathematics to prepare himself for graduate work. Although mainly known for his many hours in the 372 lab, Jens has also slaved for the senior level microprocessor lab (EE 479) and the introductory device physics class (EE 383). He considers microprocessors and computer engineering as his hobby, having started in junior-high school back in the days when computer terminals were not yet standard and code generation had to be done via switches. As with Chao-Li, Jens is quite a musician, comfortable on the keyboard, the strings, and the drums. Currently, he and a group of others are recording a promotional sound for Fred Meyer.

-Hsi-Jung Wu

(Eta Kappa Nu, from page 3)

Another purpose of the organization is to encourage its members to be a constructive force, helping fellow members and non-members alike to improve the standards of the profession, the courses of instruction, and the institutions where its chapters are established. Undergraduate chapters engage in a wide variety of activities on the campus and beyond its borders to fulfill these responsibilities. These activities are numerous in kind and wide in scope, tailored to best fit each chapter's individual needs and opportunities.

An international organization, elected by the chapters, exercises general supervision and correlates the efforts of these groups. A quarterly magazine keeps the members informed of the organization's activities and provides a means of contact between graduates and undergraduates.

Membership invitations were sent to eligible candidates in mid-April. Most of the charter members, consisting of approximately 35 undergraduates as well as professors Alistair Holden, Yongmin Kim, Mani Soma, and Jim Ritcey, were inducted on May 25 at a formal initiation. Following the ceremony, officer positions were confirmed and a reception was held. Most of the officers were elected at a prior meeting on May 15.

The following people will serve as HKN officers through the next academic year:

President	Ashok Kumar
Vice-President	Monica Caoili
Treasurer	James Pak
Correspondence Secretary	Brian Wilson
Recording Secretary	Darwei Kung
Bridge Correspondent	Matthew Gordon
Faculty Liaison	Mike Uhl
Project Director	Lawana Quayle

In addition, Kristi Rodenheiser was chosen as Member-at-Large and Professor Jim Ritcey will serve as Chapter Advisor.

-Ashok Kumar
(with excerpts from the HKN brochure)

(Merger, from page 1)

begin July 1, 1989 and be completed by July 1, 1990. The new department will then be responsible for administering both the BSCompE and BS in Computer Science degrees.

Proponents of the plan hope that the merger will generate new levels of research that will raise the visibility level of the UW's programs. It is also hoped that the new department will address the rapidly growing interest in these important fields.

-Darren Anderson

It's That Time of the Year Again

THE 1989 COMMENCEMENT exercises for this summer's EE graduates are just around the corner. They will be participating in the Gold Ceremony which will be held on the afternoon of June 10. Briefly, the schedule will be as follows:

1:45 p.m.	Doors open at Hec Ed. Pavilion; graduates assemble for the Academic Procession under the North Stands of Husky Stadium
2.15 p.m.	Academic Procession begins
2:30 p.m.	Commencement Exercises begin in Hec Ed.
4:00 p.m.	Recessional begins

Admission to the event will only be granted to those guests with complimentary tickets. Refer to the "Instructions to Graduates" booklet for further details of the event. There will be a reception after the ceremony for all EE graduates and their guests (see the announcement below and note the reply deadline).

Commencement Reception

The faculty and staff of the Electrical Engineering Department

cordially invite all 1988-1989

Graduates and their Commencement Guests

to a

•• *Commencement Reception* ••

immediately following the afternoon Commencement ceremonies.

The reception will be at the south entrance to the Electrical Engineering Building.

The building will be open so that interested guests may be shown around.

R.S.V.P. to the Advising Office in Room EEB215 by June 5.

We Made It!

The following students have applied for graduation:

JUNE 1989
Brian D. Andrew
Kevin Bahm
Sharon Banay
Ken Beard
Steven Bohrer
Vamard Boman
Julianne Bortner
David Bossio
Richard Burton
Sammy Cheung
Vincent Chung
Diana L. Duryee
Wai Fu
Hollis George
Tim Hallmark
David Hart
Jenny Hien
Hugues Hoppe
Tsai C. Huang
Chung Yan Hung
Mark Jensen
Ron Joshua
William Chan Kawai
Fon Wen Kuo
Tony Lam
Bryan Lee
Lilly Z. Lee
Sang Lee
Tat Hong Lee
Hung Lieu
Gregory L. Lipski
Sean Luong
Tran Ly
Armanda Mai
Rochelle Mai
Steven Martin
David McKinstry (Comp. E.)
James M. Merrick
Barry L. Minor (Comp. E.)
Michael Mott
Chol Mun
Michael Murray
Timothy R. Myers
Chi T. R. Ng
Duy Tan Nguyen
Kim Anh Nguyen
Loc Huu Nguyen
Son Thai Nguyen

(continued next page)

(We Made It!, from page 6)

Thanh V. Nguyen
Thu Ngoc-Anh Nguyen
Andrew Nicolas
John Ogden
Diane Oh
Boon-Hwee Ong
Chi Ong
Shawn Preston
Joshua S. Ray
John Rivard
Jeff Schroeder
Brian J. Selden
John R. Siemion
Randy Stamper
Timothy Swanson
Debby J. P. Tao
Leslie Tate
Michael J. Thanh
Paul J. Thelen
Henry Todd
Tarshan Van Tran
Tony Tran
Ricardo Valdes (Comp. E.)
Doug Vargha
Ellen Jen-Show Wang
Leslie J. Wang
Howard R. Woodward
Hsi-Jung Wu (Comp. E.)
Fred Wurden
Joseph Yi

AUGUST 1989
Richard K. Barry
Meng Chao
Rodney Cheong
Maureen Conner
Will R. Cummings
Tuan Hoang
Stephen Johnson
Jeff Chao Fu Kao
Tuan La
Mandana Mojirsheiboni
Khanh Q. Nguyen
Clark J. Olson (Comp. E.)
Patrick Phung
Dan L. Tran

EE Undergraduate Advising News

CONGRATULATIONS and best wishes to all the June and August graduates, plus everyone else who received their degrees this past year. Good luck with all your future ventures!

Many thanks to all the students who participated in picture-taking. It was a smashing success. Your cute smiling faces were appreciated and are posted in the Advising Office.

Preregistration for Autumn started May 8. Check the bulletin board in the Advising Office for any changes that have taken place since the Time Schedule went to press. Entry codes are available now (if needed). Fewer entry codes are now needed to gain entry into EE classes and it has been great! Students are asking, "Where are the lines?"

Just a friendly reminder: **part-time petitions for Autumn Quarter are due by September 11.**

Please remember that **Period I registration for Summer Quarter ends May 31.**

ATTENTION AUGUST GRADUATES: If you have not yet applied for graduation, you should make an appointment with Marilyn before June 30 to complete your graduation application.

The deadline for December graduation application is October 6. However, you can make an appointment to apply for graduation as soon as you have registered for Autumn Quarter. Then one more thing can be crossed off the long list of things you need to do before you graduate.

New ABET Engineering Science and Engineering Design credit sheets are available from the Advising Office. There are several changes, so bring yourself up to date by picking up a new one soon. These new designations are effective Autumn 1989—they are not retroactive!

A new Policy and Procedure for Transfer Between the BSEE and BSCompE Degree Programs has been put into effect. Students should note that transfer requests will only be considered at the time of regular admission in the Spring and Autumn. **Deadlines for transfer requests are February 1 and July 1.** Only one transfer will be allowed between the programs. Forms are available in the Advising Office.

Students who have not yet completed their 100-200 Engineering Science courses should note that pre-engineering students now have first priority for registration in these classes. SO—as a result these classes are difficult to get into. Plan ahead and do not wait to take these 200 level courses your senior year. Take any Engineering Science courses you still need as soon as possible. Lack of a 4 credit Engineering Science course delayed at least one student's graduation this Spring Quarter—and he had a job offer too!

-Marilyn, Joy, and Becky

I/O

A Letter From Noges

It is heartwarming to experience the support that the academic and industrial community has shown during the fire crisis. Help has been offered by the University Administration, the College of Engineering, College of Arts and Sciences, Department of Computer Science, and Department of Mathematics. From the industrial community, IBM has lent equipment and Hewlett-Packard and Tektronix Companies have offered special equipment donations. With such spirit our setback will be only short-lived and we will be moving forward with even greater determination and spirit of cooperation.

Endrik Noges
Acting Chairman, Department of Electrical Engineering

FROM THE EDITOR

Well, here it is, the brand-new reader feedback, gripe, complain, praise, comment, react, and B.S. section, **I/O.** Here's your chance to say what you've always wanted to say but never before had a chance to say. Your opportunity to express the unexpressible, to refute the irrefutable, and to propose the impossible. The outlet for your angst and emotions (you *must* have something to say after being a student here). Is there a professor or TA who's doing a really swell job of teaching? Shower him or her with some praise and encouragement! Is there a prof. or TA who's doing a really lousy job? Shower him or her with some criticism (preferably constructive). Remember, every faculty and administration member gets a copy of the *EE News* so YOU WILL BE HEARD by at least someone. Judging from the large turnout at the Student Forum, EE students aren't a totally complacent lot. So DON'T JUST GET MAD, *WRITE!*

By the way, you may submit letters and other paraphernalia to the IEEE "Wonderbox" in the first-floor lounge. Or you can send stuff to me via electronic mail at YO_YO_MAN on the ACS MAX. We certainly welcome any comments or suggestions for the newsletter. In any case, please include your name and your phone number so that I may verify that you actually wrote it (you can still sign the letter "Anonymous" or anything you like). Also, stay tuned for details on a public *EE News* computer account for next year. I'd like to get one up and running so people can access it at any time and leave any comments or suggestions.

Remember, now is the time to get involved and only YOU as a collective whole can bring about any favorable changes you'd like to see.

-Editor

1-800-562-6000: Bug Your Local Legislator

The number is 1-800-562-6000. When you call, you can leave a message about specific pending legislation or just about general concerns you would like to see addressed. The legislature has let the UW slip on its priority list over the years and has let the EE Department in particular slip relative to other departments. We were in line to get a new building a few years ago but they still haven't given us the money. Meanwhile, we are in a crunch for space. A new building with more space and better lab facilities would be an immense help in attracting quality faculty and keeping those we already have.

Another general area of concern is brain drain. We have lost several top professors to better job offers this decade. This is directly due to inadequate funding from the legislature for faculty salaries. This is not a universal problem, contrary to popular opinion. Some schools with adequate funding are able to offer their professors attractive enough salaries to be very competitive with industry. One of our recent Ph.D's was offered 55k to START

(continued next page)

(1-800, from page 8)

by the University of Michigan. For a 9-month appointment, that is a starting salary that is hard to beat in industry. However, most of our profs, including full professors, are making less than what their top students will be offered upon graduation. Its is easy to validate this claim. Salaries are listed in a book available from the reference desk in Suzallo library.

Yet another concern is the funding for assistantships, both teaching and research. We have 225 grad students. There are about 29 TA's. The number of research assistants is also small. This strongly affects both the quality of undergraduate and graduate education.

So call your legislators and complain. Tell them that the UW needs to be a higher priority for the economic future of our state and nation. Also, have parents and relatives call, especially if they live in another part of the state. The legislators have told our lobbyists many times that they just aren't hearing a lot from the voters about this. Until they do, don't expect any significant change.

Don Wunsch

NEWS STAFF

Contributors

Advising Office	Allen Hooper	Steve Stemple
Darren Anderson	Ming Koh	David Wu
Brenna Chow	Ashok Kumar	Hsi-Jung Wu

Editor
Ming Koh

The *EE News* is published semi-quarterly by the IEEE Student Branch at the University of Washington.

Moritz Resigns Post as Associate Chairman

PROFESSOR William Moritz has announced that he is resigning his post as Associate Chairman for Curriculum, Instruction, and Undergraduate Programs. He has agreed to serve in that position until a successor is appointed but no later than mid-June, 1989.

Dr. Moritz cited growing unhappiness with the current situation and strong disagreement over certain departmental priorities as reasons behind his decision.

-Darren Anderson

(EE Forum, from page 2)

rate—both in terms of course offerings for the quarter and the professors teaching them. I know you rely upon the data provided to you, but why do you feel there is such a reluctance among the faculty to commit to teaching?

Marilyn Kramp and Dr. Moritz: The faculty can only forecast their schedules so far in advance and difficulties arise when professors are doing research projects, leave for retirement, or go on a sabbatical. New faculty members keep things in flux. Insufficient enrollment cancels classes along with insufficient resources. Professors do try to anticipate students' needs but external and future circumstances are difficult to foresee.

Most students don't know that the EE Department cannot even schedule its own classes in the EEB (except for the labs). Another UW administrative department handles that. That is why EE students sometimes have to go to Thomson or Savery Hall for their classes. Things are pretty much arranged on a space-available basis.

Dr. Moritz suggested a locked-step system similar to the ones used by the Civ.E and Chem.E departments. He argued that such a system will ensure that upper-division students will not be squeezed out of classes like Engineering

(continued next page)

*(**EE Forum**, from page 9)*

210, 220, 230, and 260 in their senior year. A locked-step system will ensure that most students take these classes either as pre-engineers or juniors. Right now, the STAR system works for pre-engineers by giving them priority to these classes. A graduating EE should expect to deal with this new hassle. Dr. Noges commented that the locked-step system is less flexible but makes scheduling easier, so tradeoffs should be considered.

Question: Why isn't there a formal means of communication between the Advising Office and students to keep students informed of policy changes and other things going on within the department?

Joy Hirschstein: The existing advisors don't have the time to put together a newsletter nor do they have the budget and resources to do so. However, students should periodically check the blackboards inside and outside the Advising Office for the latest information and updates. The office also makes copies of important policies and quarterly class offerings for students to have. Students should learn to treat the EE building as a "home base" and should make an effort to come by periodically to check on deadlines and other important developments. The *EE News* is also an excellent way to stay informed and each issue contains an article from the Advising Office.

Question: Several times over the last year you (Dr. Noges) have stated that the department is aware of the unreasonable workloads in certain classes and that you are working on a solution. What exactly is being done and when will we see its effects?

Dr. Noges: The department is planning to take a student survey of each class asking each student to honestly and accurately record the amount of time spent on that class's material. It is a huge project that is still being planned and it will take a lot of clerical work and student participation. Until then, the department is contemplating whether to increase the credit hours or decrease the workload for certain classes.

A few members of the audience voiced their negative feelings about course workloads at this point. They stressed that they had to work, study, and maintain a household all at the same time.

Question: Regarding the curriculum, there is a great disparity in the material covered and the amount of work required in many classes depending on the instructor. What procedures are in place to ensure standardization, and who should students talk to if they feel a professor is not keeping his or her responsibilities?

Dr. Moritz: There is no set procedure but a student can bring it up with the instructor, the undergraduate curriculum head, or the chairman of the department. No one will know about a particular professor's inactivities if no one reports it.

Question: Recently, there has been a lot of student concern regarding the stricter continuation policy. The department has stated that these procedures are necessary to move as many students as possible through the department as quickly as possible. Given the fact that the students entering the department are some of the brightest and most responsible the university has to offer, please comment on the following issues:

1) The reluctance of students in certain cases to take the 12 credits required by the continuation policy.

2) The fact that the average completion time for the BSEE degree is close to five years.

3) The suggestion made earlier this year that students not immediately be placed on probation the first time they slip—in effect, allowing one free violation during their stay in the depart-

(continued next page)

*(**EE Forum**, from page 10)*

ment thereby preventing discouragement and negative attitudes.

Dr. Moritz: Most universities require 192 credits for a BSEE so the UW's total of 186 is actually less than the norm. Since it already takes most students five years to complete the degree here, it would be in the student's best interest to take at least 12 credits each quarter.

After getting into the department, the workload does increase and better time management is required. What should also be expected is a drop in GPA. Too many students worry about their grades in particular. A drop in the numbers has to be accepted along with the increased workload.

Referring to the continuation policy, some in the audience suggested that two part-time students could fill the space of one full-time student. That way, more students could be accepted into the department—especially older students who work and have families.

Question: There is clearly a problem of low morale in this department, both among the students and the faculty. One professor recently stated, "I believe that I have damaged my professional career by my commitment to teaching, the establishment of laboratories, . . . and service to the college and this department. It is clear that the only thing that counts here is research." How do you respond to these charges and what specific actions are you taking to combat these prevailing attitudes?

Dr. Noges: Teaching and research are both important. Research and publications bring recognition to the UW faculty thereby promoting more corporate involvement and financial endowments. Also, the equipment obtained by the instructors through research benefits students since most of equipment is available for their use. For example, Hewlett-Packard is offering a large discount on some of their products. Research and teaching must be linked together to keep up with the times. Unfortunately, teaching sometimes suffers as a second priority behind research so students need to get involved and give their professors some feedback. If anyone has a good idea on how to better judge teacher performance, let the department know about it. Mandatory evaluations may be a step to upgrading teaching.

Unfortunately, teaching sometimes suffers as a second priority ... so students need to ... give their professors some feedback.

On this subject, the audience voiced their desire for more personal teaching practices, education training for new professors, and the need for students and professors to work together to improve the teaching.

Question: Many students voice concerns that at large institutions such as the UW, they are unable to develop close relationships with faculty. This situation is especially difficult for those students applying to graduate school. What suggestions do you have for who students can turn to for recommendations?

Dr. Damborg: Letters of recommendation are usually used only for borderline cases when it comes to graduate school admissions. But some ways that students can get more personal teacher-student relationships is to do special projects with a professor, or give your professor a challenge by asking "penetrating questions."

Dr. Moritz: Another solution might be to decrease the number of students admitted into the department. That would improve the teacher/student ratio but it would

(continued on page 13)

Faculty and Graduate Student Activities

Dr. M.E. Aggoune gave a talk entitled "Preliminary Results on Using Artificial Neural Networks for Security Assessment" at the Power Industry Computer Applications Conference, June 1989, Seattle. Co-authors of the paper were M.A. El-Sharkawi, D.C. Park, M.J. Damborg, and R.J. Marks II.

Dr. M.E. Aggoune and Prof. L.E. Atlas gave an invited talk "Artificial Neural Networks for Static System Security Assessment" at the 1989 IEEE International Symposium on Circuits and Systems, 9-11 May 1989, Portland. Co-authors were D.A. Cohn, M.J. Damborg, M.A. El-Sharkawi, and R.J. Marks II.

Prof. R.J. Marks II gave an invited talk entitled "Skew Effects due to Optical Path Length Variation in Iterative Neural Processors" at the 1989 IEEE International Symposium on Circuits and Systems, 9-11 May 1989, Portland. Co-authors are S. Oh, D.C. Park, and L.E. Atlas.

Z. Li presented a talk entitled "Accelerated Convergence of an Iterative Implementation of a Two Dimensional IIR Filter" at the 1989 IEEE International Symposium on Circuits and Systems, 9-11 May 1989, Portland. (R.J. Marks II was a co-author).

Seho Oh presented a paper entitled "Noise Sensitivity of Projection Neural Networks" at the 1989 IEEE International Symposium on Circuits and Systems, 9-11 May 1989, Portland. (R.J. Marks II was a co-author).

R.B. Darling gave an invited plenary lecture, "Application of Surface Modification and Contact Prelayers to Compound Semiconductor Devices" at the April symposium of the Puget Sound chapter of the American Vacuum Society.

Prof. Robert J. Marks II gave an invited presentation on January 24, 1989 for the Seattle Section of the IEEE Circuits & Systems Society and IEEE Computer Society entitled "Neural Networks for Associative Memories and Combinatorial Search Problems: An Introduction".

Professor Subrahmanyam S. Venkata was elected to Fellow Grade by the IEEE on January 1989 for his "leadership in electric-power education and research in energy transmission technology."

Prof. R.J. Marks II gave an invited talk entitled "Skew Effects in Interative Optical Processors", at the EE/CS Seminar, Texas Tech University, Lubbock on November 30, 1988.

James W. Taylor gave a presentation of the paper "EKG Pattern Analysis: Minimal Delay R-wave Detection Using an Alternating Projection Neural Network" at the WEST-88 Conference held on the UW campus, October 17-18. Profs. Les E. Atlas and Robert J. Marks II were co-authors.

Prof. Robert J. Marks II organized and chaired two special sessions at Northcon/88 held at the Seattle Center, October 4-6, 1988: Neural Networks: Algorithms and Applications, and Neural Networks: Implementations. Authors in the session were form Boeing Computer Services, Boeing Aerospace, the Oregon Graduate Center, and, of course, the Dept. of Electrical Engineering at U.W.

Profs. Les E. Atlas and Robert J. Marks II were invited speakers at the Corporate Technical Workshop on Neural Networks at the Pacific Northwest Division of Battel in Richland, Washington, 3-4 October 1988. Prof. Atlas gave a presentation entitled "Automatic Speech Recognition" and Prof. Marks spoke on "The Theory of Neural Networks and Their Optical Implementation".

Professors Shapiro and Haralick recently attended the SPIE Conference on Applications of Artificial Intelligence VII in Orlando, Florida. Professor Shapiro chaired a session on "High-Level Vision" and presented a paper entitled "Nodal-Based Vision Using Relational Summaries," co-authored by Haiyuan Lu. Professor Haralick presented two papers: "Optimal Affine-Invariant Point Matching" with Mauro Costa, Tsaiyun Phillips, and Linda Shapiro, and "Image Segmentations Using the Morphological Pyramid" with Changkyu Lee and Tsaiyun Phillips.

The Interactive Systems Design Laboratory has been notified that their paper "Error Detection and Correction in Multilevel

(continued next page)

(Activities, from page 12)

Algerbraic Optical Processors" by S. Oh, D.C. Park, R.J. Marks II, and L.E. Atlas [Optical Engineering, vol. 27, pp.289-294 (1988)] has been selected for inclusion in the book Optical Computing, edited by H. John Caulfield. The anthology is advertised as "a source book of outstanding optical engineering papers, selected from the world literature, on the subject of optical computing."

Faculty and Graduate Student Publications

L.E. Atlas, "Potential Advantages of Neural Networks for Automatic Speech Recognition," *Northcon/88 Conference Record*, vol.II, pp.877-881, Seattle WA, October 1988 (Western Periodicals Co., North Hollywood, CA)—invited paper.

L.E. Atlas, T. Homma, and R.J. Marks II, "A Neural Network Model for Vowel Classification," *Proceedings of the International Conference on Acoustics, Speech and Signal Processing*, 1987; was recently republished in *Proceedings of the 1988 Connectionist Model Summer School*, (Morgan Kaufman Publishers, San Mateo, CA.1988) pp.380-387.

K.F. Cheung, R.J. Marks II, and L.E. Atlas, "Convergence of Howard's Minimum Negativity Constraint Extrapolation Algorithm," *Journal of the Optical Society of America* A, vol.5, pp.2008-2009 (1988).

R.B. Darling, B. Nabet, and R.B. Pinter, "Implementation of Analog Shunting Neural Networks for Optoelectronic Detection and Processing," *Proc. Int. Symp. Circuits and Systems*, pp.465-469, 1989.

R.B. Darling and B. Nabet, "Prospects for Integration of Sensory Neural Networks in Gallium Arsenide Photodetector Arrays," *Northcon/88 Conference Record*, vol.II, pp.946-952 (Western Periodicals Co., North Hollywood, CA), Seattle, WA, October 1988—invited paper.

R.B. Darling, "Generalized Gradual Channel Modelling of Field-Effect Transistors," *IEEE Trans. Electrons Dev.*, vol.35, no. 12, pp.2302-2314, Dec. 1988.

R.J. Marks II, S. Oh, L.E. Atlas, and J.A. Ritcey, "Homogeneous and Layered Alternating Projection Neural Networks," *Real-Time Signal Processing for Industrial Applications*, edited by Bahram Javidi (SPIE Optical Engineering Press, Bellingham, WA. 1989), pp.217-232.

J.G. McDonnell, R.J. Marks II, and L.E. Atlas, "Neural Networks for Solving Combinatorial Search Problems: A Tutorial," *Northcon/88 Conference Record*, vol.II, pp.868-876, (Western Periodicals Co., North Hollywood, CA) —Invited paper.

B. Nabet, R.B. Darling, and R.B. Pinter, "Analog Implementation of Shunting Neural Networks," *Advances in Neural Information Processing Systems*, vol.1, pp.695-702, 1989.

(EE Forum, from page 11)

create a lot of dissatisfaction. If the number of students remains the same or is decreased, then the EE department definitely needs more resources to accomodate the students' needs.

The questions and responses above are only a fraction of what was discussed at the forum. The high student turnout and the keen interest demonstrated by everyone present (the forum started at 2:30 and did not get over until about 5:30) indicate the need for similar meetings to be held periodically in the future. IEEE is planning to make a list of all the questions asked at the forum. If you'd like to read all fifty of them, go to the IEEE lounge and an officer will help you.

-Brenna Chow

(Fire, from page 1)

fire destroyed the Image Processing Systems Laboratory on the first floor of the building. The lab was supervised by Professor Yongmin Kim and at the time of the blaze contained the work of about 17 graduate students. It was estimated that about $688,000 in equipment was lost. Computers destroyed in the blaze included a Macintosh II, a NeXT, an IBM PS/2 Model 80, an IBM RT, and several IBM AT's. "We were able to salvage remnants of about 5 IBM AT's," said Mills, "but that's really only a drop in the bucket compared to what was lost." He added that some students were able to salvage parts of their work from hard disks and others had backups at home. Some were not as lucky. "One student lost practically everything he had been working on up until that point," said Gilman Wong, another graduate student who used the lab. Many in the lab were working on the UWGSP II and UWGSP III image processing projects at the time of the blaze. It is estimated that the mishap will set most of their work back at least a quarter.

Concern was raised after it was discovered that the flames had burnt away the insulation from the ceiling pipes and exposed traces of asbestos. In order to assess the damage for insurance purposes and identify any salvageable equipment, Karl Mills and fellow graduate student Larry DeSoto had to don protective suits and enter the burnt-out lab. Most of the asbestos has been cleared and the lab is currently being refurbished. It is hoped that things will be up and running again by the end of June. In the meantime, the students and remaining equipment have been relocated to the basement of the building.

Suspiciously, the next series of fires occurred on the basement level of the building. Three small fires broke out during the wee hours of May 15; they were set in the hallway outside Room 22 where Professor Kim's Laboratory was relocated. On the night of May 16, another fire was ignited, this time inside Room 17 in a box of papers on a student's desk. It was discovered after Teaching Assistant Chao-Li Tarng smelled smoke and called 911. David Wu, a student who was asleep at the time in the EE Lounge, awoke from the commotion and promptly pulled a fire alarm at about 10:30 p.m. Total damages from both fires amounted to over $15,000.

Endrik Noges, Acting Chairman of the Department, is urging those with building passes and keys to strictly observe the building access rules.

The latest fire occurred on the morning of May 18 causing substantial damage to Room 315, the undergraduate computer lab. Damage to equipment is estimated at over $200,000 including the loss of most, if not all, of the IBM PC's and PS/2's in the lab, many of them newly-acquired. Although a security guard was present at the time of the fire, he was told to patrol the lower floors of the building because of the locations of the previous three fires. The room was a general access lab for EE students and the PC's contained programs used in many of the department's courses.

This latest incident has prompted building officials to install alarms on all entry doors except for the west entrance on the second floor where a security guard has been posted. Those with legitimate authorization must now sign in when entering by this door during off-hours and sign out when leaving. Another security guard will be on constant duty throughout the facility. In the near future, building access during off-hours will be controlled and monitored by a magnetic card system which keeps track of all persons entering.

Endrik Noges, Acting Chairman of the Department, is urging those with building passes and keys to strictly observe the building access rules. He also urges anyone who may have pertinent information regarding the case to contact him or the UW Police.

-Ming Koh

Next issue:
September 1989

Buh-Bee, Buh-Bee, That's All Folks!

UNIVERSITY OF WASHINGTON — *Department of Electrical Engineering*

EE News

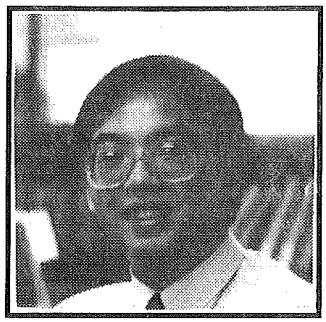
November 1989 Volume 4, Number 1

Individuals bring along diverse backgrounds and interests

New professors join department

YOU MAY HAVE NOTICED several new faces among the EE faculty this quarter. They are the seven new professors who joined the department over the summer.

Chi Chan, originally from Hong Kong, started working with the department as an assistant professor. His schooling includes a B.E.E., Ohio State University, 1981; M.S., Ohio State University, 1982; and Ph.D from the University of Illinois in 1987. His



Chi Chan

specialty is the electromagnetic analysis of printed circuit boards and his interests are computational electromagnetics, scattering, antennas, and bioengineering. His hobbies are fishing and badminton but, surprisingly, he has not had too much time to enjoy them yet.

Richard Christie came to work here as an assistant professor because "the electric energy program is one of the best in the country." He is involved with power systems—generation, transmission, operations, and computational analysis. His major fields of interest are expert systems (artificial intelligence technology), power system operations, and software engineering.

Richard Christie

Rich has a B.S. and an ME EPE from Rensselaer Polytechnic

(continued on page 5)

New building to house EE and CompSci/CompE departments

PLANS ARE UNDERWAY for the construction of a new building for the two departments of Electrical Engineering and Computer Science/Computer Engineering. The UW Programming Committee in charge of the project is finishing the architect selection process. The committee,

(continued on page 5)

In this issue:

EEB fire investigation update

THE ARSONIST who set the EE Building afire last Spring Quarter has either left the area or decided to cease his or her activities, according to latest news from Lt. Vic Peirsol of the University Police. No new leads are available despite having interviewed 35 to 40 people since the fires first began. Those interviewed consisted of staff, faculty, and students who stayed at the EEB in the evenings, and those who stepped forward after reading notices in the *Daily* and the *Seattle P-I.*

Though the EEB and some of its labs were damaged severely, new equipment and facilities were ready for the new school year. The university administration provided the $146,000 replacement cost for the damaged PC's in Room 315. This amounted to approximately 60% of the original cost of the computers. Instead of purchasing the same systems again, the Computer Resources Committee, chaired by Professor Mani Soma, opted for more modern equipment including the new H-P workstations. The state legislature also allocated $75,000 a year for the '89-'91 biennium to be used for equipment purchases.

The University's Physical Plant has remodelled the Image Processing Lab that was damaged in one of the fires. Most of the equipment was replaced for $340,000. The Physical Plant is also remodelling a room in the EEB basement for workstations and PC's. All of this should result in more modern and improved facilities for the Department.

Students are reminded that building hours are 7 a.m. to 9 p.m. Security is understandably tight and only faculty, staff, and students who either have offices in the EEB or specific laboratory needs are allowed access outside building hours.

-Brenna Chow

Administrative positions filled

THE FOLLOWING faculty members were recently named to administrative positions in the Department:

Associate Chair	Mark Damborg
Curriculum Chair	Frank Alexandro
Graduate Program Chair	Sinclair Yee
Research and Development Chair	Robert Albrecht

In addition, it is hoped that a new Department Chairman will be appointed by January 1 of next year. When that occurs, Dr. Endrik Noges, the current Acting Chairman, will resume his activities as a regular member of the teaching faculty but will continue to assist the Department in any ways necessary.

-Ming Koh

New security system installed

SEVERAL SERIOUS incidents of arson during Spring Quarter 1989 and the addition of new lab equipment to the EE Building over the summer have prompted administrators to take extra steps in insuring the safety of the facilities.

As a result of the increased security, some building policy changes have taken place. Previously, the EE Building was open for public access between the hours of 6 a.m. and 11 p.m. Only faculty and staff members, teaching assistants, and other authorized persons were issued keys which opened any of the building entrances. Public access hours have now been reduced to 7 a.m.—9 p.m. and entry into the facilities outside these hours is permitted only through the second floor west entrance, and only by the use of a new security card key.

The electronic lock at this entrance is actually an extension of the existing security system in place on the ISED computer labs in Rooms 230, 232, and 234. One advantage of these locks is the running record they keep of which particular keys were used on them and the ability to return this information if needed. According to administrators, the system was installed at a cost of just under $5000. It is hoped that these policy changes and the new key system will prevent any further property damage or losses.

-Steve Stemple

CDADIC to foster new research

THE CENTER FOR DESIGN of Analog-Digital Integrated Circuits (CDADIC) was established jointly at the University of Washington and Washington State University with sponsorship from the National Science Foundation, the Washington Technology Center, and numerous electronics companies including Boeing, Motorola, and Eldec. The Center's main research programs focus on the design of mixed analog-digital circuits and systems including design methodologies, simulation development, device models, high performance VLSI designs, test methodologies, and noise studies. Those currently associated with the Center at the UW include Professors Helms, Kim, Lauritzen, Liu, Moritz, Soma, Yang, and Zick. The Center is interested in greater participation by faculty and students and will present a seminar series on its research programs. The next seminar will be held in EEB Room 420, 12:30-1:20 p.m. on November 28. Seminar announcements are distributed to all faculty and students.

-Mani Soma

EEB computer resources update

FOR AUTUMN QUARTER 1989, 12 Hewlett-Packard workstations are installed in Rooms 105 and 221 for students' use in undergraduate courses. 10 PS/2's were refurbished after the fire in Room 315 and are now available in Room 105. Students can also use the PC's in Sieg Hall which are equipped with software for EE courses. The Department expects to have 13 additional H-P Workstations sometime during Winter 1990 to accommodate the students' load. These stations are scheduled to be installed in Rooms 105 and 17 (currently being remodeled). Further computer acquisition for undergraduate and graduate education and research being discussed by the Computer Resources Committee.

-Mani Soma

Advising office news

WE WANT TO SAY congratulations and welcome to all the new students who have entered the degree programs in the department this quarter. We look forward to working with you until you receive your degree. Remember to enjoy your stay in the department.

The deadline for **March 1990 graduation** application is January 12. It would be a good idea to apply for March graduation after you have registered for Winter Quarter. Make an appointment with the Advising Office after you have registered. The graduation application process only takes 15-20 minutes. If you are planning on graduating in March, stop by the Advising Office if you have questions. You want to be sure all graduation requirements will be met as it's not any fun discovering you still have a distribution deficiency at the time you are applying for graduation.

Part-time petitions for Winter Quarter are due by December 15. Part-time petitions will automatically be disapproved after December 15. PLEASE, PLEASE, PLEASE plan ahead. The Advising Office does not like to tell you we cannot accept late part time petitions.

FOR YOUR INFORMATION — Policy on graduate courses:

1. Only 4 credits of graduate coursework (500 level and above) will be allowed to count towards your BSEE/BSCompE degree.
2. Graduate seminar courses will not be allowed to fulfill an EE/CompE elective credit.

IMPORTANT LATE-BREAKING NEWS FOR COMP.E STUDENTS

Computer Engineering majors' academic records have been transferred to 114 Sieg Hall. Marilyn Kramp is the Academic Counselor and is looking forward to continuing to be your advisor in the De-

(continued on page 8)

IEEE/EMBS conference held

THE ELEVENTH Annual International Conference of the IEEE/EMBS was held at the Seattle Sheraton Hotel during November 9-12, 1989. It is the largest scientific meeting covering the traditional and emerging areas of biomedical engineering and computing. Professor Yongmin Kim of the EE Department here at the UW was Program Chairman for the conference.

There were 23 major tracks ranging from imaging and cardiology to neural network and neuromuscular systems. There was also a plenary special symposium on biomedical imaging, i.e., medical imaging, image management, and biological imaging. More than 1000 papers from 41 different countries were accepted for presentation in 180 regular sessions and three poster sessions, including the Student Paper Competition. Also, Dr. Robert F. Rushmer, a renowned bioengineer, educator, physician, and a founder of the UW Bioengineering Center, gave a keynote address on "Technology and Health Care in the 21st Century."

In addition, there was a Student Professional Awareness Conference during the regular conference. There were three morning speakers on careers and university-related start-ups. The luncheon speech was "A User's Guide to Biotech Start-Ups."

-Yongmin Kim

Peden honored with IEEE awards

PROFESSOR IRENE PEDEN was recently notified that she had won two awards from the IEEE. The first is a Meritorious Achievement Award in Accreditation Activities from the Educational Activities Board (EAB) for her "sustained leadership in support of the accreditation process." The second is a Meritorious Service Citation for "outstanding and sustained service," also presented by the EAB. Dr. Peden was formally presented with both awards at an IEEE dinner on November 13.

-Ming Koh

(New building, from page 1)

chaired by Dr. Kermit Garlid of the nuclear engineering department, includes two representatives from the EE department: the department chairman and Dr. Mani Soma. The representatives from the computer science department comprise of its department chairman and Dr. Helmut Golde. In addition, there are representatives from the College of Engineering, the ASUW, and the GPSS. The committee will work closely with the architects to ensure that all plans are carried out smoothly.

Meeting with the Programming Committee is the EE department's own Building Committee chaired by Dr. Robert Albrecht. Its purpose is to help develop the requirements for the new building, coordinate areas of activities, and ensure that the facility will meet any future requirements.

The new facility will be built within the general area of the current EE building, although the exact location is yet to be determined. It has not yet been decided whether all or part of the current EE building will be razed. The final decision will ultimately depend on costs and flexibility requirements.

-Ming Koh

IEEE student branch activities

- Resumes to be included in the 1989-90 UW IEEE Student Branch Resume Book are being accepted now. The resume book is sent once a year early Winter Quarter to over 100 companies who employ electrical engineers. Both career and co-op job seekers are encouraged to submit their resumes as resume books of past years have landed students job offers. Deadline is December 1.
- A limited number of sweatshirts will be printed with the old design ("Electrical Engineering") for those who prefer them. These "old" sweatshirts are heavy weight by Russell and run $14 for IEEE members and $17 for non-members. Colors are white lettering on navy blue or navy blue lettering on grey. Specify the color desired and your IEEE membership number (if applicable) when you order. Orders must be ***pre-paid*** and left in the WonderBox by Friday, December 1.
- The first annual EE sweatshirt design contest is now underway! Everyone is welcome to submit their ideas and the winning design, as selected by the IEEE officers, will be worn with pride by UW EE students wherever they go. Or something like that. Actual-size, camera-ready copy is preferred, but we'll take whatever you give us. Time to dig out those hidden creative talents! Leave your designs with any IEEE officer or in the entry box in the lounge; the entry deadline is Friday, December 1. And take note: ***an H-P calculator and a sweatshirt will go to the winner.***
- Applications for the 1990-91 Charles Legeyt Fortescue Fellowship, which carries a $24,000 stipend and is awarded every other year, are available from Allen Hooper or David Wu. The application deadline is January 31, 1990.

-David Wu

(New profs, from page 1)

Institute in 1973 and 1974, and a Ph.D from Carnegie-Mellon University, 1989. He teaches the EE 344 lab on energy devices and asks, "where are all the Juniors?" Aside from being a Monty Python fanatic, his hobbies include running, cross-country skiing, hiking, and other outdoor activities.

Another assistant professor, **Blake Hannaford** comes to us from the Jet Propulsion Laboratory of Caltech in Pasadena, California. He has a B.S. from Yale University, 1977, and an M.S. and Ph.D from U.C. Berkeley, 1985. His thesis was on human movement control, a bio-medical engineering tract within the EE department there.

Blake's interests include telerobotics, neurological control systems, man-machine systems, and bioengineering. He is currently putting together a mobile-robotics lab (for the spring) to complement Professor Albrecht's class. He will also teach a graduate

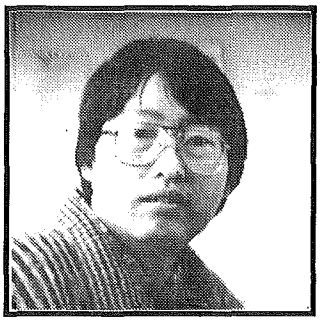
(continued next page)

(New profs, continued)

course on human and robotic control and manipulation. His hobbies include woodworking, photography, and travel. "It really feels nice to be starting out here in the Northwest."

Jeng-Meng Hwang also started working here as an assistant professor this autumn. He came here because he enjoyed both the living environment of Seattle and, especially, the very friendly research environment at the UW. Jeng teaches EE 335 and also a graduate course on parallel architectures for silicon and image processing. His specialties include parallel array processors, signal processing, neural networks, and computational learning. His schooling consists of B.S. & M.S. degrees from National Taiwan University, 1981 and 1983, and a Ph.D from the University of Southern California, 1988. His hobbies include tennis, swimming, and travelling. "I'm really happy to join the department."

BlakeHannaford



Jeng-Meng Hwang

Kelin Kuhn

Andrew Yang

Kelin J. Kuhn is a native Washingtonian from Gig Harbor and originally taught in the Materials Science Department. She got her BSEE here at the UW but pursued her M.S. and Ph.D at Stanford University. She is very knowledgeable in the areas of compound semiconductors (III-V materials such as gallium arsenide, indium gallium arsenide, and aluminum arsenide) and molecular beam epitaxy as applied to strained layer systems. Kelin teaches solid state electronics, EE 355, 356, 383, and a new course, EE 484, and MSE 567, which is the Molecular Beam Epitaxy class. Her hobbies include motorcycles, hiking, and rock climbing.

Thomas "Tom" Pearsall came to the department as a professor from AT&T Bell Laboratories in Murray Hill, N.J. He is the Program Director for the Compound Semiconductor Engineering Program of the Washington Technology Center. This terrific responsibility combines scientific work and teaching with interactions between the university, government agencies, and industries. His position allows him to bring together the research departments in physics, chemistry, and engineering, especially those concerned with the properties of semi-conductor super lattices.

Dr. Pearsall's schooling consists of a B.A., B.E.E. from Dartmouth College, 1968; M.Sc in Solid-State Physics, University of London, 1970; and a Ph.D in Applied Physics, Cornell University, 1973. Here at the UW, he teaches circuits, physics and technology of semiconductor devices, electricity and magnetism, and optics. His hobbies include opera singing, cooking, and will include the outdoors now that he is living here in the beautiful Northwest.

Andrew Yang has come to us from the University of Illinois, where he received both his Ph.D and MSEE degrees. Before attending Illinois Prof. Yang held a position at Advanced Micro Devices in Sunnyvale, where he worked for a year and a half after earning his BSEE at the University of California at Berkeley. His primary research areas are VLSI, CAD, and device modelling (especially new generation, self-customizing IC design software that is adaptable to changes in technology). This quarter, Prof. Yang is teaching EE 355, Introduction to Digital Electronics, but he would like to

(continued on page 9)

HKN Electrical Engineering Honors Society
Iota Upsilon Chapter
Eta Kappa Nu Association
Department of Electrical Engineering
Mail Stop FT - 10
University of Washington
Seattle, WA 98195

INTRODUCTION OF ETA KAPPA NU

Hi! Last spring, some of your classmates were inducted into the new chapter of Eta Kappa Nu (EE Honor Society). After some preliminary meetings to finalize the organization on the UW campus, the people involved are now ready to pursue their main goal of providing activities for all EE students, activities that are fun or career-related or maybe... both! We need YOUR help and participation! Please fill out the survey form below. Your input is greatly appreciated.

To all members, our first event will be on Nov. 17. An officer will be contacting you, but if you haven't heard from us, please leave us a note in our mailbox. You don't want to miss it!

If you are not a member and interested in becoming one, you will receive a letter during winter quarter if you are eligible. The next initiation ceremony will be held during spring quarter.

FREE CD, ALBUM, OR CASSETTE !!

That's right! As an incentive to return this survey, we have devised a "simple" contest. Merely by matching the correct baby picture with its respective Eta Kappa Nu Officer, you become eligible to win a $ 15.00 gift certificate at Tower Records. The pictures will be on display starting from Nov. 13th across from the EEB main office in the display case. The contest form is on the back of the survey. Additional forms will also be available at the display case. Good luck! Note: If there is a tie, the winner will be drawn at random among the top entries.

(detach here)

Please check the activities which you would be interested in participating in. Any additional suggestions would be appreciated.

__ tutoring program
__ local company speakers
__ company tours
__ student run course evaluations
__ activities with other departments
__ professor appreciation day
__ professor presentations on topics of interest

__ river rafting
__ ice skating
__ spring cruise
__ pizza parties
__ broomball
__ ski trips

Sports tournaments:
__ volleyball
__ tennis
__ basketball
__ other _____

Other suggestions: _____

_____

_____

Turn over for the baby contest entry form.

HKN

THE IOTA UPSILON Chapter of Eta Kappa Nu, the Electrical Engineering Honor Society, was recently installed at the University of Washington . The chapter held its first initiation on May 5, 1989 with 26 new initiates. The charter officers are:

President	Ashok Kumar
Vice President	Monica Caoili
Treasurer	James Pak
Corresponding Secretary	Brian Wilson
Recording Secretary	Darwei Kung
Bridge Correspondent	Matthew Gordon
Project Director	Lawana Quayle
Faculty Liaison	Mike Uhl
Faculty Advisor	Dr. Jim Ritcey

The chapter will be involved in EE activities throughout the year. One activity will be the initiation of new members in the near future. Any EE student interested in becoming a member, and all current members interested in assisting the chapter in activities, are encouraged to drop a note in the Eta Kappa Nu mailbox in the EE Office Room 211.

-Matthew Gordon

(Advising news, from page 3)

partment of Computer Science and Engineering, Electrical Engineering majors will continue to receive their academic advising in EEB 215.

There will be a meeting to welcome all Computer Engineering majors to the Department of Computer Science and Engineering on Tuesday, December 5 at 4:00 p.m. in 422 Sieg Hall. Students will establish computer accounts and tour the facilities at this meeting. Remember this date and see you there!

If you are a CompE major and plan on graduating in March, you must make an appointment with Marilyn in 114 Sieg. Part-time petitions for CompE students must now be turned in to Marilyn in Sieg 114 as well.

Stop in and say "hi" to our newest staff member, **Ann Ong**. She joined the Advising Office team during June and can answer all kinds of questions regarding university policies and procedures. She will be graduating in June with a degree in social work. We feel very fortunate to have Ann's assistance in the Advising Office.

-Marilyn, Joy, and Ann

Instructions

Match the picture number with the officer name. You may turn in your ballots in the envelope near the display or in the Eta Kappa Nu mailbox in the main office. One entry per person please! All entries are due by December 1 at 5:00 pm.

Number	Name	Office
___	Ashok Kumar	President
___	Monica Caoili	Vice-President
___	James Pak	Treasurer
___	Brian Wilson	National Secretary
___	Darwei Kung	Corresponding Secretary
___	Matthew Gordon	Bridge Correspondent
___	Mike Uhl	Faculty Liaison
___	LaWana Quayle	Project Director
___	Dr. James Ritcey	Faculty Advisor
___	Dr. Endrik Noges	Acting Chairman

Your Name _____ Phone _____

I/O

IEEE/EMBS Conference a success

Dear Electrical Engineering Faculty and Students:

The 11th Annual International Conference of the IEEE Engineering in Medicine & Biology Society was held at the Seattle Sheraton Hotel last week, during November 9-12, 1989. More than 1300 participants from all around the world (40+ countries) attended the conference. The quality of the conference's technical program was excellent, and the 186 sessions ran very smoothly thanks to many student volunteers. The participants were really impressed with the tour of the University of Washington's Electrical Engineering and Bioengineering laboratories. Overall, they told me that it was the best IEEE/EMBS Conference they had attended.

Many Electrical Engineering faculty members participated in the conference and/or contributed significantly to its success, including Professors Cheung (Biosensor Track Chair), Hannaford (Biorobotics Track Chair), Ishimaru (Laser & Electrooptics Track Keynote Speaker), Pinter (Physiological Model Session Chair), Moinpour (Biosensor Session Chair), Zick, Sigelmann, and Bjorkstam. Also, about 30 Electrical Engineering graduate and undergraduate student volunteers (out of a total of 70) actively participated in running the sessions smoothly and providing other important logistical support during the conference. I would like to extend my sincere thanks and appreciation for your contribution, participation, support, and encouragement in making the conference a huge success. Thank you!

Yongmin Kim, Ph.D.
Program Chairman

*(**New profs**, from page 6)*

see the establishment of a second senior elective course in digital electronics to reflect the current need in industry. He has started teaching one new course already, EE 538, Computational Methods for Circuit Simulation and Device Model Design. Married with one two year old daughter, Prof. Yang enjoys tennis and racquetball when time allows.

Chris Bromfeld & David Wu
Photos by David Wu

Editor's note: We regret that we were unable to photograph Dr. Pearsall before press time.

FROM THE EDITOR

Hello again and welcome back. I hope all of us enjoyed our summers, whether we spent them doing internships, doing nothing, or (ick!) doing homework. Here's hoping that this year goes smoothly for everyone.

Congratulations and best of luck (with emphasis on "luck") to all the new EE or CompE undergraduates on their entrances to their respective programs this year. Keep up the effort, but remember to stop and smell the roses every now and then.

I am beginning to see a little more involvement from students and faculty in the publication of the *EE News* and I hope this trend continues. A slight apology is in order for the rather erratic publication schedule, but all of us involved are trying to cope with erratic schedules of our own. Hopefully, a method will soon be worked out resulting in shorter newsletters published more frequently. With this in mind, we will attempt to turn out one more brief issue before the quarter's out, providing, of course, that we receive enough newsworthy material.

Once again, we value your comments and letters concerning the newsletter or the department and encourage you to turn them in to the IEEE "WonderBox" down in the first-floor lounge or the mailbox in the main office. I can also be reached via E-mail at YO_YO_MAN on the ACS MAX.

-Ming Koh

Faculty and department activities

FACULTY AWARD

Professor Robert J. Marks II has been awarded the rank of Fellow by the Optical Society of America for his work on signal recovery, optical processing, and optical neural networks.

Second Symposium on Expert Systems Application to Power Systems

The EE Department hosted the Second International Symposium on Expert Systems Application to Power Systems, July 17-20, 1989, which was sponsored by Puget Power, Electric Power Research Institute, and the IEEE Seattle Section. This symposium brought together over 200 specialists in the development of intelligent systems for power systems/plants from 24 countries. The University of Tokyo, Japan, the Royal Institute of Technology, Sweden, and La Trobe University, Australia, also assisted in the organization of this successful event. The UW organization team included Professors M. J. Damborg, S. S. Venkata, M. A. El-Sharkawi, graduate students and secretaries, with Professor C. C. Liu as Chairman of the Organizing Committee.

Over the last several years, much progress has been made in the development of intelligent systems as operational or planning aids to human engineers. A local example is an on-line expert system currently operating at the Puget Power control center. It aids power system operators in fault location and substation restoration. This system, which is the first on-line operational rule-based system in a utility control center in the U.S., was developed by a research group directed by Professor C. C. Liu.

-C. C. Liu

Meter School

The Department offered and sponsored the 35th Meter School to 185 utility engineers and metermen during September 11-15, 1989. Five parallel courses on single-phase metering, three-phase metering, system metering, solid-state metering, and electronics were taught by 32 instructors from the power industry and the UW. The 6 EE instructors were Professors Les Atlas, R. N. Clark, D. G. Dow, D. Reynolds, M. A. El-Sharkawi, and S. S. Venkata. Prof. Venkata is also a member of the School's Steering Committee. The three Departmental technicians, namely G. Andexler, J. Schultz, and N. Ward played an important role in the successful offering of the School.

-S. S. Venkata

RELAY Workshop

The Department co-sponsored a three-day, hands-on workshop on RELAY, a PC-based software program for coordinating relays in transmission systems during September 19-21, 1989. The other co-sponsors were Puget Power and Electric Power Research Institute, which sponsored the research and development of the software at the UW. Fifteen protection engineers from 12 utilities around the nation participated in the workshop. The 2 EE instructors were Professors M. J. Damborg and S. S. Venkata. Professor Venkata was also one of the organizers of the workshop, which was held in 324 Sieg Hall with strong support from Associate Dean G. L. Zick and Mr. J. Mock of the College.

-S. S. Venkata

PATENT NEWS

The Interactive Systems Design Lab has been awarded a patent, "Optical Neural Net Memory," U.S. Patent No. 4,849,940. The patent is assigned to the Washington Technology Center. **R.J. Marks II**, **L.E. Atlas**, and **S. Oh** are the inventors.

Professor C. C. Liu has been appointed Member of the Editorial Board, Proceedings of the IEEE. He was also elected Chairman of the Technical Committee on Power Systems and Power Electronics and Circuits, IEEE Circuits and Systems Society. During this summer, he was invited to Seoul, Korea, to participate in the Korea-U.S.A. Joint Seminar on Expert Systems for Electric Power Systems, sponsored by the Korea Science and Engineering Foundation and the U.S. National Science Foundation. Dr. Liu was also an invited professor at the Swiss Federal Institute of Technology, Lausanne, Switzerland during August and September.

(continued next page)

(Activities, continued)

Professor Robert J. Marks II was an invited participant at the West Virginia Neural Network Symposium at West Virginia University, Morgantown, 15-16 June, 1989. He gave two presentations entitled "Projection-Based Artificial Neural Networks" and "Optical Implementation of Artificial Neural Networks."

Professor Arun Somani attended and presented two papers titled "Distributed Syndrome-Decoding for Regular Interconnected Structures" and "Reliability Analysis and Comparison of Two Fail-Op/Fail-Safe Architectures" at the prestigious FTCS-19 Conference held at Chicago in June 1989.

Prof. Somani was invited to attend and present a technical talk to the International Federation of Information Processing, Working Group 10.4 — Dependable Computing and Fault Tolerance on "High Performance Highly Reliable Computer Architecture" at Zion, IL, June 1989.

Prof. Somani visited and presented technical talks on the topics "New Approaches to System-Level Diagnosis," "Distributed Diagnosis Algorithm for Regular Interconnected Structures," and "Meshkin: A Fault Tolerant Computer Architecture with Distributed Fault Detection, Diagnosis and Reconfiguration" to Siemens, Munich (West Germany), Bosch, Stuttgart (West Germany), GMD Laboratory, Bonn (West Germany), University of Karlsruhe, Karlsruhe (West Germany), and University of Duisberg, Duisberg (West Germany) in September 1989.

Prof. Somani attended and presented a paper titled "On Characterization of Systems with Sequential Fault Occurrence and Reconfiguration" at the of 12th International Conference on Fault Tolerant Systems and Diagnosis held at Prague (CSSR), September 1989.

Prof. Somani attended and presented a paper titled "Meshkin: A Fault Tolerant Computer Architecture with Distributed Fault Detection and Reconfiguration," at the 4th International Conference on Fault Tolerant Computing Systems held at Baden-Baden, West Germany, September 1989.

Professor Leung Tsang and graduate students **K. H. Ding** and **C. Mandt** presented two papers at the 1989 IEEE Antennas and Propagation/URSI Symposium that was held in San Jose in June. Professor Tsang and graduate student **R. West** presented a paper at the IEEE Geoscience and Remote Sensing Symposium that was held in Vancouver, B.C. in July 1989. He also presented two papers and chaired a session at the Progress of Electromagnetics Symposium in Boston in July 1989. He was the co-chair of a panel entitled "Propagation and Medium Effects" at the NSF Workshop on "The Future Directions in Electromagnetics Research" that was held in Boston in July 1989. He also presented a paper at the 1989 International Symposium on Antennas and Propagation that was held in Tokyo, Japan in August.

Prof. Tsang was an invited participant of the Monbusho International Scientific Research Program of University to University Cooperative Research on "Inverse Problems in the Measurement Technique by the Scattering and Absorption Process." He spent two weeks at Kobe University, Japan, on the collaborative research in August.

Professor S. S. Venkata was involved in the following Presentation Workshops and Short Courses:

Invited Participant, "Research Needs for Power System Planning & Operation," National Science Foundation and Georgia Institute of Technology, Atlanta, Georgia, September 5-8, 1989.

Invited Speaker, "Expert Systems Application to Distribution Systems Automation," Scott & Scott Consultants' User Club Meeting, Seattle, Washington, August 7, 1989.

Member, Organizing Committee & Chairman of Session on Methodologies, Second Symposium on Expert Systems Application to Power Systems, Seattle, Washington, July 17-20, 1989.

Session Chairman on "Power Systems Computer Assisted Education," 1989 IEEE Summer Power Meeting, Long Beach, California, July 9-14, 1989.

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*(**Activities**, continued)*

Invited Speaker, "Expert Systems Application to Distribution Systems," Tennessee Technological University, Cookville, Tennessee, June 14, 1989.

Invited Speaker, "Expert Systems Application to Distribution Systems," West Virginia University, Morgantown, West Virginia, June 12, 1989.

Invited Speaker, "Computer Assisted Relay Coordination," ERPI Task Force Meeting on Power System Planning and Operation, Seattle, Washington, May 16-17, 1989.

Organizer and Instructor, "Computer-Based Distribution System Planning and Automation," a short course presented to 25 engineers, IEEE International Conference on Circuits & Systems Society, Portland, Oregon, May 8, 1989.

Faculty and graduate student publications

M. Aggoune, M.A. El-Sharkawi, D.C. Park, M.J. Damborg, and R.J. Marks II, "Preliminary Results on Using Artificial Neural Networks for Security Assessment," *Proceedings of the 1989 Power Industry Computer Applications Conference*, pp. 252-268, June 1989, Seattle, WA.

M.E. Aggoune, L.E. Atlas, D.A. Cohn, M.J. Damborg, M.A. El-Sharkawi, and R.J. Marks II, "Artificial Neural Networks for Static System Security Assessment," *Proc. 1989 IEEE International Symposium on Circuits and Systems*, pp. 490-494, 9-11 May 1989, Portland—invited paper.

L.E. Atlas, R.J. Marks II, M. Donnell, and J.Taylor, "Multi-Scale Dynamic Neural Net Architectures," *Proceedings of the IEEE Pacific Rim Conference on Communications, Computers & Signal Processing*, 1-2 June, 1989, Victoria B.C. (Canada), pp. 509-512.

M.A. El-Sharkawi, R.J. Marks II, M.E. Aggoune, D.C. Park, M.J. Damborg and L.E. Atlas, "Dynamic Security Assessment of Power Systems Using Back Error Propagation Artificial Neural Networks," *Proceedings of the 2nd Annual Symposium on Expert Systems Applications to Power Systems*, pp. 366-370, 17-20 July 1989, Seattle.

Z. Li and R.J. Marks II, "Accelerated Convergence of an Iterative Implementation of a Two-Dimensional IIR Filter" *Proc. 1989 IEEE International Symposium on Circuits and Systems*, pp. 1483-1486, 9-11 May 1989, Portland.

R.J. Marks II, S. Oh, and L.E. Atlas, "Alternating Projection Neural Networks," *IEEE Transactions on Circuits and Systems*, vol. 36, pp. 846-857 (1989).

R.J. Marks II, S. Oh, D.C. Park, and L.E. Atlas, "Skew Effects Due to Optical Path Length Variation and Iterative Neural Processors," *Proc. 1989 IEEE International Symposium on Circuits and Systems*, pp. 474-477, 9-11 May 1989, Portland—invited paper.

S. Oh, D.C. Park, R.J. Marks II, and L.E. Atlas, "Nondispersive Propagation Skew in Iterative Neural Networks and Optical Feedback Processors," *Optical Engineering*, vol. 28, pp. 526-532 (1989)—invited paper.

K.H. Ding and L. Tsang, "Effective Propagation Constants in Media with Densely Distributed Dielectric Particles of Multiple Sizes and Permittivities," Chapter 3 of *Progress in Electromagnetic Research*, vol. 1, edited by J. A. Kong, Elsevier, pp. 241-295, 1989.

D.P. Winebrenner, L. Tsang, B. Wen, and R. West, "Sea-Ice Characterization Measurements Needed for Testing of Microwave Remote Sensing Models," *IEEE Journal of Oceanic Engineering*, vol. 14, no. 2, pp. 149-158, April 1989.

(continued next page)

*(**Publications**, continued)*

L. Tsang, K. H. Ding, and C. P. Winebrenner, "Multiple Volume Scattering Effects in Microwave Polarimetric Remote Sensing," *Proceedings of the International Geoscience and Remote Sensing Symposium*, pp. 2104-2107, Vancouver B.C., July 1989.

L. Tsang, K. H. Ding, and B. Wen, "Dense Medium Radiative Transfer Theory in Polarimetric and Microwave Remote Sensing for Media with Multiple Species of Particles," *Proceedings of the 1989 International Symposium on Antennas and Propagation*, pp. 989-992, Tokyo, Japan, August 1989.

S. S. Venkata and B. Jeyasurya, "Discussion on a Hybrid Expert System for Faulted Section Identification, Fault Type Classification, and Selection of Fault Location Algorithms," by A. A. Girgis and M. B. Johns, *IEEE Transactions on Power Systems*, vol. 4, no. 2, April 1989, p. 985.

B. Jeyasurya, S. S. Venkata, S. V. Vadari, and J. Postforoosh, "Fault Diagnosis Using Substation Computer," *Proceedings of the 1989 IEEE/PICA Conference Proceedings*, pp. 289-295, and *IEEE Transactions on Power Systems* (in press).

D. Rumpel, S. S. Venkata, K. Pandji, C. C. Liu, and N. M. Nagdy, "Real-Time Database for Power Systems Using Language-Oriented Data Structure," 1989 IEEE Summer Power Meeting, Long Beach, California, July 9-14, 1989 and *IEEE Transactions on Power Systems*, 8 pages, (in press).

R. Ramaswami, M. J . Damborg, and S. S. Venkata, "Coordination of Directional Overcurrent Relays in Transmission Systems - A Subsystem Approach," IEEE Summer Power Meeting, Long Beach, California, July 9-14, 1989 and *IEEE Transactions on Power Delivery*, 8 pages, (in press).

A. K. Jampala, S. S. Venkata, and M. J. Damborg, "Adaptive Transmission Protection: Concepts and Computational Issues," *IEEE Transmissions on Power Delivery*, vol. 4, no. 1, January 1989, pp. 177-185.

C. S. Indulkar, B. Viswanathan, S. S. Venkata, "Maximum Power Transfer Limited by Voltage Stability in Series and Shunt Compensated Schemes for AC Transmission Systems," *IEEE Transactions on Power Delivery*, vol. 4, no. 2, April 1989, pp. 1246-1252.

S. V. Vadari, F. Tyson, and S. S. Venkata, "The Issues of Languages Versus Shells for Expert Systems Applications to Power Systems," *Proceedings of Second Symposium on Expert Systems Application to Power Systems*, Seattle, Washington, July 17-20, 1989, pp. 492-498.

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Editor

Ming Koh

The *EE News* is published by the IEEE Student Branch at the University of Washington.

Former UW student wins Young Investigator Award

THE NEWEST MEMBER of Washington State University's Department of Electrical and Computer Engineering faculty has been selected to receive a $170,000 Young Investigator Award from the Office of Naval Research.

Assistant professor Shira Lynn Broschat, who recently completed her studies here at the UW EE Department, is one of 14 "young investigators" selected from a group of 259 applicants nationwide who submitted research proposals to qualify for the award. Broschat's proposal, "Numerical Studies of Rough Surface Scattering Models," has practical applications for naval underwater communications, as well as for remote sensing of the ocean surface, which provides useful information to geophysicists, oceanographers, meteorologists, and others.

"The scattering of acoustic and electromagnetic waves by a rough sea surface is of considerable practical importance, yet no acceptable mathematical model exists that accurately predicts this scattering," according to Broschat.

The object of the Young Investigator Program is to identify and support scientists and engineers who show exceptional promise for doing creative research. The program's ultimate goal is to attract outstanding young university faculty to naval research.The Office of Naval Research awards the selected scientists a basic $50,000 grant each year for three years. The office will also match any funds the investigator obtains from naval sources outside Naval Research. At the end of three years, investigators may be selected for continued funding through the Scientific Officer's contract research program.

Chief of Naval Research J. R. Wilson Jr. commended Broschat for "her academic achievements, her obvious ability to contribute growth and strength to the nation's research and development, and the commitment to her expressed by Washington State University administrators."

Broschat's proposal ... has practical applications for naval underwater communications, as well as for remote sensing of the ocean surface ....

Broschat joined the faculty this year after completing a Ph.D at the UW. She obtained her BSEE degree in 1982 and her MSEE degree in 1985, both from the UW as well.

"I was thrilled to find out I had won the Young Investigator Award," she said. "Of course, I had hoped to, but I didn't think there was much chance. I have my work cut out now living up to the honor."

Her numerous achievements as a student at the UW included the prestigious Hewlett-Packard—American Electronics Association faculty development award, which is designed as an incentive for students aspiring to careers in teaching.That award provided Broschat with tuition plus $10,000 for three years of her education. As part of the award, Hewlett-Packard and the American Acoustics Association are giving WSU $50,000 in research equipment for hosting Broschat's first teaching position.

Broschat also placed first in the 1988 Student Prize Paper Competition sponsored by the International Union of Radio Science, an international organization for the advancement of physics, engineering, and mathematics.

Broschat has multiple outside interests, including travel, international cuisine, weightlifting, and reggae music, and is proud of her multi-ethnic identity. "I'm Japanese-American, I look Native American, I speak Chinese, and my first name is Hebrew," she explains.

-WSU Office of News & Information Services

UNIVERSITY OF WASHINGTON — *Department of Electrical Engineering*

EE News

TOTALLY RADICAL CROSSWORD-p. 3

December 1989 Volume 4, Number 2

Undergraduate advising news

UNDERGRADUATE BSEE degree applicants for March 1990, please make an appointment with Joy in the Advising Office. The deadline is January 10, so let's get them done before Christmas Break!

Please welcome our new EE Undergraduate Academic Counselor, Loni Stone. She will join us in Room 215 on December 18.

GOOD LUCK TO ALL DECEMBER GRADUATES:

John M. Ancich Jr.
Gavin E. Bepple
John Eric Braun
Rodney Cheong
Maureen Jones Conner
Thai H. Dang
Huong My Du
Said Elaoud
Timothy Janof Finholt
Ololade B. Franklin
Sheri Akemi Fukunaga
Carrie L. Gabriel
Eric W. Hanson
Thu-Uyen Thi Hoang
Rick Wayne Huguenin
An B. Huynh
Yongho Jang
Stephen O. Johnson
Marcelynn N. Kamida
Karen Anne Koontz
Chong Yun Lee
Claire B. Lloyd
Michael Kenneth Locke
Bradley Willard Maupin
Mandana Mojirsheibani
Hung Hoang Nguyen
Huy Quang Nguyen
Kathy Ha Nguyen
Melinda Diem Nguyen
Phuong Yen Loan Nguyen
Tri Duy Nguyen
Kenneth B. Pavletich
Lauren Robert Petrie
Patrick Phung
Kris L. Piccolo
Steve Presta
Kurt E. Sahlin
Lisa M. Tamekuni
Berhanu Kebede Tesema
Tri M. Tran
Tung T. Tran
Douglas A. Vargha
Scott A. Vigil
Thuy-Lan Vo
Gregory A. Wong

Happy Holidays from all of us in the Advising Office!

Graduate advising

Applications for Master's degrees-Winter Quarter 1990

Graduate students who expect to complete the requirements for a Master's degree by March, 1990 must apply for the degree at the Graduate School during the first two weeks of Winter Quarter, ***January 2 through January 16, 1990.***

(see page 2)

Consulting Engineers Scholarship

THE CONSULTING Engineers Council of Washington will award one $2000 and one $1000 scholarship to engineering students in Washington state. Winners of these scholarships are eligible to enter national competition for scholarships totaling $22,000 ($5000 maximum per scholarship) which are provided by the American Consulting Engineers Council. Eligibility requirements include sophomore or junior status. Contact Barb Foster in Room 313 for application forms. The application deadline is February 16, 1990. Professor Moritz in Room 304 is the Undergraduate Scholarship Chairman.

-Bill Moritz

In this issue:

(Graduate advising, from page 1)

Applications are evaluated for Graduate School requirements and if approved are forwarded to the appropriate Graduate Program assistant. When the student has passed the final examination and presented an acceptable thesis (if one is required), the application, signed by the student's committee, is returned to the Graduate School no later than March 16, 1990.

Approved applications are good for two consecutive quarters only, including Spring. Therefore, graduate students who apply for Winter and do not complete requirements need not re-apply for Spring Quarter 1990. However, it is required that such students be registered during the quarter in which degree requirements are met and the degree is expected.

The filing of the application for the Master's degree is solely the responsibility of the student.

Council on Neural Networks formed

ARTIFICIAL NEURAL networks are highly interconnected arrays of elementary processors that mimic the architecture of biological nervous systems. They are being used in such diverse areas as power load forecasting, speech recognition, mortgage brokering, and plastics explosives detection. Indeed, the plastics explosives detector currently used at New York's JFK Airport contains an artificial neural network.

The Council on Neural Networks (CNN) will focus on all neural network activity in the IEEE ....

At their November Meeting, the Technical Activities Board of the IEEE, consisting of the presidents of the 37 societies and councils of the IEEE, approved formation of the IEEE Council on Neural Networks (CNN). The CNN will be the focus of all neural network activity in the IEEE, including the publishing of the new journal *IEEE Transactions on Neural Networks* and coordination of the largest conference in the world on the topic, the International Joint Conference on Neural Networks.

At the first meeting of the Administrative Committee of the CNN, UW EE professor Robert J. Marks II was elected the first president of the CNN. Approved at the same meeting was Seattle as the tentative site for the 1991 International Joint Conference on Neural Networks. The conference will attract over 2000 registrants from around the world and will have a major impact on the visibility of the Northwest in general and the University of Washington in particular in this exciting, evolving area of technology.

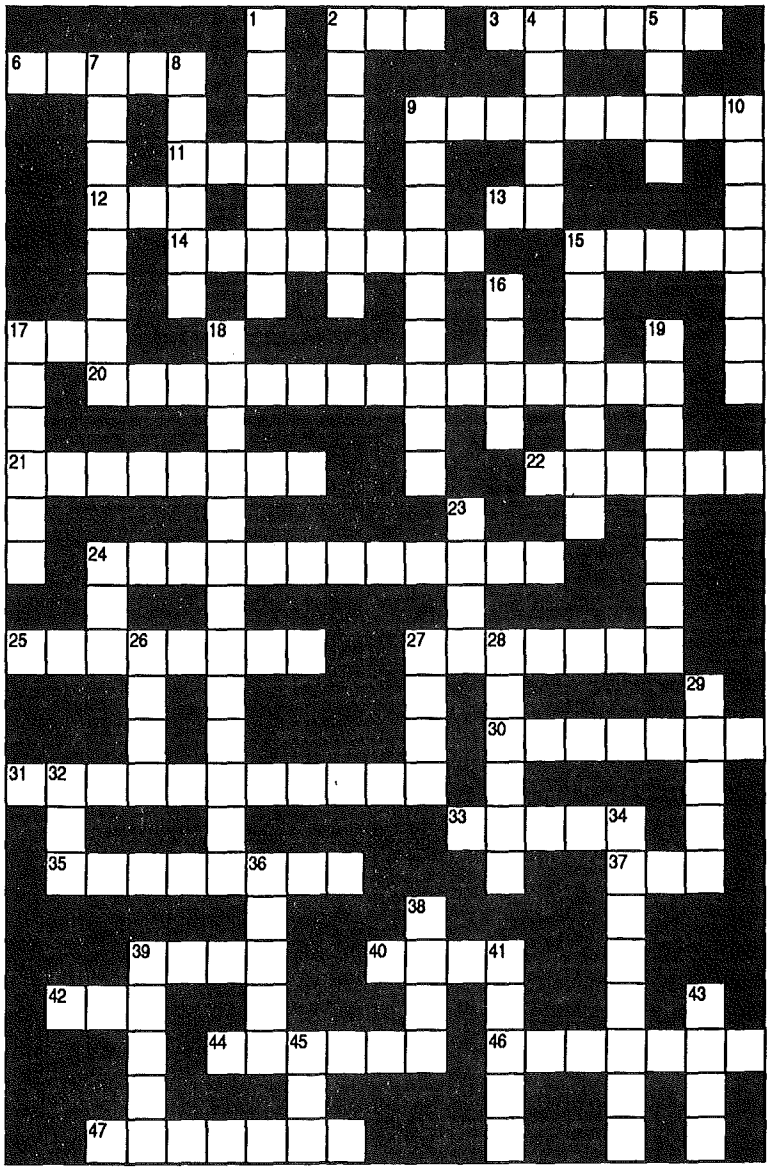
UW student selected as finalist

QINGLIN MA, a Ph.D. student, was chosen as one of three finalists in the 1990 URSI Student Prize Paper Competition for her paper, "Propagation and Depolarization of an Arbitrarily Polarized Wave Obliquely Incident on a Slab of Random Medium." She has also been invited to present her paper during the plenary session of the National Radio Science Meeting to be held in Boulder, Colorado in January 1990. Qinglin will receive a cash prize and travel expenses. The paper is based on her Ph.D. dissertation and her advisor is Professor Ishimaru.

IEEE Student Branch activities

- Resumes to be included in 1989-90 UW IEEE Student Branch Resume Book are still being accepted. Both career, co-op, and summer job seekers are encouraged to submit their resumes in the large, white box in the IEEE lounge.
- Orders for sweatshirts with the old design ("Electrical Engineering") are still being taken. An example can be found in the first-floor display window. The cost is $14 for IEEE members and $17 for non-IEEE members. Specify the size desired and white lettering on navy blue or navy blue lettering on grey when ordering. Leave your pre-paid orders together with your IEEE membership number (if applicable) in the WonderBox in the first-floor lounge. Make checks payable to IEEE.
- The EE sweatshirt design contest is still on and people are encourage to submit their designs in the white box in the lounge by the end of the quarter. Remember, the winner takes home a sweatshirt bearing his or her design and an H-P calculator!

A Crossword Puzzle



Across

2. Pulse-code modulation
3. Birthplace of rock bands REM and The B-52's
6. Radio detecting and ranging
9. Not admittance but _____
10. Chemical element
12. "___ culpa"
13. He knows baseball, and football, and basketball, and tennis, and running, and ....
14. Not Norton but _____
15. Sound made by a ripe tomato when thrown against a wall
17. Freshwater fish
20. Certain materials become this at low enough temperatures
21. Russian-born pianist
22. Your IEEE Student Chapter President (Hint: also a human character on Sesame Street)
24. Method of digital filtering
25. Inventor of the modern transistor
27. The only Catholic president of the U.S.
30. Legend claims that he sold his H-P calculator to help co-found Apple Computer
31. Soviet economic reform
33. Vulcan ambassador and Spock's father
35. Father of modern high-speed photography and inventor of sonar
37. Type of filter
39. Fixed voltage or current applied to a circuit
40. Tibetan Buddhist high-priest
42. Currently the tallest player in the NBA
44. "To be or not to be, that is the question"
46. Not MOS but _____
47. Country at constant war with either Eurasia or Eastasia

Down

1. Old Joseph himself; a transform is named after him
2. One of Santa's reindeer (Hint: it's not Rudolph)
4. Name of the lunar base in movie *2001: A Space Odyssey*
5. Joined the Pinta and the Santa Maria
7. My true love gave me 12 of these on the last day of Christmas
8. In music, a style of playing that deliberately varies the tempo
9. The longest palindrome in the English language
10. Molecular-beam _____
15. The second most abundant element in nature
16. The UW cops used this on the students in the Apple Cup melee
17. Flying buttresses are often identified with this style of architecture
18. Medical instrument used to revive patients
19. What is a game show hosted by Alex Trebek?
23. Opposite over hypotenuse
24. Lennon's wife
26. Surrender formally
27. Soviet peninsula
28. Artist who designed the "Broken Obelisk" in Red Square
29. Light amplification by stimulated emission of radiation
32. Before
34. German physicist famous for his electrical laws
38. Warsaw ____
39. Bugs Bunny's human alter-ego
41. Garden
43. Batman's creator (Hint: also the name of a building on campus)
45. French for "me"

Faculty activities

Professor Leung Tsang has been elected a Fellow of the IEEE, effective January 1, 1990, for his "contributions to wave propagation in discrete random media and the theory of microwave remote sensing."

Professor Les Atlas attended the IEEE Conference on Neural Information Processing Systems in Denver, Colorado on November 27-30, 1989. He presented two papers, "Performance Comparisons Between Backpropagation Networks and Classification Trees on Three Real-World Applications," and "Training Connectionist Networks with Queries and Selective Sampling." Co-authors were **M. Aggoune, David Cohn, M. El-Sharkawi, R. Ladner, R. J. Marks II, and D. C. Park.** Both of these papers represent research being done at our department's Interactive Systems Design Lab (ISDL). It is notable that this conference, which is very selective, accepted two papers this year from the ISDL.

Professor Ishimaru is guest editor of a special issue of *Radio Science* based on the URSI International Symposium on Electromagnetic Theory held in Stockholm, Sweden, August 1989.

Professor Robert J. Marks II gave an invited lecture entitled "Use of Queries in Neural Network Training" at the Boeing Neural Network Workshop, Greenville Corporate Theater, Kent, Washington, 17 October 1989.

Publications

Professor Robert J. Marks II has completed editing a three paper sequence on neural network implementation technology for *IEEE Circuits & Devices Magazine.* The third paper in the sequence was written by Professor Les Atlas and Mr. Y. Suzuki, who was a visiting scholar in our department. The three papers are:

- H. P. Graf and L. D. Jackal, "Analog Electronic Neural Network Circuits," vol. 5, pp. 44-49 (July 1989).
- N. H. Farhat, "Optoelectronic Neural Networks & Learning Machines," vol. 5, pp. 32-41 (September 1989).
- L.E. Atlas and Y. Suzuki, "Digital Systems for Artificial Neural Networks," vol. 5, pp. 20-24 (1989).

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Editor
Ming Koh

Special thanks to Karl Mills *at the IPSL for his help.*

The *EE News* is published by the IEEE Student Branch at the University of Washington.

Merry Christmas, Happy New Year, and all that other neat stuff.

UNIVERSITY OF WASHINGTON — Department of Electrical Engineering

EE News

February 1990 Volume 4, Number 2

Noges to resume teaching duties

New Department Chair chosen

A NEW DEPARTMENT chairman was chosen over the winter to take the place of Dr. Endrik Noges, who will be stepping down. Dr. Thomas Seliga, who is currently Associate Dean for Research in the College of Engineering at Pennsylvania State University, will assume the new position on March 16.

As Department Chairman, he will be responsible for overseeing the department as a whole, making budget and curriculum decisions, and delegating responsibilities to staff and faculty members. He will also work closely with industry to obtain grants, scholarships, research projects, and fellowships. He will serve on the College Executive Committee where he will join other department heads. He will also be involved in student concerns and activities such as the EE Forum held last year and planned again for this year. Not the least of his involvements will be the ongoing planning of the new EE/CompE/CompSci building.

Dr. Noges has been asked to serve as Associate Chairman and has agreed to do so for a limited period. He will continue to teach courses throughout the year. His specialty is automatic control, and the classes he has taught include EE 446 and EE 583. In addition, he may teach some circuit theory classes. As Acting Chairman of the department, Dr. Noges played an active role in establishing a chapter of the Eta Kappa Nu Electrical Engineering Honor Society on campus. He was on the Board of Directors of Eta Kappa Nu in the early 1960's.

-Steve Stemple

In this issue:

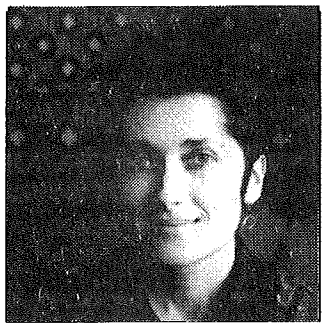
UW and Moscow conduct joint research program

IN 1988, PROFESSOR Akira Ishimaru of the EE Department and Dr. A. S. Gurvich, a well-known scientist at the Institute of Atmospheric Physics in Moscow, initiated a cooperative research program on wave propagation and applications to

(see page 3)

Department welcomes new advisor

PLEASE WELCOME Lani Stone, the new undergraduate advisor for EE students. Lani previously worked in the admissions office in Schmitz Hall and joined the EE Department on December 18 last year. So far, she has found the job both "enjoyable



Lani Stone

and challenging." Lani applied for this position because she likes the one-on-one contact with students, something she hopes to get more of.

Prior to working at the U. of W., Lani was the registrar and advisor at Cornish College of the Arts in Seattle. Although the two schools may seem strikingly different, the people, she claims, are the same. She likes the potent learning environment of the University and is particularly pleased to be on campus.

(see page 2)

Advising Office news

Please note that Registration Period I for Spring Quarter began **February 1** and goes through **March 2.**

COMPUTER ENGINEERING STUDENTS:

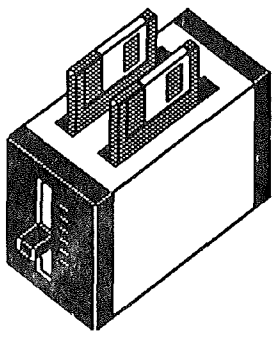
All Computer Engineering students should have received the blue form in the mail to establish their permanent computer accounts by now. If you have any questions regarding setting up your account, please see Marilyn Kramp or call her at 543-1695. She is looking forward to being able to send students e-mail.

-Lani and Marilyn

(New advisor, from page 1)

Lani says she still needs to adjust to all the quirks, ins and outs of the EE Department. Meanwhile, closer to home, her hobbies include dance, cats, and gourmet cooking. "I'm glad that I'm here and looking forward to getting to know the students."

-Chris Bromfeld



IEEE Student Branch activities

- The Seattle University Pizza Feed was a success. The speaker spoke on "creativity in engineering." The IEEE Seattle Section Grant-in-Aid Award and $500 was presented to one student each from the UW, Seattle U., and SPU. The UW's award recipient was **Ashok Kumar.**

- Announcing **new services.** IEEE officers are now available to provide you:

  * Access to old exams and their solutions—most 300 level and some 400 level courses
  * Information regarding computer facilities and their use
  * IEEE Student Branch activity information on social events, tours/seminars, and memberships
  * Peer advising on courses

The office hours for Winter Quarter are 12:30 to 1:30, MTWF, in the lounge (Rm. 111).

- The IEEE is starting **paper contests** and will award *cash prizes* in addition to *publishing* the winning papers. Topics can include previous coursework. An organizational meeting will be held February 26. Pick up an information packet in the main office or Rm. 111.

- It's time to elect new IEEE Student Branch officers for the upcoming year. Pick up a nomination form in the lounge if you qualify and are interested. Candidates must have at least a year left of undergraduate study. The benefits of being an officer are so numerous they boggle the mind.

-Allen Hooper

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Editor Ming Koh

Photography David Wu

The *EE News* is published by the IEEE Student Branch at the University of Washington.

FROM THE EDITOR

Well folks, my days as *EE News* Editor are numbered, and the search is on for a new helmsperson to take over the reins. So, if *you* or anyone you know has the guts, the tireless drive, the semi-crazy dedication, the unbounded enthusiasm, and the ability to stare at a computer screen for long periods of time, and would like to fill this revered position beginning next quarter, please contact me or any of the other officers. Drop us a note in the IEEE WonderBox in Rm. 111 or send me e-mail at YO_YO_MAN on MAX.

(Joint research, from page 1)

space and satellite communications. Dr. Dale Winebrenner of the Applied Physics Laboratory and EE Department here on campus spent three weeks at the Institute in October under this program.

Dr. Winnebrenner's trip began as the first of what will hopefully be a series of scientific exchanges between the Institute of Atmospheric Physics of the USSR Academy of Sciences and our own College of Engineering. The basis for this exchange is a set of long-standing scientific contacts between Prof. Ishimaru and Profs. Gurvich and V. I. Tatarskii of the Institute. Dr. Winebrenner's invitation to Moscow led to another invitation as a speaker at the Sixth International School of Microwave Theory and Technique held October 2-7 in Varna, Bulgaria on the Black Sea. Following the School, Dr. Winebrenner traveled to Moscow and Leningrad for three weeks of lectures and discussions on scattering theory and remote sensing of the polar regions.

In Bulgaria, Dr. Winebrenner met several renowned researchers in rough-surface scattering theory from the Institute of Radiophysics of the Ukrainian Academy of Sciences.

... the Institute provided an excellent "culture program" of museums, theater, dance, and a Soviet rock concert.

Several of the resulting discussions related directly to current issues in the phase perturbation technique for rough-surface scattering originated by Dr. Winebrenner as Prof. Ishimaru's student. In Moscow, Dr. Winebrenner toured the Institute of Radioengineering and Electronics, where data is processed from Soviet probes to Mars and Venus, as well as from Earth remote-sensing satellites. He also initiated new working relationships with rough-surface scattering theoreticians at the Institute of Atmospheric Physics and the Shirshov Institute of Oceanology. He gave four talks which were well-received, and the Institute provided an excellent "culture program" of museums, theater, dance, and a Soviet rock concert. In Leningrad, he spent two days at the Artic and Antarctic Research Institute discussing spaceborne microwave observations of sea ice and machine-automated interpretation.

The trip went very well and a scientist from the USSR is expected to visit here next summer.

-D. Winnebrenner and N. Henry

Faculty and graduate student publications

L.E. Atlas, J. Conner, D. C. Park, M. A. El-Sharkawi, R. J. Marks II, A. Lippman, R. Cole, and Y. Muthusamy, "A Performance Comparison of Trained Multi-Layer Perceptrons and Trained Classification Trees," *Proceedings of the 1989 IEEE International Conference on Systems, Man, and Cybernetics*, (Hyatt Regency, Cambridge, Massachussetts, 14-17 November 1989) pp. 915-920.

X. Jiang and J. S. Meditch, "Integrated Services Fast Packet Switching," *Proceedings of the IEEE GLOBECOM '89*, Dallas, Texas, November 1989, pp. 1478-1482.

J. S. Meditch and X. Jiang, "An Integrated Services Fast Packet/Fast Circuit Switch," *Proceedings of the IEEE ICC '89*, Boston, Massachussetts, June 1989, pp. 104-110.

Alan C. Nelson (co-author), "Supercomputer Simulation of CT," *Radiology* 173(P)(supplement), p. 415. Presented by Professor Nelson's student, R. Johnson at the 1989 Radiological Society of North America meeting held at Chicago's McCormick Place, November 26 to December 1.

Alan C. Nelson and Robert Haralick (co-authors), "Optimal Information Retrieval from Complex Low Frequency Backgrounds in Medical Images," *Proceedings of the 1989 IEEE/EMBS Conference*, Seattle, November 9-12, 1989, pp. 384-385. Student R. Johnson presented the paper at the conference.

NORTHWEST ENGINEERING CAREER FAIR

FRIDAY, MARCH 2, 1990
11:30 - 3:30
HUB 310

- Local and non-local companies
- Career and summer employment
- Refreshments

Bring your resume

Sponsored by the University of Washington IEEE Student Branch

Solution to the December *EE News* Crossword

```
      F PCM ATHENS
RADAR O R   Y I
  R U A REACTANCE
  U BORON E H A P
  MEA I C D BO  I
  M THEVENIN SPLAT
  E O R R V M I  A
GAR D   I A L J  X
O SUPERCONDUCTIVE Y
T   F   E E C O
HOROWITZ  R HOOPER
I   B   S N A
C OVERSAMPLING R
  N I   N   D
SHOCKLEY KENNEDY
  E L   O E   L
  D A   L WOZNIAK
PERESTROIKA M   S
 R  O   SAREK E
 EDGERTON  N  IIR
    E  P   R
  BIAS LAMA C
 BOL  L  C R H K
  A HAMLET BIPOLAR
  N  O   O F N
 OCEANIA  R F E
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Family News

Professors Linda Shapiro and Robert Haralick spent the Christmas break in Paraguay, where they adopted four-month old Michael Aaron Haralick.

UNIVERSITY OF WASHINGTON — *Department of Electrical Engineering*

EE News

April 1990 Volume 4, Number 4

Administration Profile

Thomas Seliga and the new era

THE DEPARTMENT of Electrical Engineering finally has a new chairman. Dr. Thomas A. Seliga began his duties in March 1990, and he comes to the UW with impressive credentials. As the Associate Dean for Graduate Studies and Research in the College of Engineering at Pennsylvania State University, he led that school's engineering research program into a new era by overseeing an increase in funding by a factor of 3 in 4-5 years. This accomplishment transformed Penn State into a nationally recognized research institution. Prior to that, he was a professor of EE at the Ohio State University and the Director of their Atmospheric Sciences Program. In 1967-1968, he was Program Director of Astronomy at the National Science Foundation.

One of Dr. Seliga's goals for UW's EE Department includes improvement of our facilities. Classrooms and offices need to be refurbished. Currently, the new EE building that everyone has been hearing about is still in the programming and design stage. Dr. Seliga will be working with the faculty and Dean to gain final approval for the building. A new building will not only alleviate the poor conditions in the current one, but also provide additional space to meet the Department's rapidly growing research programs. Other universities' EE departments have undergone or are undergoing major renovations. For example, Penn State's EE West building has just received approval for major renovations; the University of Michigan recently completed a new building; and right here in Seattle, Seattle University's EE Department recently moved into its new facility. UW's EE Department hasn't had any major additions for many years, and clearly needs the planned new facility.

One of Dr. Seliga's goals for the UW's EE Department includes improvement of our facilities.

Another goal is more and better publicity for the Department. Dr.

(see page 4)

In this issue:

Second EE Forum raises issues both old and new

THE EE FORUM, where students voice their concerns to the EE faculty, was held on April 18. The moderator was Dr. Moritz.

Many questions and concerns were about instructors' performances in lecturing, course content, and grading. Several students complained that some professors send their TAs to lecture instead of showing up themselves, and that TAs were teaching some courses. Dr Noges, Associate Chairman, assured the audience that TAs rarely teach courses, and only when there is lack of a

(see page 2)

Department gears up for 1990 Engineering Open House

THE 1990 ENGINEERING Open House will be held on April 27 and 28. This is a great occasion to show our activities to the general public, including high school students who are curious about electrical engineering. The open house is also a great opportunity for you to get a feel for new technologies. IEEE, Eta Kappa Nu, and many

(see page 3)

Advising Office news

The deadline for August 1990 BSEE applications is June 29. Please be aware of this and schedule an appointment in the Advising Office in a timely manner. If you miss the deadline, you may not be eligible to graduate in August!!

Registration dates for Summer Quarter 1990: April 30 - May 30 (Period I). Entry codes available April 30.

Please note the change in the registration start date for Autumn Quarter 1990! Registration dates are May 14 - June 15 (period I). Entry codes available May 14.

Notice: closing of Sections in 264 Schmitz Hall. The success of STAR has resulted in a reorganization in the Office of the Registrar and the closing of Sections. Beginning April 11, students go to the Registration Office (225 Schmitz) where you will be served at one of nine available windows. During peak registration periods additional staff will be available to assist with non-STAR transactions at these windows.

-Lani & company

Spring 1990 admissions

Dane Abrigana
Troy Bailey
Susan Boxx-Ransom
Adam Braden
Benjamin Byman
Emily Chandler
Daniel Chan
Jeanette Clark
Kenneth Cooke
Edward Cox
Theo Daffenbaugh
Suzanne DeBaecke
Keith Drabek
Hoang Duong
Kimtuyet Duong
William Esser
Dustin Federspiel
Robert Fenner
Bernard Franza
Greg Gibson
Greg Green
Shahram Hariri
Paul Heydron
Thao Huynh
Guogin Hu
Nadi Rafik Itani
Michael Kanemoto
Ryan Kearny
Keith Kilmer
Heang Kim
Chan-Pei Kuo
Frank Lawrence
Stephanie La
Marywynne Leon
Sheldon Levias
Yong-Quin Lu
Kyle McCanta
Bartholome McManus
Hien Nguyen
Hoang Huy Nguyen
Hung Quy Nguyen
Khiet Nguyen
Loc Nguyen
Long Van Nguyen
Mo Nguyen
Thu-Tam Nguyen
Zhengkai Pan
Cameron Parker
Ardeshir Rezvani
Geir Sacterstoen
Kelly Salvatori
Haresh Sangani
Frank Sincock
Kevin Smith
David Soukasene
Terry Tadlock
Tai Tran
Brian Trudeau
Brian Tuck
Wendy Wang

WELCOME ABOARD

(EE Forum, from page 1)

faculty instructor. He pointed out that the EE department has a very low faculty/student ratio. He asked that students in a course where the instructor was not lecturing regularly talk to him or another faculty member.

A concern was raised about the consistency of grading among instructors. Dr. Noges replied that the professors are individuals and thus grade differently from one other. There is no standard university policy on what the average of a class should be. He said that students should know at the beginning of the course the instructor's standards and method of grading.

The consistency of core courses was a concern of several students, and Dr Alexandro said that he is assigning a committee to take care of making a regular mechanism to solve the consistency problem. He admitted that core courses have not been monitored well in the past.

The problems with lab manuals in EE310 was brought up, but Dr Alexandro said nothing would be done with this problem because the course and the equipment would soon be changed. The problem with Pascal not being a prequisite for EE374 was also brought up. Apparently, the instructor expected everyone in the class to know it. Dr Alexandro said he would look into it, but that this is an ongoing problem with the College of Engineering, which only requires proficiency in Fortran.

Other concerns brought up were that the advising office was open for too few hours per day, and that there was no late-night wheelchair access to the building.

(continued next page)

(EE Forum, from page 2)

)th problems were addressed immediately: Lani Stone, undergraduate advisor, said that forms would be placed outside the office; and Dr. Noges said the wheelchair users would be given keys to the ramp entrance of the EE building.

There was some concern and even some anger among several students about the facultys' responsiveness to last year's complaints. There was also concern about the priority conflicts of research and teaching. The faculty present assured the students that research and teaching were necessary for each other and did not conflict. Dr. Seliga, Chairman, said that a student representative might be put on the student faculty review committees for planning the future of the EE department.

-Paul Szabo & Brian Wilson

(Open House, from page 1)

professors and students have volunteered to assist in the planning and preparation of this event.

I would like to invite all students and their families/friends to visit the open house displays and demonstrations. These displays will cover a broad spectrum of subjects, including imaging, robots, vision, energy, computing, electromagnetics, motors, and others.

-C. C. Liu

IEEE Student Branch activities

- The EE Spring Picnic will be held Saturday, May 12 at Woodland Park. All EE students, faculty, and staff members are welcome! Food and activities will begin at 12:30 and activities will last till dusk. Look for the posters in the halls for more details. A ***FREE CAMARO*** will be given away as a door prize, so be sure to make it!

- If you didn't get an EE sweatshirt last quarter, this is your very last chance! One last order of sweatshirts with the "Electrical Engineering" design will be made. Colors available are white lettering on navy blue and red lettering on grey. Prices are $14 for IEEE members and $17 for non-members. Orders must be pre-paid and left in the Wonder Box in the IEEE lounge (EEB 111); order forms are in the lounge and on the first floor display case window.

- IEEE, in conjunction with Eta Kappa Nu, is sponsoring a food table during the Open House. The table will be on the lawn in front of the EEB, right off Stevens Way. In case of rain the food table will be at the front entrance of EEB. Come visit us!

- The following people have been elected to serve as 1990-91 IEEE officers:

Linda Lee	Chair
Darwei Kung	Vice-Chair
John Hotchkin	Secretary
Sue Tseng	Treasurer
Ralph Jorgenson	Membership
Mimi Mar	Publicity
Teri Howe	ESC Rep.
Jane Huynh	Operations
Paul Szabo	Editor
David Wu	Members-
Ming Koh	at-Large

  There are, however, present and future openings. A co-editor position is open, and Operations will be vacant after this quarter.

- An engineering interdepartmental volleyball tournament may be held later this quarter, providing the other departments don't weasel their way out. Watch for posters!

-David Wu

(Seliga, from page 1)

Seliga thinks that UW's EE Department is very good, but few know this. "UW's EE Department needs to pound its chest more." Referring to the UW's ranking in a March issue of *Newsweek*, (we ranked 24th in engineering nationwide), Dr. Seliga credits Dr. Ray Bowen, Dean of the College of Engineering, for working to increase UW's image. Among the reasons why Dr. Seliga came to the UW was the encouragement and enthusiasm of both Dean Bowen and the faculty of the Department.

Enhancement of the Department's seminar program is another goal. In addition to sending our faculty members to present seminars elsewhere, he wants them to communicate their research results to students and colleagues here as well. In addition, we must do a better job at attacting outstanding engineers from other institutions to the UW so that our faculty members and students can learn about their latest research findings. "Essentially," Dr. Seliga says, "we must do everything possible to develop a stimulating, productive environment for our students and faculty. Improving our physical facilities and enhancing our seminar program are only two of many factors that will contribute to this."

Dr. Seliga looks forward with enthusiasm to fulfilling his aspirations for the EE Department. He feels helping the faculty to achieve their individual goals is his greatest challenge and the key to success for the whole Department.

Welcome to the department!

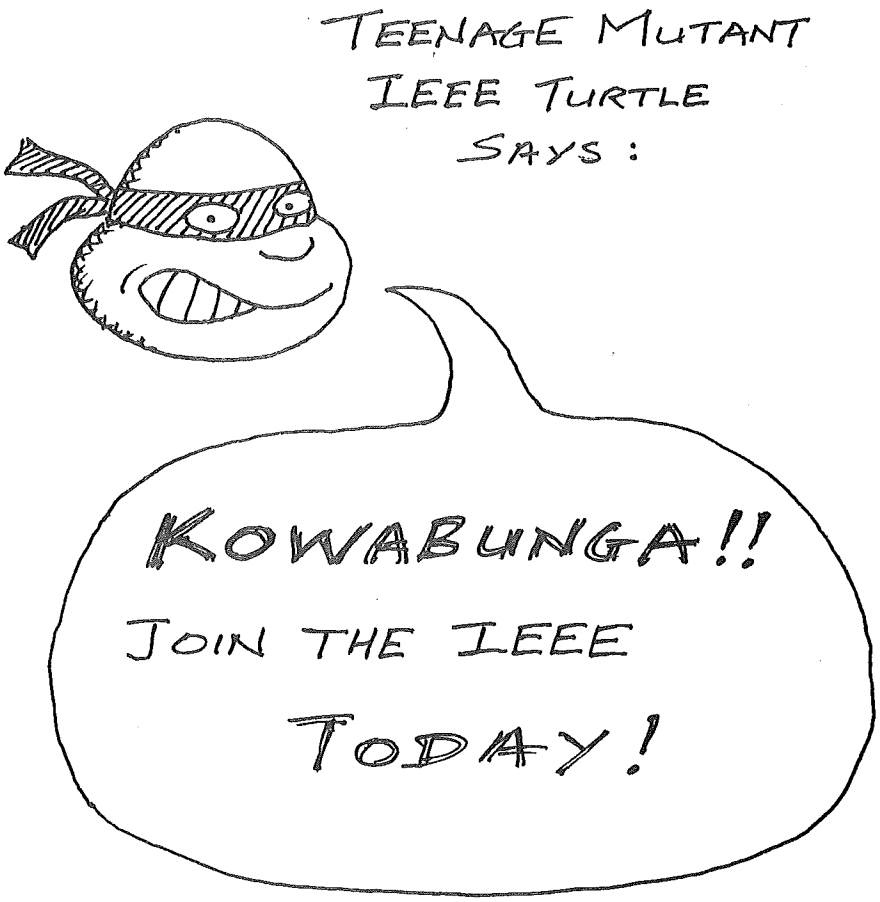
-Brenna Chow

News Staff

Contributors

Advising Office
Brenna Chow
Ming Koh
C. C. Liu
Paul Szabo
Brian Wilson
David Wu

The *EE News* is published by the IEEE Student Branch



Faculty activities

Professor **Akira Ishimaru** was appointed Editor-in-Chief of a new journal *Waves in Random Media*, a publication of the Institute of Physics, United Kingdom. Co-editors are Professor V. I. Tatarskii of the USSR and Professor E. Jakeman of the United Kingdom. The first issue will be published in January 1991. The international Editorial Board consists of eminent scientists working in the field, including Professor **Leung Tsang** of our department.

Prof. **C. C. Liu** was appointed Guest Editor of a special issue of the *Proceedings of the IEEE* to be devoted to knowledge-based systems in electric power systems. He was also appointed Chairman of a new task force on expert system applications to power systems by the International Conference on Large High Voltage Electric Systems, an international power engineering society based in Paris, France.

Prof. **Robert J. Marks II** has been appointed to the Editorial Board of the *International Journal of Neurocomputing.*

Prof. **Robert J. Marks II** gave an invited presentation entitled "Neural networks for classification & regression" at the First Workshop in Neural Networks, Auburn, Alabama, 5-6 February, 1990.

Faculty and graduate student publications

Al-Alusi, M. R. and R. B. Darling, "Influence of high-level injection on the impedance characteristics of GaAs-$Al_xGa_{1-x}As$ double-heterostructure laser diodes," *Journal of Applied Physics*, vol. 67, no. 4, February 15, 1990, pp. 2127-2135.

Blattenbauer, J. A. and Y. Kim, "Introduction to digital image processing and survey of PC-based imaging systems," *Computers in Mechanical Engineering*, vol. 111, pp. 54-56, July 1989.

Cheung, K. F. and Robert J. Marks II, "Image sampling below the Nyquist density without aliasing," *Journal of the Optical Society of America*, vol. 7, pp. 92-105 (1990).

Choi, H., Haynor, D. R., and Y. Kim, "Partial volume tissue classification of multivariate MR images," *IEEE EMBS Eleventh Annual Conference*, pp. 569-570, 1989.

Darling, R. B., "Surface sensitivity and bias dependence of narrow-gap metal-semiconductor-metal photodetectors," *Journal of Applied Physics*, vol. 67, no. 6, March 15, 1990, pp. 3152-3162.

DeSoto, L. A., Haynor, D. R., Choi, H. S., Kim, Y., and T. S. Roberts, "Three-dimensional distortion in magnetic resonance images," *IEEE EMBS Eleventh Annual Conference*, pp.494-495, 1989.

Gee, J. C., Barfield, W., Haynor, D. R., and Y. Kim, "The design and analysis of a medical imaging workstation," *Third International Conference on Human-Computer Interaction*, pp. 286-293, 1989.

Holdsworth, J. R., and C. T. Leondes, "Computational Methods in Decoy Discrimination and Optimal Targeting in Ballistic Missile Defense," *Advances in Control and Dynamic Systems*, Academic Press, 1990.

Kim, Y. (ed.), "Digital Image Capture, Formatting, and Display," *SPIE Medical Imaging IV Conference*, vol. 1232, SPIE, 1990.

Kim, Y. and F. A. Spelman (eds.), "Images of the Twenty-First Century," *Proceedings of the Annual International Conference of the IEEE EMBS*, vol. 11 (2100 pages in six parts), IEEE, 1989.

Kim, Y., Zieber, H. G., and F. Wang, "Uniformity of current density under stimulating electrodes," *CRC Critical Reviews in*

(continued next page)

*(**Publications**, from page 5)*

Biomedical Engineering, vol. 17, pp. 585-619, 1990.

Leondes, C. T. (ed.), *Control and Dynamic Systems: Advances in Theory and Applications*, Academic Press, New York, vols. 30-33, 1989.

Ritchie, C. J., Peterson, E., Yee, D., Kim, Y., Godwin, J. D., and C. R. Crawford, "A 3-D motion control system for simulation of CT motion artifacts," *IEEE EMBS Eleventh Annual Conference*, pp. 487-488, 1989.

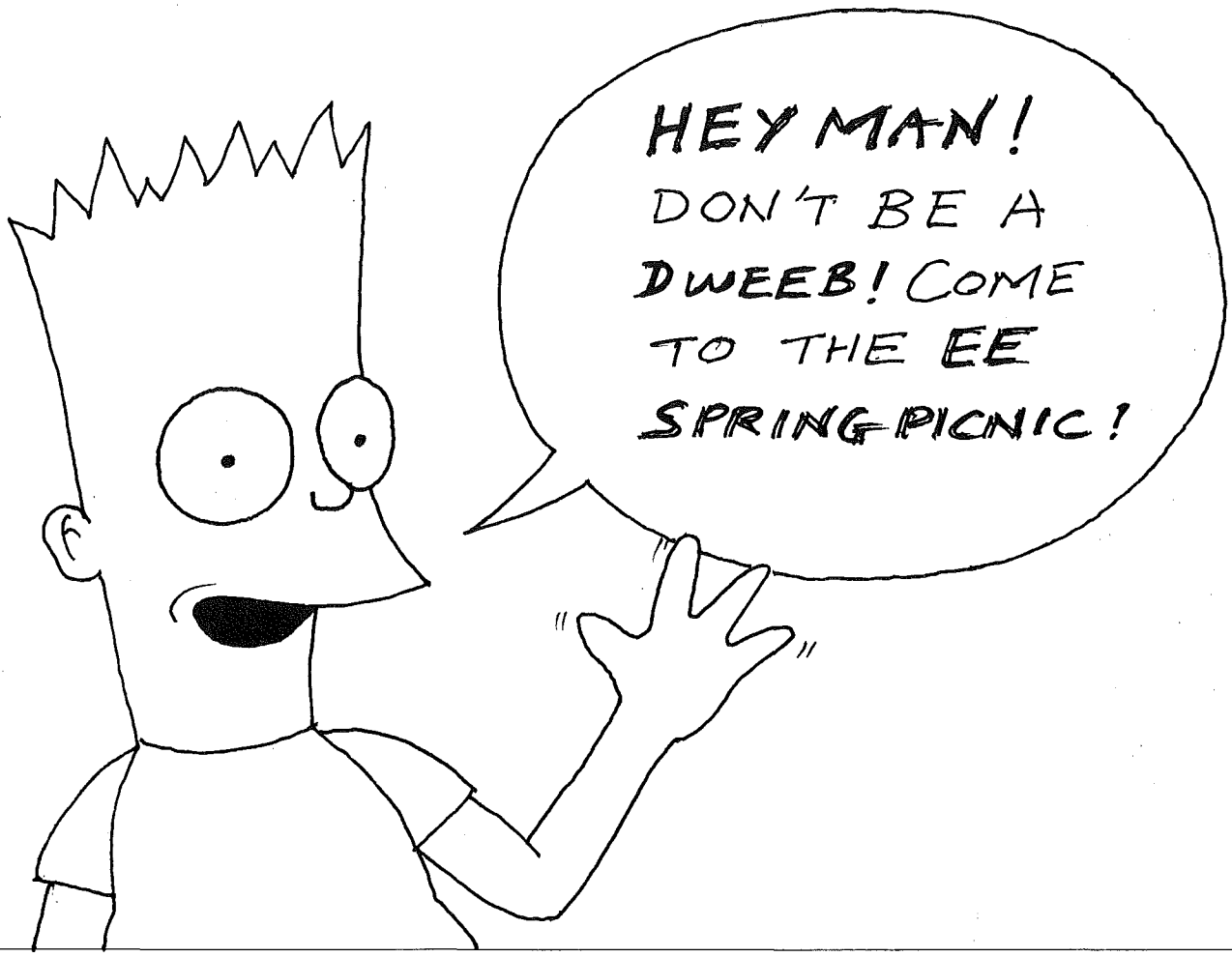
Satin, Arthur L. and C. T. Leondes, "Ensembling Clocks of the Global Positioning System (GPS)," *Proceedings of the AIAA Conference*, Vermont, December 1989, also accepted by *IEEE Transactions on Aerospace and Electronic Systems*, vol. 26, no. 1, January 1990.

Wang, Dachung and Cornelius T. Leondes, "Robust tracking of non-linear systems with uncertain dynamics. Part 1," *Int. J. Systems Sci.*, vol. 20, no. 12, pp. 2619-2641.

Wang, Dachung and Cornelius T. Leondes, "Robust tracking of non-linear systems with uncertain dynamics. Part 2," *Int. J. Systems Sci.*, vol. 20, no. 12, pp. 2643-2661.

Whitmore, S. A., and C. T. Leondes, " A Technique for Compensation of Pneumatic Distortion in Pressure Sensing Devices," *Proceedings of the AIAA Conference*, January 8-11, 1990, Reno, Nevada.

Zhu, Z. and Y. Kim, "Algorithm for automatic road recognition on digitized map images," *Optical Engineering*, vol. 28, pp. 949-954, 1989.



UNIVERSITY OF WASHINGTON *Department of Electrical Engineering*

EE News

BETTER THAN EVER BEFORE!

October 1990 Volume 5, Number 1

EE News Welcomes Dr. Eve Riskin to UW

New Professor Joins EE Faculty

The *EE News* would like to give a warm welcome to the EE Faculty's newest member, Dr. Eve Riskin. Professor Riskin came to the UW last month after receiving her Ph.D. from Stanford where she specialized in image compression. She did her undergraduate work at MIT, finishing up there in 1984.

Professor Riskin chose the UW over several other universities because of its reputation in medical imaging, its excellent medical school, and its location within a large city. An obvious newcomer to the Puget Sound region who has yet to experience the joys of the area's famous late fall, winter, and spring months, she has not been too thrilled with the comparatively mild weather here for her first month.

Beginning winter quarter, Dr. Riskin will be teaching EE 595, a course in data compression. In addition, she has received funding for research in the compression of medical and binary images, and would like to encourage any students interested in these fields to stop by and see her in Room 310. She enjoys teaching, having been a T.A. for several courses while at Stanford, and thinks some of the qualities which make for a good instructor include knowledge of the material, responsiveness to the class, the ability to see things from the student's perspective, and a good sense of humor.

Looking toward the future, she sees radiological workstations and automated radiological pre-screening as two of the big advances coming in her field in the years to come. She is looking forward to getting settled in here at the U, establishing herself in her teaching and research, and becoming involved as a mentor for other women in engineering.

Again, welcome to the UW and the EE Department Professor Riskin!

—Dale Wilson

The Undergraduate Scholarship Watch

Have you ever wondered what kind of scholarship aid the Department has for undergrads? How do you apply? How are the winners selected? Well, read on and I hope to answer those questions and more.

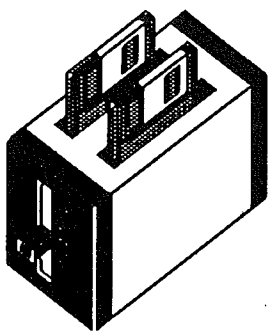
This current year a total of 22 students have received undergraduate scholarships through the Department. The total amount awarded is about $35,000 with awards ranging from $500 to $3600. Some of the awards come from the College of Engineering. A few companies (National Semiconductor, Chevron Information Technology, and Art Anderson) donate money specifically for EE undergrads. Even some EE alums have written checks to support scholarships. Another large source is the Electric Energy Industrial Consortium (EEIC) representing many energy companies in the region.

In order to be eligible, you must submit a COMPLETE Scholarship Application. In the past these have been due by March 1. I stress COMPLETE because of the 55 applications received this year, a large number were not. Typical problems were missing transcripts, no signature, and incomplete information on such things as credits, citizenship status, and expected graduation date. Incomplete applications are not considered for awards.

You should also know that many of the awards carry restrictions. Examples are GPA minimums, fields of

(see page 4)

In this issue:



Have you eaten breakfast lately?

A Word from the Advising Office

Welcome back to school! The Advising office would like to congratulate the new EE students on gaining admission to the department.

The Advising Office has installed racks outside the office so that students can pick up forms, et cetera during the times that the office is closed. We will do our best to keep the racks filled with the appropriate forms!

—Lani & Joy

HEY!!!

LET YOUR VOICE BE HEARD!

The *EE News* staff wants to make this newsletter YOUR newsletter. We are looking for students and faculty members who want to make anything public, and we mean ANYTHING. You can advertise your "HP-28S for sale" or you can even express your opinion on how the IEEE lounge looks like. (Someone came up with the brilliant idea of using this "ads" section for exchanging used textbooks and databooks.) The cost? Of course it's FREE! Simply contact Ken (633-2236) or send e-mail to **opcode@ee**.

Autumn 1990 Undergraduate Admissions

Welcome to the Department!

Marc Ames
Christopher Auth
Thomas Bachman
Kent Beddoe
Sirah Bekele
Woinitu Bekele
Joseph Bond
Rodney Britten
Alan Browers
Michael Brown
James Brunner
David Bryan
Herman Buchanan
Minh Cao
Charles Carver
Elaine Chang
Kui-Hu Choi
Mike Chow
Simon Chow
Johnny Chu
Kok-Ching Chu
Joseph Colburn
James Cooke
Bradley DeGrazia
Jim Do
Tony Do
Kathleen Dugan
Russell Edwards
Wei X. Feng
Sarah Frank
David Fry
Gregory Geschke
Scott Gordon
William Greif
Steven Gubala
Don S. Gunn
Divya Gupta
James Hall
Richard Hensel
Kevin Hubbard
Kyong Hwangbo
Jeff Ichikawa
Ryota Ikeda
Roxana Karimi
Scott Karlsen
Michelle Kee
Glenn Keltto
Minh Khuu
Kerry Krell
Christopher Krysler
Lee Tat
Vanaphone Kuthakun
Linda Lagergren
John Lam
Duy Vu Le
Hung Le
Tam Le
Tien Lim
Hsiu Ma
Jamie Malak
John Manley
John Martin
Julie Martin
Deanna McDowall
Richard McGinty
Christina McRae
Roland Meyer
Paul Moore
Thomas Moore
Michael Na
Teshome Negiri
Donald Nguyen
Duc Huu Nguyen
Huy Q. Nguyen
Nhu-Thuy Nguyen
Nhut T. Nguyen
Son Nguyen
Thang V. Nguyen
Tran Hoang Nguyen
Jacob Nichols
Sampoerno Njono
Steven Nosich
Thomas O'Dell
Robert Olsen
Brett Ostrum
Carolyn Paraiso
Kim-Dung Phan
Dale Potter
Ma Portia Romero
Daniel Roos
Alice Salcido
Kathy Schueler
David Shade
Sung Won Shin
David Smith
Rob Spiger
Robert Spiger
Jennifer Stuart
Robert Summers
Lam Ta
Ha Tang
Brian Terry
Meseret Tiumelisan
Trinh Tong
Mark Topinka
Hang M. Tran
Hang T. Tran
Thy Tran
Thuy Truong
Khan Van
Geoffrey Wang
Jeff Ward
Pat Weinman
Yuan Wen
Joseph Wilson
Marc Wilson
Susan Wolthuis
Mihiret Wubshet
Hobyung Yoon
Piotr Ziedalski

The EE NEWS needs enthusiastic, forward thinking, hard working individuals to be reporters, but we will gladly accept anyone who is merely interested. If you want to contribute to this paper and have some fun too, contact either of us or any of the IEEE officers as soon as possible. Or, if you just have suggestions, ideas, or critiques, please tell us or drop us a note in the IEEE Suggestion Box located in the student lounge. Thank you.

—Ken Sadahiro (633-2236) and Dale Wilson (368-8690)

IEEE Student Branch activities

I am excited about this school year with the UW section IEEE, the professional society on campus! What is IEEE? It's the Institute of Electrical and Electronics Engineering. IEEE is the largest engineering society in the world. This international organization supports societies in Computers, Power, Electronics, Biomedical, and many others; and they set technical standards commonly used in the industry, just to list a few of the things IEEE is involved in.

Modeled after the professional society of IEEE, we, the UW student section, are also striving to set standards and precedents in the Electrical Engineering Department. We are the link between the EE administration, professors, and students. We organize the pizza feeds and socials, career fair, seminars and tours, the *EE News*, and we are also involved in the new EE curriculum and EE building planning. Not only are we a non-profit organization, but most of our activities are free for students, thanks to the strong support we receive from the IEEE Seattle Section and the EE Department!

We have an awesome group of dedicated, talented and fun officers and an advisor; they are:

Chair:	Linda Lee
Vice-Presidents:	Ming Koh
	Darwei Kung
Treasurer:	Sue Tseng
Grad Rep:	Ralph Jorgenson
EE News Editors:	Ken Sadahiro
	Dale Wilson
Membership:	Ben Fahy
Operations:	Mimi Mar
	H.P. Yee
ESC Rep:	Teri Howe
Faculty Advisor:	Dr. Mani Soma

We are looking forward to good renovations to the IEEE lounge, special activities for graduate students only, special events for graduating students, and lots of other fun stuff.

Come check us out in the IEEE lounge, EEB 111, and keep watching for posters and announcements for up coming events! If you would like to join IEEE, or be more involved with IEEE, or have any suggestions drop us a note in the Wonder Box located in the IEEE lounge.

—Linda Lee

●●● Calendar of Events ●●●

November 1

Engineering Awareness Reception

HUB East Ballroom, 2:30-4:30

Visit the IEEE table with the EE Department display!

November 14

FLUKE Tour

Meet at ENGR Lib. loading dock to tour Fluke Park in Everett.

Sign up at the front entrance of EEB by Nov. 9.

Transportation is provided.

Sponsored by the Society of Women Engineers.

Fall Welcoming Party A Success!

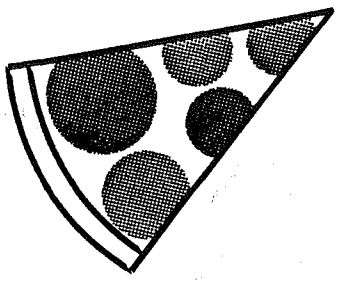
The IEEE Fall Welcoming Party held Thursday evening the 9th of October was a huge success, as the student lounge was overflowing with undergrads, grads, and even one professor. The big party was of course highlighted by the free pizza and pop.

IEEE President Linda Lee began the event by introducing the new student officers, and was followed by HP's ice breaker to help the students become better acquianted. Then, the 30 large pizzas arrived and, just as quickly, disappeared as EE students never pass up a free meal! During the pizza feast, a vote was taken of all those in attendance about funding for the purchase of a pool table for the IEEE Student Lounge and was passed by an overwhelming margin. So, look for the new pool table to arrive sometime in the coming months.

...look for the new pool table to arrive sometime in the coming months.

Finally, the HUB Game Room had been reserved for the evening, allowing for free bowling, pool, and foosball for everyone who could be there. In all, the party was enjoyed by everyone who attended. Be sure to watch for announcements for next quarter's big IEEE event and BE THERE!

—Dale Wilson



"Flying Pepperoni Pizza"

(continued from page 1)

interest, citizenship, sex and minority status. It is essential that you answer all the questions on the application so that we can determine if you qualify for these restricted awards. The field of interest is particularly important. This year many applicants did not provide us with a clue as to the branch of EE they were pursuing. Thus it was impossible to match them with appropriate awards.

The good news is that the Department has money to give away.

Each complete application is carefully reviewed. Transcripts are scrutinized. Personal statements are read. Financial need information from the Financial Aid Office is added. We also consider the level of previous support awarded with an eye to 'spreading the wealth.' However, some donors specifically want to provide multi-year awards (subject to satisfactory progress of course).

We then try to make the best possible match between available resources and the eligible applicants, subject to the various restrictions mentioned above. We try to wrap up the process by the end of Spring Quarter but sometimes donors are late getting money or information to us. Lately we have focused our awards on admitted EE majors although this year a few scholarships were made available to students admitted for Autumn Quarter.

All of the money for this academic year has been allocated. However, we sometimes become aware of additional awards during the year and make an effort to publicize these opportunities in a timely manner. Keep your eyes open for notices.

The good news is that the Department has money to give away. It's all gone for this year but there will be more for next year.

—Bill Moritz

1990-91 Departmental Scholarship Award Recipients

College of Engineering

ALCOA: Joseph Lum, Ken Sadahiro
LEWIS: Christina McRae
BOEING: Jeffrey Ichikawa, Anu Jain
WEYERHAUSER: Clara Trippett

Electrical Engineering

CHEVRON: Kristi Brockschmidt, Frederick (Fritz) Reitz
NATIONAL: Troy Bailey, Daniel Chan, David Hernandez, Kyle McCanta, David Seman, Paul Warren
EEIC: William Esser, David F. Land, Wayne Law
ART ANDERSON: Dennis Rye
OLD CROWS: John Williams
DEPARTMENT: Amanda Hoang, Loc Pham, Wilfred Wong

Congratulations to all the recipients!

Engineering Cross-currents

Visiting Professors from Overseas

As we open up a new school year, you may have noticed a few new international faces in the building. One of those faces belongs to Dr. Kuniaki Yoshitomi, Ph.D., a visiting associate professor from Kyushu University, Japan. He will be with the department until June 1991 conducting experimental studies on millimeter wave scattering, optical scattering, and ultrasound technology. Despite his vast experience in the field of research, these topics are new to Dr. Yoshitomi. When asked about his feelings on conducting research in a foriegn country, the father of a 2 year-old boy replied, "I am definitely looking forward to conducting research with a definite goal and application, which is not always the case in Japanese universities." As a message to the students in the department, he says, "I am impressed at how the students put in so much effort into their studies...keep it up!"

Another new international face belongs to Dr. S.V. Sokolovskiy of the Institute of Atmospheric Physics, Academy of Sciences, in Moscow, USSR. He has been with us since October 3rd and will be here until the 27th as part of an exchange program between the Institute and our College of Engineering. Dr. Dale Winebrenner, EE research assitant professor from the Applied Physics Laboratory, visited the Institute last year. Dr. Sokolovskiy's specialty is wave propagation in the planetary atmosphere.

We at the department would like to give them a warm welcome and hope they enjoy their stay.

—KenSadahiro

What? More congratulating?!

Congratulations (again!) to Kristi Brockschmidt for being chosen as a recipient for the 1990-91 Golden Key National Honor Society Scholarship.

"Grounded in the Northwest"

Report from Northcon/90

The Northwest's largest exhibition and conference for design, test and production engineers, also known as Northcon/90, took place at the Seattle Center Coliseum on October 9-11. As a joint venture of the Seattle and Portland sections of IEEE, the Cascade chapter of ERA, and the Electronics Manufacturers Association, the three-day event addressed the interdependence of engineering functions with a unique blend of vertical exhibits, corresponding vertical technical sessions and professional seminars, exploiting the latest engineering issues and technologies.

Over 300 companies and organizations, ranging from wiring manufacturers to CAE developers, exhibited their latest and best in automated design tools, design, development, test and production software, and analysis instrumentation. The twenty technical sessions were divided into four different disciplines: Design, Leading-Edge Technologies, Manufacturing, and General Interest. Some of the topics discussed during these sessions included Fault Tolerance, Visual Systems, Neural Network Theory and Application, and Education and Training on the 1990's. A number of professors from our department even participated in some of the sessions. (See article at right.) The 21 professional seminars, on the other hand, incorporated lessons and hands-on experience on such issues as basic Ohm's Law electronics for purchasing, sales, and production and support personnel, chemicals of the future, and "just-in-time" manufacturing. The special software demonstration sessions provided participants with even more opportunities to get their hands on the latest application programs.

Former *EE News* editor Ming Koh and I attended the conference on October 11th. On that day, we had the opportunity to see a Microsoft demonstration on a 386SX based IBM using Windows 3.0 with other Microsoft application programs. We learned about a new, powerful feature called Dynamic Data Exchange (DDE), which allows users to update imported data by editing the original. Say, for example, you have imported a pie-chart from Excel into Word, and you decide to change the value of one of the pieces of the pie. If Excel and Word are run simultaneously (multitasking), you can simply go to Excel, change the data, and the pie-chart exported to Word will automatically be updated. According to Steven R. Smith, associate vertical marketing manager, at least 1-2 megabytes RAM is recommended in order to have DDE perform without delays.

It was unfortunate that we were not able to see our professors in action, but as an overall impression, both Ming and I agreed that it was "neat."

—Ken Sadahiro

Professors Participate in Northcon/90

Professors Arun K. Somani and Linda Shapiro put in their time and effort to organize two of the twenty technical sessions offered at the recent Northcon/90 engineering conference. Professor Somani organized the technical session titled, "Fault Tolerance and High Performance Systems," (October 9) which mainly focused on the relevant issues and solutions in design and implementation of such systems that require integrity. Professor Somani presented the overview paper, in which he separated the focus of the session into two parts: the processing problems of a single-computer system, and the necessity and cost of redundancy implemented in a multi-computer system. He also discussed how redundancy can be reduced by using parallelism available in multi-computer systems. The three following papers, presented by professional engineers in the Seattle area, were titled "Fault Tolerance in Multi-stage Interconnection networks," "Reconfigurable Fault Tolerant Computer System," and "Testability Analysis Tools."

"...it is a very good industrial show, so I encourage more people to attend."

Professor Shapiro organized a technical session titled "Visual Systems." (October 10) The session described the recent advances in visual systems research and applications. Professor Shapiro presented two papers during this session. She presented the third paper of the session, "Using Ternary Relationships Among Image Line Segments to Represent Two Dimensional Patterns," with Professor J. Henikoff, and the fourth paper, "Representing Morphological Vision Procedures in Predicate Logic," with Professor Robert Haralick and graduate student Hyonam Joo.

When asked about the attendance to the technical sessions, Professor Somani replied, "they were not that well attended." He even mentioned that Professor Shapiro was disappointed at the low turnout. He did, however, stress the point that, "it is a very good industrial show, so I encourage more people to attend."

Also, Professor Robert Marks, together with Associate Professors Jeng-Neng Hwang and Les Atlas, presented a paper titled "Neural Network Research at the UW—Recent Results and Applications" for the Neural Network technical session (October 9).

—Ken Sadahiro

Faculty and Department Activities

Professor Somani attended the 16th Annual International Fault Tolerant Computing Symposium (FTCS-16) and the summer meeting of International Federation of Information Processing, Working Group 10.4 on Dependable Computing and Fault Tolerance held at Langdale, UK in July 1990 and presented a talk on "Trustability: A Dependability Measure for Systems with Fault Detection and Reporting."

Professor Somani and his students attended the International Conference on Parallel Processing held at Chicago in August 1990 and presented two papers titled, "The Generalized Hyper-Cube," and "An Efficient Sorting Algorithm for the Star Graph Interconnection Network."

Professor Somani attended the Hybrid Automated Reliability Predictor (HARP) Workshop and presented two papers titled "Phased-Mission Reliability Analysis," and "Experience with HARP in Analyzing Reliability of Two Fail-op/Fail-op/Fail-safe Architectures."

Professor Sigelmann spent three weeks at Kobe University, Japan, this summer, participating in the Monbusho (Japan's Ministry of Education) International Scientific Research Program of University to University Cooperative Research on "Inverse Problems in the Measurement Technique by the Scattering and Absorption Process." Professors Ishimaru and Tsang visited Kobe last year and Professors Kitamura, Kaya, and Yoshimura visited our department this summer.

Professor Chen-Ching Liu was appointed to be an Associate Editor of the IEEE Transactions on Circuits and Systems.

Professor Liu was invited to teach a short course at the Imperial College of Science, Technology and Medicine, London, UK, in June 1990. He gave several lectures on expert system applications to power systems. Professor Liu also chaired international task force meetings in Tromso, Norway, and Paris, France.

In September, Professor Liu was invited to Lisbon to visit a real-time expert system implemented at the National Energy Control Center of Portugal. This expert system for power system voltage control was developed by Professor Liu and his graduate students.

During Spring 1991, Professor Liu has decided to take a sabbatical leave; he has been appointed to the Endowed Chair of Frontier Technology for the Future Electric Energy Systems at the University of Tokyo, Japan, for that quarter.

A WORD FROM THE EDITORS

Here you have it, the first issue of the year! Both of us are certainly thrilled that this one came off the press with relatively few problems. If, however, you would like to make any comments to our editing or to the newsletter in general, please drop us a line. You can reach us at our phone numbers (search for them on other pages!), the IEEE Wonder Box in the lounge, or via e-mail at **opcode@ee**. We are always open to any form of criticism whatsoever, as long as it is decipherable.

Thanks once again to those who have supported this issue, and we hope to see you again in a few weeks in our second issue!!!

—Ken & Dale

NEWS STAFF

Editors:
Ken Sadahiro
Dale Wilson

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Chen-Ching Liu
Bill Moritz
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Advising Office

The *EE News* is published by the IEEE Student Branch at the University of Washington.

UNIVERSITY OF WASHINGTON *Department of Electrical Engineering*

EE News

Skiing, anyone?

November 1990 Volume 5, Number 2

NSF $15M Engineering Education Grant Includes UW

The National Science Foundation has announced the award of a five-year, $15 million grant to a coalition of engineering schools, including the UW, for a project designed to increase both the quality of undergraduate engineering education and the participation of women and underrepresented minorities in engineering.

The coalition, named ECSEL (Engineering Coalition of Schools for Excellence in Education and Leadership), consists of the schools and colleges of engineering at the UW, M.I.T., Howard Univ., Morgan St. Univ., Penn St. Univ., City College of New York and the Univ. of Maryland. The NSF chose these schools for the quality of their engineering programs coupled with the diversity of their respective student bodies and the complementary spectrum of the institutions themselves: private and public, small and large, east coast and west coast.

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At the UW, Dean J. Ray Bowen of the College of Engineering will lead the project with Jens E. Jorgensen, Boeing Professor of Manufacturing, as the Principal Investigator, and James S. Meditch, Professor of Electrical Engineering, as the Co-Principal Investigator. A team effort in preparing the University's portion of the ECSEL proposal involved faculty from all of the College's undergraduate degree granting departments. Thanks to their effort, UW will receive $456,000 in funding during the first year and a projected $2.5 million over the five-year term of the award.

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—James S. Meditch

$1,000 and $2,000 Scholarships Available

The Consulting Engineers Council of Washington is offering two scholarships for 1991 – one for $1,000 and the other for $2,000. The recipient of the $2,000 award will be eligible to compete for national awards totaling $24,500 (with a top award of $5,000). Applicants must be U.S. citizens pursuing a Bachelor's degree in engineering and be **entering** their junior, senior or 5th year in the fall of 1991. Students who are graduating in December 1991 are not eligible for this scholarship.

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In this issue...

The Other Side: Professor El-Sharkawi

You may have seen him lecturing in EE 344, or socializing at an EEIC dinner, or maybe even fishing in one of the many Northwest rivers and streams... But I found Professor Mohammed El-Sharkawi working diligently at his desk late one Friday afternoon.

He is definitely a busy man, for not only does this professor teach undergraduate and graduate courses (Winter Quarter: EE 453, Electric Drives), he is also directing a research project which has, most recently, created quite a stir in the department. The project is in its ninth year of development - the result is entitled the Adaptive VAR Compensator (AVC), a device which virtually eliminates reactive power, thus increasing a system's power delivery. Within the year, the AVC will be approaching the market stage. Already, a number of companies have shown interest in using the AVC to cut down on their utility bills, and even as we spoke, the phone rang bringing news of even more companies interested in the device. In a given year, typically six to nine graduate students assist with the project, as well as undergraduates earning credit via EE 499.

"We need to rethink the way we handle some of our generation ideas right now," Professor El-Sharkawi said, adding that we, as engineers, must address the public's concerns about new generation and transmission of energy.

I asked Professor El-Sharkawi why he became an electrical engineer, and why he specifically chose the power field, and he replied, "You can't be a power engineer without knowing a little bit about every kind of engineering." As an undergraduate and graduate student at the (now) University of Helwan in Cairo, Egypt, he studied electrical engineering, intrigued with the idea of controlling large amounts of energy - thus studying the power systems discipline. His life's dream - to become a university professor - has undoubtedly been realized. Just this past spring, Professor El-Sharkawi was promoted to full professor.

He believes the future of the power industry has major problems and challenges, with "bright solutions." "We need to rethink the way we handle some of our generation ideas right now," Professor El-Sharkawi said, adding that we, as engineers, must address the public's concerns about new generation and transmission of energy. Convincing the public to conserve energy and finding inventive ways to save energy (such as employing the AVC device technology) are among the best ways to solve these problems. He thinks that the power electronics field is expanding rapidly, as these issues become more important.

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—Kathy Dugan

Editor's Note: This is the first of what we hope will be a regular column by Kathy in which she will take an in-depth look at a different EE professor in each issue - focusing on the aspects of professors which we might not be able to see in our interactions with them in class.

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(1) prepare your resumé,

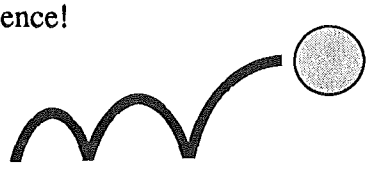
(2) attach a piece of paper onto your resumé stating which category you would like to be classified under (Co-op, Graduating Sr., Finishing Grad students), and

(3) put it in the manila envelope on one of the cupboard doors in the IEEE lounge, EEB 113.

The deadline is **December 12, 1990**, so you'd better hurry! If you have any questions or concerns, send e-mail to ieee@ee or call Ken at 633-2236.

IEEE Obtains New E-mail Account

The IEEE-UW Student chapter now has a general purpose e-mail account for all types of correspondence. All inquiries concerning activities, operations, or whatever should be directed to: **ieee@ee**. Also, there is a new correspondence account for the EE News, and it is: **ee_news@ee**. We'll be looking forward to receiving all of your correspondence!



Advising Office News

Deadline to submit applications for BSEE degrees for Winter Quarter 1991 (March) is January 22, 1991. Make an appointment with Lani before that date to fill out the proper graduation forms!

Welcome a new student helper in the EE Advising Office - Raul Vargus.

Happy Holidays!

—EE Advising Office

Myths & Mysteries .....

In this section, we will attempt to answer any questions and dispel any rumors heard circulating around the EE Department. If you have any specific questions for this column, please let us know and we will attempt to find an answer for you, or at least direct you to someone who might know.

Question #1: Does a student have to graduate immediately once they have completed the minimum departmental graduation requirements?

Answer #1: According to Lani in the Advising Office, there is a 1 quarter grace period which allows you to continue taking classes for that 1 quarter after you have fulfilled all of your degree requirements.

Question #2: I'm confused about the statistics requirement. STAT 390? MATH 390? IND E 315? Huh?

Answer #2: To fulfill the EE undergraduate statistics requirement you can take either STAT 390 or MATH 390 (they actually are the exact same class). However, DO NOT take IND E 315!!! This course will not satsify the EE statistics requirement because it is only 3 credits.

—Dale Wilson

Graduate Student News

Howdy!

This will be an ongoing column (maybe) presenting news and inside information about the electrical engineering graduate student program. We'll keep you informed about upcoming events, fellowship opportunities, and other information which we think may be helpful to you.

To better represent ourselves vis a vis the administration, we should empower some kind of representative council. This would create a mechanism by which the individual graduate student can make his/her/its voice heard. Most of us are too busy to pursue many of our concerns in the department, and it would be to the advantage of all to heed the call of "Graduate students of EE Unite, you have nothing to lose but your chains."

To organize such a group, we need both willing candidates and the support of the graduate students. We, as the revolutionary council, will take an initial vote from the graduate students which will determine if anyone has any interest at all in this. Drop off your votes, (the cut-out below), in the EE mailbox marked "EE Graduate Student Council" in the main office. Feel free to include any comments or suggestions with your ballot. The possible functions of the proposed council include, but are not limited to, presenting graduate concerns to the administration, arranging social gatherings (FREE FOOD and all kinds of beverage), organizing the new fall graduate student party, and providing for the general welfare.

To move to the news, there are two items of interest. First, there will be an informal graduate student gathering soon, to initiate the NEW and not yet here used pool table (date to be announced). Secondly, IEEE is currently planning to create a graduate student picture display. This permanent display will be placed at some prominent spot in the building. Pictures will be taken in the first two weeks of winter quarter by our wandering photographer. So for the first two weeks of the quarter, wear something tacky. If you manage to avoid our candid camera, there will be a picture day scheduled.

—the Graduate Student Ghostwriter and the IEEE Graduate Student Representative

Graduate Student Ballot

☐ Yes, I think there should be an EE graduate student council!

☐ No, I do not think think there should be an EE graduate student council!

Please drop this ballot into the mailbox marked "EE Graduate Student Council" in the main office. Add any comments or suggestions you might have in the space provided below. Thank you..

_____

_____

_____

_____

Since it is the recruiting rush-season, read and think about this for a moment...

Letter to an EE student

In many ways, as an EE student about to embark on a career in electronics engineering, you are among the most privileged graduates of all.

...Then again, maybe not.

• You can expect excellent salary offers of about $31,978, just below petroleum, chemical and mechanical engineers. By the time you graduate in June 1991, you should rank fourth among all majors in starting salaries. To top it off, you are able to jump-start your career earlier than your classmates who want to be doctors, lawyers or even MBA's.

...Then again, you're not likely to stay ahead of those doctors, lawyers and MBA's. EE's are a bit like a drag racer. Fast off the mark, but salary acceleration is strictly short-run.

• You're entering a career that, by all accounts, is among the most in demand. You can load up a hard disk with all the forecasts of "shortages" of engineers and scientists that we face in the 1990's. Makes you feel good, huh?

...Yet, some of the biggest names in the business have put on the brakes hard in their college recruiting over the past year or so. Some giants, like Wang Labs, Tektronix and a host of defense contractors, have suffered through hard times in the last two years. They have fewer EE's now than they did a year ago. And the national electronics engineering society, the Institute of Electrical and Electronics Engineers (IEEE), has grave doubts about any predictions of shortages of engineers. As engineers themselves, they wonder how these forecasters can make such predictions. You can measure supply by looking at the pipeline of engineering graduates. *Demand* is another matter entirely. Do companies really know how many EE's they need in three years? The IEEE is skeptical.

• As a soon-to-be EE grad, you are likely to be wooed and courted by a number of engineering employers.

...Enjoy it. From about five years on, it gets tougher. That knowledge that the employers so diligently seek now will be "outdated" by then. There's a lot to talk about the "half-life" of an engineer being five years. You may think that's bull–and it probably is–but you're about to learn a fact of life as a EE: You may graduate, but you never stop learning. Or you had better not, anyway. No way can you sit down in a cubicle somewhere–even in a big, prestigious company–and expect to emerge from it 25 years from now with a big pension and gold watch. This career you've chosen calls for aggressive career planning and constant retraining and re-education. Think about it. If you had started your first job in 1980, you probably would not have had a PC on your desk, microprocessors would have been out only for three or four years and you would have been on the threshold of (gasp) the 8-bit generation.

• You belong to an elite profession that is changing the face of how each and every one of us goes about living our lives.

...Problem is, does the public really know it? Maybe you've noticed in talking with English majors how their eyes glaze over when you start rattling off talk about megabits, rectifiers and oscillations. You'll learn that if you ever want to grab a non-techie's attention, talk about the end-use product. "Oh, I'm working on the B-2 bomber...a system that will probe your brain without surgery...or a portable phone you can carry around in your shirt pocket."

• You're also entering one of the most entrepreneurial of fields. Silicon Valley is crammed with EE's who have launched their own businesses. If you're ambitious and savvy, you could join David Packard, Steve Jobs or Bill Gates on "Billionaire's Row."

...Or, you could end up out of work at 40, protesting that the world still needs your knowledge of TTL, NMOS, and Fortran. No, it doesn't.

It's up to you.

–Article courtesy of *Electronic Engineering Times*, October 1990

A word from IEEE

Hey you! There's more to school than transistors and bit shifters! (believe it or not!) Yes, be more than just a DOUBLE-"E"...be in I-triple-"E"! IEEE's get involved in the lives of EE students: they voice opinions about teachers and classes through IEEE and HKN's course evaluations; they plan our graduation celebration, pizza parties and picnics; they publish the EE News and resumé books; they help decide how to renovate the EE building; and much much more! We will also be hosting the IEEE-Seattle section pizza feed in January!

Develop leadership and professional skills and put in your ideas of what the EE department should be like. Take initiative and let you voice be heard by being an IEEE officer and make changes happen! Join the IEEE today!

—Linda Lee, IEEE-UW Student Chapter President

E.I.T. EXAM

Application Deadline: December 13, 1990

Applications for the next Engineer-in-Training (E.I.T.) Exam —which will be given on April 12, 1991—must be submitted by Decmeber 13, 1990. Applications are available in the College of Engineering Dean's Office, Loew 371. Helpful hint: do not wait until the last minute to pick up this form and fill it out. The sign-up fee for this exam is $50.00, and study books are available through the College of Engineering and later through IEEE. Also, you have to have your signature notarized - there is a notary available in the HUB by the Candy Counter. If you have further questions, you should contact Beth Ann Keeler, College of Engineering Dean's Office, at 543-0340.

NEWS STAFF

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Dale Wilson
(contact us via e-mail: ee_news@ee)
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Kathy Dugan
Contributors:
Advising Office
IEEE Grad Student Representative
...actually, Ralph Jorgenson
Robert J. Marks II
James S. Meditch
Bill Moritz

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Holiday Wish Lists

The response to the Holiday Wish List request was less than overwhelming to say the least, but those who did respond submitted great lists. Thank you! May all those people who responded find everything they want under their trees this holiday season (ESPECIALLY the person who wants a roommate without gas!), and, hopefully, the rest of you who did not get into the holiday spirit will find lumps of coal in your stockings!!! However, most people did not sign their lists so Santa may have some difficulty finding you, but anyway here are the lists we received. *—Dale Wilson*

1. A text book for under $40, a choo choo train, a national football championship, a large print edition of the TTL Data Book, two clocks at the UW that read the same time, a big, red firetruck, a winning LOTTO ticket, a roommate without gas, the answers to the universe, or Christian Applegate's phone number. —Kris Kringle

2. A BSEE Degree, a pool inside my house, $50,000/year income, a job to go with that income, and a trip to the moon. —Rudolph

3. Students who can follow instructions, students who can communicate clearly and accurately, and students who have an intuitive feel for the real world (and know which end of a soldering iron to grab!)
—Professor Moritz

4. 15 Design credits to magically appear on my transcript, my very own HP Digital Oscilloscope for those boring weekend nights at home with the folks, an Analog Workbench Program which provided instantaneous results, and a dog. —Frosty the Snowman

5. My GPA back! —Miss Claus
(Hey, don't we all! Ed.)

6. A trip to the Rose Bowl, 3 day weekends, to be featured on America's Most Wanted, and a six-pack. —Blitzen

7. Free tuition, a job waiting for me after graduation so I don't have to look for one, a black Lamborghini, and Mom & Dad to move out of the house.
—Donner

8. No more rain, no more rain, and no more rain. —Mr. Sunshine

9. A new, highly intellectual, self functioning, fuel-efficient, compact brain that I can simply replace with the existing one I have. Also, 36 hours to a day would be nice. —Ken

10. Out of Seattle, out of the Puget Sound region, out of Western Washington, a grad school appointment, and a new car (the Mercury Bobcat wagon is no longer the status symbol it once was!). —Dale

Faculty and Department Activities

Publications

• K.F. Cheung and R.J. Marks II, "Image sampling below the Nyquist density without aliasing", **Journal of the Optical Society of America A**, vol. 7, pp. 92-105 (1990).

• M.J. Damborg, M.A. El-Sharkawi, M.E. Aggoune, and R.J. Marks II, "Potential of artificial neural networks to power system operation", **Proc. 1990 IEEE International Symposium on Circuits and Systems**, (1-3 May, 1990, New orleans, Louisiana), pp. 2933-2937, invited paper.

• J.N. Hwang, J.J. Choi, S. Oh, and R.J. Marks II, "Classification boundaries and gradients of trained multilayer perceptrons", **Proc. 1990 IEEE International Symposium on Cicuits and Systems**, (1-3 May, 1990, New Orleans, Louisianna) pp. 3256-3259.

• A. Ishimaru, R.J. Marks II, L. Tsang, C.M. Lam, D.C. Park & S. Kitamaru, "Optical sensing of particle size distribution by neural network technique", **Proc. 10th Annual International Geoscience and Remote Sensing Symposium**, 20-24 May, 1990, Washington, D.C., (IEEE Press) vol. III, PP. 2129-2132

• Y. Zhao, L.E. Atlas, and R.J. Marks II, "The use of cone-shaped kernels for generalized time-frequency representations of non-stationary signals", **IEEE Transactions on Acoustics, Speech, and Siganl Processing**, vol. 38, pp. 1084-1091 (1990).

• R.J. Marks II, "The IEEE Neural Networks Council", **IEEE Transactions on Neural Networks**, vol. 1, p. 249 (1990).

• L.E. Atlas, R. Cole, Y. Muthusamy, A. Lippman, G. Connor, D.C. Park, M. El-Sharkawi & R.J. Marks II, " A performance comparison of trained multi-layer perceptrons and classification trees", **Proceedings of the IEEE**, vol. 78, pp. 1614-1619 (1990).

• A. Ishimaru, R.J. Marks II, L. Tsang, C.M. Lam, D.C. Park, and S. Kitamaru, "Particle size distribution using optical sensing and neural networks", **Optics Letters**, vol. 15, pp. 1221-1223 (1990).

Announcements

• Professor Robert J. Marks II was named one of the eleven topical editors of the **Journal of the Optical Society of America A: Optics and Image Science** published by the *Optical Society of America.* Professor Marks will be editing those papers submitted in the area of *Optical Signal Processing and Image Science.*

• Prof. Robert J. Marks II has been appointed to the Editorial Board of the **International Journal of Neurocomputing.**

• Prof. Robert J. Marks II has been re-elected President of the *IEEE Neural Networks Council* (NNC) for 1991. The NNC publishes the **IEEE Transactions on Neural Networks** and sponsors the *International Joint Conference on Neural Networks*, which will be held this summer in Seattle.

• Pieter J. van Heerden, Robert J. Marks II and Seho Oh, "Method and apparatus for identifying that one of a set of past or historical events best correlated with a current or recent event", U.S. Patent No. 4,939,683, July 3, 1990

• Robert J. Marks II gave an invited presentation entitled "Neural networks for classification & regression" at the *First Workshop in Neural Networks,* Auburn University Hotel & Conference Center, Auburn, Alabama, 5-6 February, 1990

• Prof. R.J. Marks II gave an invited presentation entitled "Kernel Synthesis for Generalized Time-Frequency Distributions Using the Method of Projection onto Convex Sets" at the *Advanced Signal Processing Algorithms, Architectures, and Implementation,* San Diego, July 10-12, 1990. Co-authors of the paper are Drs. S. Oh, L.E. Atlas, and Mr. J.W. Pitton.

Book Review

Springer-Verlag has just released a book by Prof. Robert J. Marks II entitled *Introduction to Shannon Sampling and Interpolation Theory*. It is the first book in signal analysis solely devoted to the topic of sampling and subsequent restoration of continuous time signals and images. The sampling theorem is a fundamental topic in any field that treats continuous time signals or images in real time. These fields include communication engineering, seismology, image processing, biomedical applications, speech, digital signal processing and holography. The fundamentals of the sampling theorem are developed in detail in this book. Numerous generalizations are treated in depth, including those of Papoulis and Kramer. Effects of truncation, data noise and jitter on restoration error are analyzed. The sampling theorem is generalized to higher dimensions, resulting in optimal sampling strategies for certain classes of images. Continuous sampling is also developed in depth. Here, a signal is restored from knowledge of its structure in one or more disjoint temporal intervals. To allow for effective self study, *Introduction to Shannon Sampling and Interpolation Theory* contains numerous exercises with corresponding selected solutions.

Prof. Marks will be using the text in his EE522 course, Shannon Sampling and Interpolation Theory.

UNIVERSITY OF WASHINGTON *Department of Electrical Engineering*

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The IEEE-UW Chapter will publish a Resumé Book by late January 1991, and submissions of resumés are desperately wanted! Submission of your resumé will automatically enter you in the IEEE-Student of the Year Award contest (prize money!) so we encourage all of you to enter. Here are 3 simple steps to follow:

(1) prepare your resumé,

(2) attach a piece of paper onto your resumé stating which category you would like to be classified under (Co-op, Graduating Sr., Finishing Grad students), and

(3) put it in the manila envelope on one of the cupboard doors in the IEEE lounge, EEB 113.

The deadline is **December 12, 1990**, so you'd better hurry! If you have any questions or concerns, send e-mail to ieee@ee or call Ken at 633-2236.

IEEE Obtains New E-mail Account

The IEEE-UW Student chapter now has a general purpose e-mail account for all types of correspondence. All inquiries concerning activities, operations, or whatever should be directed to: **ieee@ee**. Also, there is a new correspondence account for the EE News, and it is: **ee_news@ee**. We'll be looking forward to receiving all of your correspondence!

Advising Office News

Deadline to submit applications for BSEE degrees for Winter Quarter 1991 (March) is January 22, 1990. Make an appointment with Lani before that date to fill out the proper graduation forms!

Welcome a new student helper in the EE Advising Office - Raul Vargus.

Happy Holidays!

—EE Advising Office

Myths & Mysteries .....

In this section, we will attempt to answer any questions and dispel any rumors heard circulating around the EE Department. If you have any specific questions for this column, please let us know and we will attempt to find an answer for you, or at least direct you to someone who might know.

Question #1: Does a student have to graduate immediately once they have completed the minimum departmental graduation requirements?

Answer #1: According to Lani in the Advising Office, there is a 1 quarter grace period which allows you to continue taking classes for that 1 quarter after you have fulfilled all of your degree requirements.

Question #2: I'm confused about the statistics requirement. STAT 390? MATH 390? IND E 315? Huh?

Answer #2: To fulfill the EE undergraduate statistics requirement you can take either STAT 390 or MATH 390 (they actually are the exact same class). However, DO NOT take IND E 315!!! This course will not satsify the EE statistics requirement because it is only 3 credits.

—Dale Wilson

Graduate Student News

Howdy!

This will be an ongoing column (maybe) presenting news and inside information about the electrical engineering graduate student program. We'll keep you informed about upcoming events, fellowship opportunities, and other information which we think may be helpful to you.

To better represent ourselves vis a vis the administration, we should empower some kind of representative council. This would create a mechanism by which the individual graduate student can make his/her/its voice heard. Most of us are too busy to pursue many of our concerns in the department, and it would be to the advantage of all to heed the call of "Graduate students of EE Unite, you have nothing to lose but your chains."

To organize such a group, we need both willing candidates and the support of the graduate students. We, as the revolutionary council, will take an initial vote from the graduate students which will determine if anyone has any interest at all in this. Drop off your votes, (the cut-out below), in the EE mailbox marked "EE Graduate Student Council" in the main office. Feel free to include any comments or suggestions with your ballot. The possible functions of the proposed council include, but are not limited to, presenting graduate concerns to the administration, arranging social gatherings (FREE FOOD and all kinds of beverage), organizing the new fall graduate student party, and providing for the general welfare.

To move to the news, there are two items of interest. First, there will be an informal graduate student gathering soon, to initiate the NEW and not yet here used pool table (date to be announced). Secondly, IEEE is currently planning to create a graduate student picture display. This permanent display will be placed at some prominent spot in the building. Pictures will be taken in the first two weeks of winter quarter by our wandering photographer. So for the first two weeks of the quarter, wear something tacky. If you manage to avoid our candid camera, there will be a picture day scheduled.

—the Graduate Student Ghostwriter and the IEEE Graduate Student Representative

Graduate Student Ballot

☐ Yes, I think there should be an EE graduate student council!

☐ No, I do not think think there should be an EE graduate student council!

Please drop this ballot into the mailbox marked "EE Graduate Student Council" in the main office. Add any comments or suggestions you might have in the space provided below. Thank you..

_____

_____

_____

_____

Since it is the recruiting rush-season, read and think about this for a moment...

Letter to an EE student

In many ways, as an EE student about to embark on a career in electronics engineering, you are among the most privileged graduates of all.

...Then again, maybe not.

• You can expect excellent salary offers of about $31,978, just below petroleum, chemical and mechanical engineers. By the time you graduate in June 1991, you should rank fourth among all majors in starting salaries. To top it off, you are able to jump-start your career earlier than your classmates who want to be doctors, lawyers or even MBA's.

...Then again, you're not likely to stay ahead of those doctors, lawyers and MBA's. EE's are a bit like a drag racer. Fast off the mark, but salary acceleration is strictly short-run.

• You're entering a career that, by all accounts, is among the most in demand. You can load up a hard disk with all the forecasts of "shortages" of engineers and scientists that we face in the 1990's. Makes you feel good, huh?

...Yet, some of the biggest names in the business have put on the brakes hard in their college recruiting over the past year or so. Some giants, like Wang Labs, Tektronix and a host of defense contractors, have suffered through hard times in the last two years. They have fewer EE's now than they did a year ago. And the national electronics engineering society, the Institute of Electrical and Electronics Engineers (IEEE), has grave doubts about any predictions of shortages of engineers. As engineers themselves, they wonder how these forecasters can make such predictions. You can measure supply by looking at the pipeline of engineering graduates. *Demand* is another matter entirely. Do companies really know how many EE's they need in three years? The IEEE is skeptical.

• As a soon-to-be EE grad, you are likely to be wooed and courted by a number of engineering employers.

...Enjoy it. From about five years on, it gets tougher. That knowledge that the employers so diligently seek now will be "outdated" by then. There's a lot to talk about the "half-life" of an engineer being five years. You may think that's bull–and it probably is–but you're about to learn a fact of life as a EE: You may graduate, but you never stop learning. Or you had better not, anyway. No way can you sit down in a cubicle somewhere–even in a big, prestigious company–and expect to emerge from it 25 years from now with a big pension and gold watch. This career you've chosen calls for aggressive career planning and constant retraining and re-education. Think about it. If you had started your first job in 1980, you probably would not have had a PC on your desk, microprocessors would have been out only for three or four years and you would have been on the threshold of (gasp) the 8-bit generation.

• You belong to an elite profession that is changing the face of how each and every one of us goes about living our lives.

...Problem is, does the public really know it? Maybe you've noticed in talking with English majors how their eyes glaze over when you start rattling off talk about megabits, rectifiers and oscillations. You'll learn that if you ever want to grab a non-techie's attention, talk about the end-use product. "Oh, I'm working on the B-2 bomber...a system that will probe your brain without surgery...or a portable phone you can carry around in your shirt pocket."

• You're also entering one of the most entrepreneurial of fields. Silicon Valley is crammed with EE's who have launched their own businesses. If you're ambitious and savvy, you could join David Packard, Steve Jobs or Bill Gates on "Billionaire's Row."

...Or, you could end up out of work at 40, protesting that the world still needs your knowledge of TTL, NMOS, and Fortran. No, it doesn't.

It's up to you.

–Article courtesy of *Electronic Engineering Times*, October 1990

A word from IEEE

Hey you! There's more to school than transistors and bit shifters! (believe it or not!) Yes, be more than just a DOUBLE-"E"...be in I-triple-"E"! IEEE's get involved in the lives of EE students: they voice opinions about teachers and classes through IEEE and HKN's course evaluations; they plan our graduation celebration, pizza parties and picnics; they publish the EE News and resumé books; they help decide how to renovate the EE building; and much much more! We will also be hosting the IEEE-Seattle section pizza feed in January!

Develop leadership and professional skills and put in your ideas of what the EE department should be like. Take initiative and let you voice be heard by being an IEEE officer and make changes happen! Join the IEEE today!

—Linda Lee, IEEE-UW Student Chapter President

E.I.T. EXAM

Application Deadline: December 13, 1990

Applications for the next Engineer-in-Training (E.I.T.) Exam —which will be given on April 12, 1991—must be submitted by Decmeber 13, 1990. Applications are available in the College of Engineering Dean's Office, Loew 371. Helpful hint: do not wait until the last minute to pick up this form and fill it out. The sign-up fee for this exam is $50.00, and study books are available through the College of Engineering and later through IEEE. Also, you have to have your signature notarized - there is a notary available in the HUB by the Candy Counter. If you have further questions, you should contact Beth Ann Keeler, College of Engineering Dean's Office, at 543-0340.

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The *EE News* is published by the IEEE Student Branch at the University of Washington.

Holiday Wish Lists

The response to the Holiday Wish List request was less than overwhelming to say the least, but those who did respond submitted great lists. Thank you! May all those people who responded find everything they want under their trees this holiday season (ESPECIALLY the person who wants a roommate without gas!), and, hopefully, the rest of you who did not get into the holiday spirit will find lumps of coal in your stockings!!! However, most people did not sign their lists so Santa may have some difficulty finding you, but anyway here are the lists we received. *—Dale Wilson*

1. A text book for under $40, a choo choo train, a national football championship, a large print edition of the TTL Data Book, two clocks at the UW that read the same time, a big, red firetruck, a winning LOTTO ticket, a roommate without gas, the answers to the universe, or Christian Applegate's phone number. —Kris Kringle

2. A BSEE Degree, a pool inside my house, $50,000/year income, a job to go with that income, and a trip to the moon. —Rudolph

3. Students who can follow instructions, students who can communicate clearly and accurately, and students who have an intuitive feel for the real world (and know which end of a soldering iron to grab!) —Professor Moritz

4. 15 Design credits to magically appear on my transcript, my very own HP Digital Oscilloscope for those boring weekend nights at home with the folks, an Analog Workbench Program which provided instantaneous results, and a dog. —Frosty the Snowman

5. My GPA back! —Miss Claus
(Hey, don't we all! Ed.)

6. A trip to the Rose Bowl, 3 day weekends, to be featured on America's Most Wanted, and a six-pack. —Blitzen

7. Free tuition, a job waiting for me after graduation so I don't have to look for one, a black Lamborghini, and Mom & Dad to move out of the house. —Donner

8. No more rain, no more rain, and no more rain. —Mr. Sunshine

9. A new, highly intellectual, self functioning, fuel-efficient, compact brain that I can simply replace with the existing one I have. Also, 36 hours to a day would be nice. —Ken

10. Out of Seattle, out of the Puget Sound region, out of Western Washington, a grad school appointment, and a new car (the Mercury Bobcat wagon is no longer the status symbol it once was!). —Dale

Faculty and Department Activities

Publications

• K.F. Cheung and R.J. Marks II, "Image sampling below the Nyquist density without aliasing", **Journal of the Optical Society of America A**, vol. 7, pp. 92-105 (1990).

• M.J. Damborg, M.A. El-Sharkawi, M.E. Aggoune, and R.J. Marks II, "Potential of artificial neural networks to power system operation", **Proc. 1990 IEEE International Symposium on Circuits and Systems**, (1-3 May, 1990, New orleans, Louisiana), pp. 2933-2937, invited paper.

• J.N. Hwang, J.J. Choi, S. Oh, and R.J. Marks II, "Classification boundaries and gradients of trained multilayer perceptrons", **Proc. 1990 IEEE International Symposium on Cicuits and Systems**, (1-3 May, 1990, New Orleans, Louisianna) pp. 3256-3259.

• A. Ishimaru, R.J. Marks II, L. Tsang, C.M. Lam, D.C. Park & S. Kitamaru, "Optical sensing of particle size distribution by neural network technique", **Proc. 10th Annual International Geoscience and Remote Sensing Symposium**, 20-24 May, 1990, Washington, D.C., (IEEE Press) vol. III, PP. 2129-2132

• Y. Zhao, L.E. Atlas, and R.J. Marks II, "The use of cone-shaped kernels for generalized time-frequency representations of non-stationary signals", **IEEE Transactions on Acoustics, Speech, and Siganl Processing**, vol. 38, pp. 1084-1091 (1990).

• R.J. Marks II, "The IEEE Neural Networks Council", **IEEE Transactions on Neural Networks**, vol. 1, p. 249 (1990).

• L.E. Atlas, R. Cole, Y. Muthusamy, A. Lippman, G. Connor, D.C. Park, M. El-Sharkawi & R.J. Marks II, " A performance comparison of trained multi-layer perceptrons and classification trees", **Proceedings of the IEEE**, vol. 78, pp. 1614-1619 (1990).

• A. Ishimaru, R.J. Marks II, L. Tsang, C.M. Lam, D.C. Park, and S. Kitamaru, "Particle size distribution using optical sensing and neural networks", **Optics Letters**, vol. 15, pp. 1221-1223 (1990).

Announcements

• Professor Robert J. Marks II was named one of the eleven topical editors of the **Journal of the Optical Society of America A: Optics and Image Science** published by the *Optical Society of America*. Professor Marks will be editing those papers submitted in the area of *Optical Signal Processing and Image Science*.

• Prof. Robert J. Marks II has been appointed to the Editorial Board of the **International Journal of Neurocomputing**.

• Prof. Robert J. Marks II has been re-elected President of the *IEEE Neural Networks Council* (NNC) for 1991. The NNC publishes the **IEEE Transactions on Neural Networks** and sponsors the *International Joint Conference on Neural Networks*, which will be held this summer in Seattle.

• Pieter J. van Heerden, Robert J. Marks II and Seho Oh, "Method and apparatus for identifying that one of a set of past or historical events best correlated with a current or recent event", U.S. Patent No. 4,939,683, July 3, 1990

• Robert J. Marks II gave an invited presentation entitled "Neural networks for classification & regression" at the *First Workshop in Neural Networks*, Auburn University Hotel & Conference Center, Auburn, Alabama, 5-6 February, 1990

• Prof. R.J. Marks II gave an invited presentation entitled "Kernel Synthesis for Generalized Time-Frequency Distributions Using the Method of Projection onto Convex Sets" at the *Advanced Signal Processing Algorithms, Architectures, and Implementation*, San Diego, July 10-12, 1990. Co-authors of the paper are Drs. S. Oh, L.E. Atlas, and Mr. J.W. Pitton.

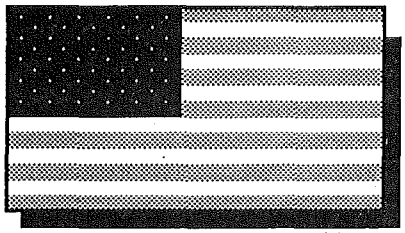
Book Review

Springer-Verlag has just released a book by Prof. Robert J. Marks II entitled *Introduction to Shannon Sampling and Interpolation Theory*. It is the first book in signal analysis solely devoted to the topic of sampling and subsequent restoration of continuous time signals and images. The sampling theorem is a fundamental topic in any field that treats continuous time signals or images in real time. These fields include communication engineering, seismology, image processing, biomedical applications, speech, digital signal processing and holography. The fundamentals of the sampling theorem are developed in detail in this book. Numerous generalizations are treated in depth, including those of Papoulis and Kramer. Effects of truncation, data noise and jitter on restoration error are analyzed. The sampling theorem is generalized to higher dimensions, resulting in optimal sampling strategies for certain classes of images. Continuous sampling is also developed in depth. Here, a signal is restored from knowledge of its structure in one or more disjoint temporal intervals. To allow for effective self study, *Introduction to Shannon Sampling and Interpolation Theory* contains numerous exercises with corresponding selected solutions.

Prof. Marks will be using the text in his EE522 course, Shannon Sampling and Interpolation Theory.

UNIVERSITY OF WASHINGTON – *Department of Electrical Engineering*

EE News



February 1991 Volume 5, Number 3

EE/ CSE look into future with new building

The Washington State Legislature has budgeted over $4 million for this biennium for the extensive planning of a new EE/CSE facility to be located in the general location of the current EE building. The co-location of the two departments together into a futuristic facility is expected to help expand the horizons of both departments. Kallman, McKinnell and Wood will be the primary architecture firm for this project.

Using the $4 million, a joint planning committee consisting of members from the College of Engineering and the EE and CSE departments will plan out the project in four steps. So far, the first step, where design consultants document the needs of both departments as a "draft program", has been completed. The second step, the presentation and revision of the program, is currently under way. The revised program will be presented to the provost for approval as the third step. And after the University formally approves basic concepts and decides how much funding is needed, the actual building design can begin.

"The main emphasis," says College of Engineering facilities manager Jud White, "is to build a building that is good looking, functional, efficient, and flexible." According to the draft program, flexibility seems to be one of the most highlighted features of all. White points out that the future of EE and CSE is difficult to predict, so even though it may cost a little more, equipment and resources must be able to adapt to trends in the long run. General purpose labs as well as specific labs are to be created. More communal spaces are to be introduced. And factors of noise, accessibility, and intra-building communication are to be considered seriously. Out of all of this, we can expect combined research and instructional efforts by EE and CSE departments, attraction of a top caliber faculty, national recognition as a leading institution in EE and CSE, and overall, a better place to learn.

...But it is too early to be optimistic. The estimated cost of the project now

(continued on page 2)

Dr. Robert Spindel receives award

New IEEE Fellow

Dr. Robert Spindel, Director of the UW Applied Physics Laboratory was recently named an IEEE Fellow for the advancement of technology in ocean acoustic tomography — the three-dimensional mapping of the ocean, its currents, thermal structure and transfer, etc., using underwater sound waves. His early work focused on how the ocean affects acoustic wave propagation over long distances (>1000 km), which then led to examining the inverse of this problem. That is, what can the received sound waves tell us about the ocean it has just passed through. This led to his current work in ocean acoustic tomography.

Each year, the IEEE recognizes a limited number of its Senior members for their outstanding contributions to the electrical and electronics engineering profession. A candidate must be nominated either by another individual or a group, and the final decision is based upon the evaluation by an IEEE Society related to their field of work, evidence of technical accomplishments, the confidential references of at least five other IEEE Fellows who are capable of assessing the candidate's qualifications, total years in the profession and service to IEEE and other professional societies. The award is one of the highest given out by the IEEE. Asked what the honor means to him, Dr. Spindel replied that it is gratifying to be recognized by your colleagues for your accomplishments and to have your work considered significant by the other

(continued on page 2)

In this issue...

E.I.T. study and exam books now available

E.I.T. study and exam books for April exams are now available through IEEE during office hours.

Prices: **IEEE members $25**
non-members $30

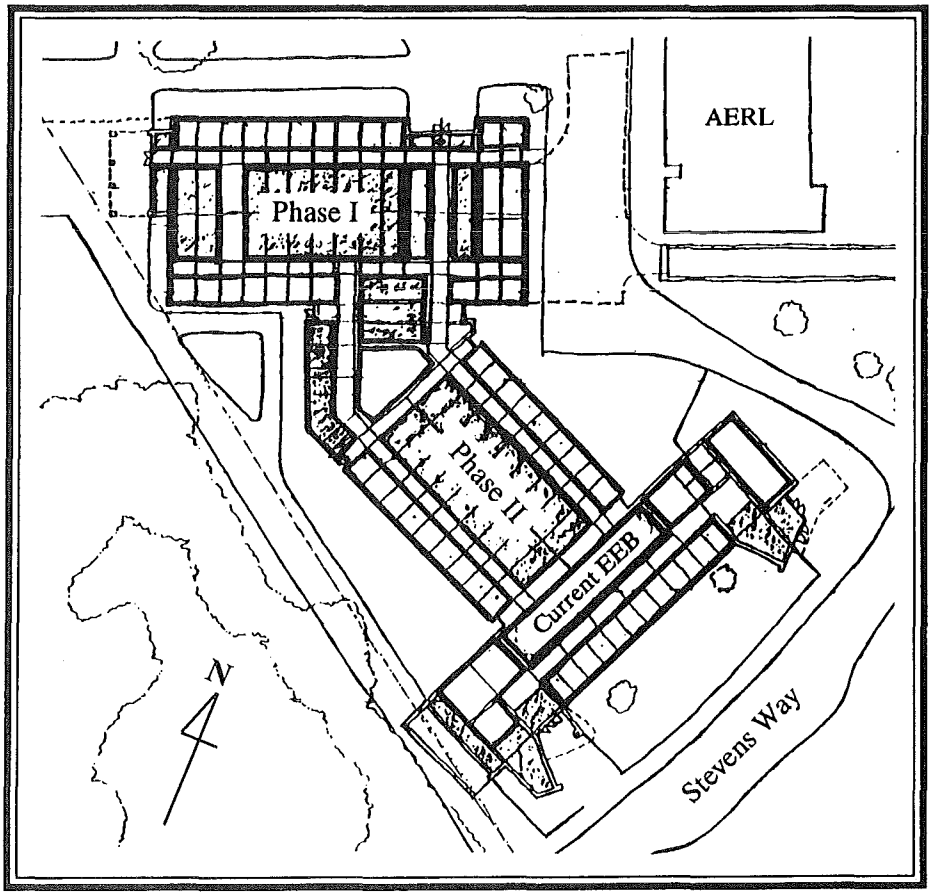
Supply is limited so act soon. Members! Present your membership card when you purchase one. Write your checks to **IEEE.**

New building, cont'd from page 1

ranges from $130 to $135 million for 330,000 gross square feet, required to satisfy the demands of both departments. The governor's six year capital budget for 1991-97, however, projects a $93 million commitment to the project—enough to complete 230,000 gross square feet. This only incorporates Phase I and II (see below) of the project. White explains, "We have to compete with other future projects in the state of Washington for the remaining $40 million plus, and it all depends on the legislature." The fact is, both EE and CSE departments are anxious to see all their spatial and resource demands met. The University closely recognizes such demands also, and is in the position of making a request for Phase III funding. With the state budget constraints, however, not much can be said until the legislature makes a move. White concluded, "there's a lot of work left to be done."

—Ken Sadahiro

New EE/CSE building construction plan



Phase I: construction without direct impact to on-going activities and relocation of current resources after completion, projected beginning: mid '93
Phase II: demolishment and reconstruction of current EEB"T"-wing and renovation of other parts of current EEB, projected beginning: '95
Phase III: construction of new wing extending towards AERL, projected beginning: undetermined.

IEEE Fellow, cont'd from page 1

people in your field.

Although his appointment at the UW is in Electrical Engineering with an adjunct appointment in Oceanography, Dr. Spindel's position as APL Director does not allow him time for teaching. One of his current projects, the Heard Island Experiment, is receiving particular attention lately because its purpose is to examine the warming of the earth's oceans. This experiment uses underwater acoustic measurements to gather temperature data from the oceans, and by taking the data over a lengthy time period, the researchers hope to determine whether or not the ocean's are warming— an idea which has been predicted by computer models of the earth and its climate due to various factors including the notorious greenhouse effect. The experiment is slated to run for 10 years, however, Dr. Spindel believes that they may be able to recognize a trend in as little as three or four years.

Congratulations Dr. Spindel, new IEEE Fellow, from the *EE News*!

—Dale Wilson

Top 10 Companies Students Want to Work At

1. IBM
2. AT&T
3. Hewlett Packard
4. DEC
5. Apple
6. GE
7. Motorola
8. Arthur Andersen/ Andersen Consulting
9. Microsoft
10. Intel

—Source: *Computerworld*

Undergraduate Scholarship Applications

Deadline: *March 1, 1991*

NOW is the time to apply for undergraduate scholarships for the next academic year. This year the application form has been redesigned and copies are now available in the EE Advising Office and from the College of Engineering Dean's Office (Loew 371). The deadline for receipt of completed applications is **March 1.**

While we still do not know exactly how many scholarships we will have to give away next year, this year (90-91) 22 students received awards totalling about $25,000. Some scholarships also include the possibility of summer employment or co-op experiences.

Here are some tips to help increase your chances of receiving an award.

1. Fill out the application COMPLETELY. Incomplete applications will not be considered. Make sure to include all relevant transcripts and sign the application.

2. Indicate as explicitly as possible what branch of EE you are pursuing. Examples might be: computer networking, analog electronics, or semiconductor manufacturing. Some scholarships are restricted to students interested in a particular specialty area.

3. Carefully prepare a written statement to include with your application. This ONE PAGE statement of your educational and career goals can be very helpful in matching your interests with those of a donor. The statement should be typed or printed and should be free of spelling and grammatical errors.

4. Submit the application by the March 1 deadline.

Selections are based on the information in your application and the criteria for each award. Academic performance, citizenship, financial need, and area of interest are important items.

We hope to be able to announce awards by late Spring Quarter.

—Bill Moritz

EE 479 Deadline Quickly Approaching

Students interested in taking EE 479 in Spring 1991 should fill out the course application available in the EE Advising Office and return it to Advising by **February 13 at 4:30 P.M.** The completed applications will be evaluated by the instructor based on the criteria available with the application. A list of students admitted (and alternates) will be published on February 15 in advance of Spring Quarter registration.

...This process is necessary because there is often a greater demand than can be accommodated given the limited resources available to support the class. *Maximum enrollment is 20.*

The course builds extensively on earlier work and is designed to provide a quarter long project experience culminating in the demonstration of a successful prototype system. Students work in two person teams. Projects are selected from a list which includes such things as a hot tub controller, a computerized automobile dashboard, a point-of-sale (cash register) terminal and an automatic teller machine. Standard single board microcomputer systems (8086 or 68000) are used as the prototype hardware. An HP 9000 system with emulators, C and assembly language is used for software development — the major focus of the course. Lab resources include a variety of terminals, A/D and D/A systems, mag card readers, and controllable systems.

During the quarter, students serve both as designers (for their own project) and customers (for another team). They must present an oral design review of their project during week 6 and produce an extensive report including a User's Manual at the end of the quarter. There are no exams. Five credits—all design.

—Bill Moritz

Advising Office News

Spring Quarter registration is just around the corner. Period I registration is **February 19** through **March 8.** Entry codes will be available in the Advising Office starting February 19. Seniors and graduate students will be able to pick them up starting February 19, Juniors starting February 20 and Sophomores starting February 21 and after.

CHEM 151 requirement alert!! Students who have not completed the CHEM 151 requirement need to be aware that the Chemistry department has made some curriculum changes and now has a new course, CHEM 141, which is listed as a prerequisite for CHEM 151. CHEM 141 is currently being offered as a 2 credit course but will change to 1 credit in the near future (probably Autumn 1991). EE will presently allow CHEM 141 to satisfy the CHEM 151 requirement, however, when CHEM 141 changes to 1 credit, it will fall 1 credit short of the 2 credit lab requirement. Therefore, it is recommended that those students who have not completed this requirement register for CHEM 141 Spring Quarter. Confused? Please contact the Advising Office and speak to Lani for further clarification.

—The Advising Office

An *EE News* Editorial

Some Like It Hot...

It is difficult for me to believe that the electrical engineering department at a university of this size and supposed stature cannot even control something as simple as the heating in the HP Workstation Lab in room 13. The heat in that room is at times unbearable, always uncomfortable, and something needs to be done to remedy this problem IMMEDIATELY! It has gone on for far too long now.

Not only does it affect the students who must spend hours working in the lab, but Hewlett Packard was generous enough to make such a large donation to the department, and we then house the equipment in an environment which the machines are ill suited. I certainly hope representatives of the company have not witnessed this problem, or next time the desparately needed equipment may end up at another school.

Finally, this is the primary computing facility for the students, and since this is a university, we should be its top priority. However, as this situation remains unsolved, one comment continues to be heard from students working in the lab, "Would this heating problem have gone on for this long if it had affected even one professor, let alone many of them, as it does us students?"

On a brighter side, kudos to the department on the change in EE 374 from Pascal to C! I certainly hope this will be a permanent change - at least until a new language comes along and replaces C in the corporate world. Although the problem of the students being expected to know the language before coming to class has still not been resolved, at least the students are now being forced to learn a language which may be useful to them following their graduation. Thank you for this much needed change.

–Dale Wilson

The Other Side: Kelin Kuhn

"What else do you do in your spare time?", I asked.

She replied, "I raise Lake Malawi African cichlids."

Shocked? Surprised? Yes, a very energetic Professor Kelin Kuhn surprised me when telling a few of the things she does in her spare time. (For those who don't know, these cichlids are fish from the Great Lakes of Africa).

Professor Kuhn has been with the University for three years, and is now an Assistant Professor in the department. This requires her to not only teach, but also to become involved in research, acquire research support (grants, etc.), and provide different services to the department and the University.

This quarter, Kelin is teaching EE 488 (a laser class) and EE 531 (a transport theory class), but you may have seen her lecturing in EE 355, 356 or in other graduate level classes.

She is also active in the electrical engineering research committee. Specifically, her work explores the area of extremely small electronic devices ("quantum limited" devices), in which the electrons no longer behave like particles, but behave like waves. This is a field in which "conventional methods do not work, and new techniques must be developed." Professor Kuhn is actively developing these new techniques.

Such quantum limited device theory has applications in many areas. Among the most influential: as VLSI chips continue to become smaller and smaller, the components behave more like these quantum limited devices, thus knowing how the devices function will yield a better understanding of the performance capabilities of future VLSI chips. Also, there are certain types of quantum limited devices which perform much faster than circuits of today's standard, thus promoting the design of faster computers. And finally Ms. Kuhn informed me that "quantum limited devices have a major impact on optical systems because they contain energy levels whose energies can be chosen by the designer. Such devices permit greater control over specific wavelengths than is possible in conventional semiconductor material."

Right now, Professor Kuhn has one undergraduate and three graduate students assisting in her research. She was an undergraduate at the University herself, and believes that professors should encourage "top notch" students to remain at the University for their graduate work, before they migrate to other prestigious institutions.

Ever since she can remember, Kelin wanted to become an engineer. But when asked why electrical engineering, she said she chose it because it was the most difficult discipline to pursue.

Her advice to students entering the program: "Don't spend too much time worrying about choosing a particular specialty. Instead, concentrate on acquiring a breadth of engineering experience which will permit you to migrate from specialty to specialty as the demand changes." As for students entering the job market and life after college, she believes it is important to remain flexible for the first few years. Try not to buy a house or have children so that it will be relatively easy to change job environments, if need be.

Among her other hobbies, Professor Kuhn is an active member in the Judo Club at the University of Washington. She also enjoys riding motorcycles, in which one of the three she owns is an FCR 1000.

—Kathy Dugan

Annual IEEE Seattle Section PIZZA Feed !!!

February 20, 6:00 P.M.

UW South Campus Center Auditorium

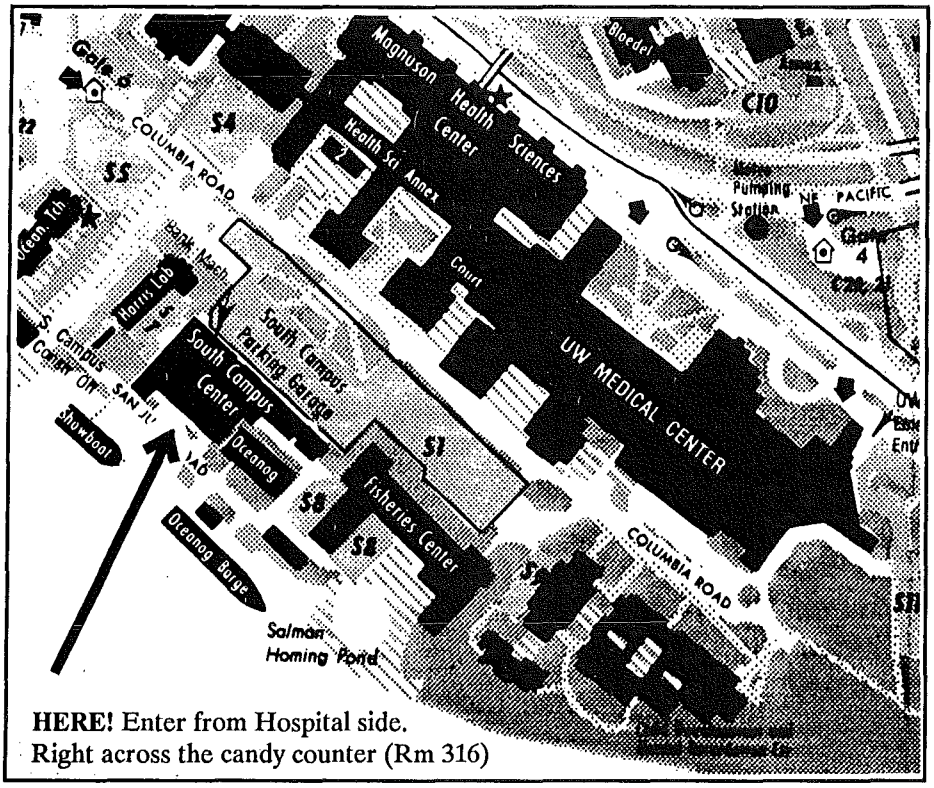
This is one of IEEE-Seattle Section's big events, and this year, the UW Student Chapter is the host. If you are an EE student and if you like Pizza, your participation is mandatory, because:

- lotsa pizza will be served
- EE Chairman Dr. Seliga will talk to undergrads about "Options After Graduation"
- the 1990-91 IEEE Student of the Year award will be presented
- professional engineers in the Seattle area will participate as well
- door prizes will be available
- and more is expected to happen!

Come down ASAP to the IEEE lounge during our office hours to obtain your admission ticket. (see below right)

Cost...

- **IEEE-Student members: $1 (bring your membership card)**
- **non-member students and others: $5**



HERE! Enter from Hospital side.
Right across the candy counter (Rm 316)

EE Sweats & T's arrive

Attention! Those who were desperate for EE sweatshirts and T-shirts, your wait is over — Sweats and T's have finally arrived! These are the ones with the traditional "Electrical Engineering" logo in bold type on the front. Sweatshirt colors include white on navy, navy on grey, and gold on purple. T-shirts are white on navy. Get yours today, if you haven't already!

—Ming Koh

••• Sweats •••

(Russell Heavyweight 50/50)
non-IEEE members: **$20**
IEEE members: **$17**

••• T-shirts •••

(100% cotton)
non-IEEE members: **$12**
IEEE members: **$10**

IEEE Office Hours

in the lounge

	11:30	12:30
M		Linda L.
T	Darwei K.	Sue T.
W		Ming K.
Th	Ken S.	Sue T.
F		Dale W.

If you cannot reach us at these times, contact us via e-mail. Our address is: ***ieee@ee.***

Eta Kappa Nu Update

Welcome back! We hope 1991 is as productive for you as we plan to make it for Eta Kappa Nu. (the Electrical Engineering honor society).

• Last year, Eta Kappa Nu and IEEE sponsored a student-run course evaluation program. The results are now available in the Advising Office, at the Eta Kappa Nu desk (room 315, desk #9), and in the IEEE lounge. This quarter we have revised the evaluation format so it is more suitable and convenient for both the students and professors. Our goal is to help students formulate the best study plan in order to succeed in the course and to provide professors with valuable feedback. Please take the time to complete the evaluations.

• It's initiation time again. We are holding an orientation on **January 30.** Anybody interested is encouraged to come. We will be happy to answer any questions you may have about Eta Kappa Nu. The initiation ceremony itself will be held on April 5. All eligible students should have received letters in the mail.

• Eta Kappa Nu is exploring new frontiers in company tours. We are heading down to Portland on **February 18** to visit Tektronix and possibly Intel or Sequent. We will take two vans down there, so space is limited. Be sure to sign up early.

• BUG will be back in March to interview for internship and career positions. BUG is a Japanese computer company that came here last November to screen for qualified students. If you are interested, submit your resume by **February 30.** Please mail it to:

Eta Kappa Nu
Dept. of Electrical Engineering, FT-10
University of Washington
Seattle, WA 98195

• The Snow Trip we held on January 27 was a lot of fun. Thanks for coming! We would like to extend a special thanks to our new Faculty Liaison, Doug Huard, for doing such a great job organizing the trip. Also, we would like to thank our graduate student member, Julie Chen, and our new initiate, Daryl Rochette, for all their help.

If you ever have any questions concerning Eta Kappa Nu or just want to talk, stop by our office (Room 315, desk #9). Our office hours are now posted. You can also reach us through E-mail. We are happy to welcome our two new officers, Doug Huard and Srini Tridandapani.

—*Anu Jain*

• Here is an updated officer and e-mail address list:

President
Mike Nakahara
HIGHTECH@blake

Vice President
Aaron Pulkka
APLUS@blake

Treasurer
Darwei Kung
KUNG@max

Corresponding Secy.
Srini Tridandapani
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Faculty Advisors
Arun Somani
ARUN@ee
Jim Ritcey
RITCEY@ee

Photo Phobia

When a computer software development engineer at Clarkson University devised a system to give professors a picture of every student in their classes, most students liked the idea. The purpose is to make the school feel more like a small community, every teacher knowing every student by face and not just as a name on a roster. But when the idea was reversed—every student getting a picture of every professor—not everyone was as enthusiastic.

First, let's explain the system. A photo of each student is taken and then digitized and put into a computer along with the students' names and ID numbers. The computer then turns out a graphic portrait that is almost identical to the original photo.

Professor M.W. Roberts, who teaches computer and electrical engineering at Clarkson, loved the idea. "Before I used the list of faces," he says, "it took almost half a semester to learn who my students were." With the photos matching the faces, he says, he learns the names of his 53 students by the second week of the semester.

But now comes the rub: When plans were begun to include digitized pictures of each faculty member, the Clarkson faculty senate said, in effect, "no way." "The faculty senate," explains its secretary, "did not want students choosing professors on the basis of appearance, such as gender and race."

No students have objected to their pictures being digitized. "If it makes it easier to remember us," says one student, "I think it's O.K. I like to see the use of technology to make the lives of people easier, and think this is a great idea."

—Article reprinted from *Graduating Engineer* Magazine.

Wanted: IEEE Officers for 1991-92

The end of the school year is approaching, and IEEE is looking for officer candidates for *Spring 1991* to *Winter 1992*. Officer applications are accepted until **February 20** in the Wonder Box in the IEEE lounge or at the IEEE Pizza Feed. Please use the form provided below. If you have any questions, please come to one of our office hours (see page 5) or contact us via e-mail at *ieee@ee*.

1991-92 IEEE Officer Application Form

Return this to the Wonder Box in the IEEE lounge by February 20 or at the Pizza Feed.

Name of Applicant:

_____

Expected Graduation (Qtr/Yr):_____

Position Desired (Check one):

___ President
___ Vice President
___ Treasurer
___ Graduate Student Rep.
___ Membership Coordinator
___ Operations
___ Engr. Student Council Rep.
___ Publicity Director

State your goals as a 1991-92 IEEE Officer.

_____

_____

_____

_____

_____

Tell us about your experience as an officer in a school organization.

_____

_____

_____

_____

_____

_____

Faculty and Department Activities

Announcements

• The paper "Shape from Shading Using the Facet Model", authored by Robert Haralick, Linda Shapiro and Ting-Chen Pong, was selected by the Pattern Recognition Society as the winner of the *Sixteenth Annual Pattern Recognition Society Award.*

• Prof. Robert J. Marks II has been named the North American liaison to the 1991 *International Joint Conference on Neural Networks* in Singapore.

• Dr. Seho Oh and Prof. R.J. Marks II gave an invited presentation entitled "Performance attributes of generalized time-frequency representations with double diamond and cone shaped kernels" at the *Twenty Fourth Asilomar Conference on Signals, Systems and Computers*, 5-7 November, 1990, Asilomar Conference Grounds, Monterey, California.

Publications

• J.N. Hwang, R.J. Marks II and L.E. Atlas, "Neural network research at the University of Washington—recent results and applications", **Northcon/90 Conference Record**, (Western Periodicals Co., North Hollywood, CA), Seattle, WA, October 9-11, 1990, pp. 263-268 —invited paper.

• S.Oh, R.J. Marks II, L.E. Atlas, and J.W. Pitton, "Kernel synthesis for generalized time-frequency distributions using the method of projection onto convex sets", **SPIE Proceedings 1348**, *Advanced Signal Processing Algorithms, Architectures, and Implementation*, San Diego, July 10-12, 1990.

• M.E. Aggoune, M.J. Damborg, M.A. El-Sharkawi, R.J. Marks II and L.E. Atlas, "Dynamic and static security assessment of power systems using artificial neural networks", **Proceedings of the NSF Workshop on Applications of Artificial Neural Network Methodology in Power Systems Engineering**, April 8-10, 1990, Clemson University, pp. 26-30.

• A.K. Somani, "Sequential Fault Occurrence and Reconfiguration in System-Level Diagnosis", **IEEE Transactions on Computers**, Vol. 39, No.12, December 1990, pp. 1472-1475.

• A.K. Somani and T. Sarnaik, "Reliability Analysis Techniques for Complex Multiple Fault Tolerant Computer Architectures", **IEEE Transactions on Reliability**, Vol. 39, No.5, December 1990, pp. 547-556.

• S.B. Choi and A.K. Somani, "Rearrangeable Hypercube Architecture for Routing Permutations", accepted for publication in **JDPC**, December 1990.

• A. Ishimaru, **Electromagnetic Propagation, Radiation and Scattering** (text book for EE 572, 573, and 574), Prentice-Hall, 1990 (just published).

...and a note from the editors...

An EE professor once said, "...the funny thing is, you always remember where you were when a significant event such as war begins." We editors of the EE News hope none of your daily lives have been seriously disrupted by the outbreak of war in the Persian Gulf. Ken would personally like to thank all who submitted their resumés for the Resume Book. And once again, thanks to all who have submitted items for this edition of the EE News.

—Ken and Dale

Reporter
Kathy Dugan

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Akira Ishimaru
Anu Jain (HKN)
Ming Koh (IEEE)
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The *EE News* is published by the IEEE Student Branch at the University of Washington.

UNIVERSITY OF WASHINGTON *Department of Electrical Engineering*

EE News

March 1991 Volume 5, Number 4

Good luck on finals!

Everyone likes it hot!

Pizza Unites EE's at IEEE Pizza Feed

Pizza. That wonderfully palateable phenomenon enjoyed by many. That common language that breaks all barriers between social groups and generations. Or so it seemed on the night of February 20 when the UW IEEE Student Branch hosted the 1991 IEEE Seattle Section Pizza Feed. The event, held at the South Campus Center, brought together students, teachers, and industry professionals from the local electrical engineering community.

After feasting on pizza and refreshments, the guests settled down to listen as Dr. Endrik Noges opened the evening's program with a speech about graduate school. The associate chair of the UW EE department explained the motivations for graduate study and encouraged the students in the audience to consider this option. During the brief intermission after Dr. Noges's speech, Professor Blake Hannaford of the EE department presented a short video on robotics. Later, in a speech punctuated with moments of humor, he discussed the similarities and differences between a career in academics and a career in industry, using signal flow diagrams, transfer functions, and feedback loops to demonstate his points.

One of the highlights of the night was the presentation of the IEEE Grant-In-Aid student awards by Paul Kostek, chairman of the Seattle Section. These awards are presented annually to those individuals who have demonstrated academic excellence and successfully contributed to their student branches. This year's recipients from the UW were Ken Sadahiro and Dale Wilson. They each received a $250 scholarship.

The final presentation of the night was given by Chris D'Hondt of IBM. Titled "Technology Manufacturing: A U.S. Paradigm," it was an overview of the latest efforts by U.S. companies to improve manufacturing efficiency and quality. Drawing heavily from his experiences as a manager with the Storage Systems Products Division in San Jose, Mr. D'Hondt described concepts such as statistical quality control and the need to challenge foreign competition.

...the 1991 IEEE Seattle Section Pizza Feed...brought together students, teachers, and industry professionals from the local electrical engineering community.

Professor Bob Marks of the EE department did a fine job of running the evening's program and introducing the various speakers. He once took the opportunity himself to briefly describe the activities of the IEEE and the benefits of being a member.

The evening closed with a drawing for door prizes, including a copy each of Microsoft Windows and Aldus Persuasion, deluxe Motorola ball-point pens, and a deluxe "GEEK" sweater courtesy of the IEEE Student Branch.

So after a successful and enjoyable evening, only one problem remained: deciding who got to take home the left-over pizza.

— *Ming Koh*

Epitaxy Beam Reactor Coming to UW in Fall 1991

Professor T.P. Pearsall and M.S.E. student Joe Ketterl have placed an order withe EMCORE Corporation for the purchase of a chemical-beam epitaxy reactor. This instrument will make possible the growth of indium phosphide and gallium-indium-arsenide-phosphide at the University of Washington. These compounds form the nucleus of all opto-electronic devices used in optical fiber telecommunications. In addition, the world's current speed record for fast transistors is held by a bi-polar transistor using these materials. The reactor is scheduled for delivery in the fall of 1991, and should be operational before the end of the year.

—*T.P. Pearsall*

We'd like to hear what you think about the EE News! Send e-mail to *ee_news@ee* today!

In this issue:

Power Engineering Page

Power Engr. Society Forms Student Branch Chapter

A student branch of the IEEE Power Engineering Society (PES) has been formed in the EE Department. Todd Kochheiser, a senior, is acting as the interim Branch Chapter Chair, and Professor Rich Christie is the Branch Chapter Counselor.

The PES is one of many technical societies within the IEEE, each reflecting an area of specialized interest. Most IEEE members belong to one or more of these societies. PES members are also members of the IEEE, and PES student branch members are also members of the IEEE student chapter.

The PES student chapter will serve as a focus for student interest and activities related to power engineering...

The PES student chapter will serve as a focus for student interest and activities related to power engineering, power engineering education in the EE department, and careers in, or associated with, the utility industry.

The Electric Energy Industrial Consortium (EEIC) and the regular Seattle section of the Power Engineering Society have agreed to promote the formation of the PES student branch by providing rebates for the first year of IEEE and PES dues for students with an interest in power engineering who join the PES student chapter. The EEIC is a group of seven energy industry companies that support undergraduate education in electric energy at the University.

For more information, or to become a member of the PES student chapter, contact Todd Kochheiser at 522-4875, or Professor Christie at 543-9689, or at his office, EEB 203.

— Rich Christie

Scholarships and Fellowships Available

EEIC Accepting Applications for Undergraduate Scholarships and Graduate Fellowships

The Electric Energy Industrial Consortium, a group of seven companies that supports power engineering and power electronics education at the University of Washington, is accepting applications for four undergraduate scholarships and one graduate fellowship for the 1991-92 academic year.

There are two undergraduate scholarships that pay **$400** per month for the nine-month academic year, and two that pay **$200** per month for the nine month academic year. The graduate fellowship pays tuition and **$1000** per month stipend for the full year. Awards are made to individuals with an interest in pursuing a career in power engineering or power electronics, and are merit-based.

Applications are especially invited from current juniors and sophomores. The awards are often made on a continuing basis from year to year, although current scholarship and fellowship recipients are required to reapply each year.

Application forms are available from the Advising Office, EEB 215. For more information, contact Professor Venkata at 543-2157, or in his office, EEB 206.

— Rich Christie

Student Paper Contest Worth $$ to Winner

The Seattle section of the IEEE Power Engineering Society (PES) has announced a student paper contest, open to all undergraduate students at universities in the Puget Sound region. The main theme of the contest is electric energy conservation, permitting topics such as devices and methods of conservation, estimated savings, or economic and/or environmental consequences of achievable conservation programs. Papers will be evaluated by a panel of judges tentatively including Professors Venkata and Christie from the EE department. The author(s) of the first prize paper will receive **$100**, and **$60** will go to the second place entry.

Papers should be about eight pages, single spaced, and conform to IEEE PES requirements regarding order of sections and references. Papers should be submitted to Professor Richard D. Christie, Department of Electrical Engineering FT-10, University of Washington, Seattle, WA 98195. The due date is **April 16, 1991**. Prizes will be awarded, and the prize paper will be presented, at a pizza feed scheduled at the University of Washington in May. For more information, contact Professor Christie at 543-9689, or in his office, EEB 203.

— Rich Christie

HKN Update

Thank you for your participation in our activities so far this year. There are many more fun times to come. In the mean time, here's our update:

• The company tours to Intel and Tektronix were extremely successful and we are looking forward to future road trips down to Portland. David Land, a new initiate, did an excellent job in establishing contacts with these comapnies and setting up the tours. We plan to continue expanding our affiliation with companies outside the Seattle area.

• Eta Kappa Nu is holding the Winter Pizza Thing on Monday, **March 11 at 5:00 p.m.** at Round Table Pizza, two blocks North of the U-Village. Eta Kappa Nu members, BUG guests and initiates who have paid their dues can come for free. The cost will be $2.00 for others who wish to attend. Please watch for fliers.

• The Japanese company, BUG, will attend the Winter Pizza Thing and will also hold interviews on the morning of **March 12**. They will interview for summer time, co-op, and career positions. If you are interested, please submit your resume to the BUG representative, Mike Nakahara, in EEB 315 (Desk#9), by **March 11**.

• Initiation and officer elections will be held on **April 5**. All initiates and members are encouraged to submit officer nominations. Please turn them in by the end of this quarter.

• The EE Department is planning an EE Graduation Party. If anyone is interested in helping out, contact an HKN or IEEE officer today.

• HKN and IEEE are organizing an EE Forum to be held next quarter. This will provide you as a student with the opportunity to meet face to face with the administration, faculty and staff to discuss any departmental concerns you may have. Topics in the past include questions about full time and part time status, as well as ABET design credit issues. If there are any topics you are interested in discussing, please drop your suggestions in the HKN or IEEE mailbox in the main office.

As always, we welcome any suggestions for future activities or just comments in general. Please drop in anyday during office hours.

— Anu Jain, HKN Bridge Correspondent

Advising Office News

A fond farewell to Joy Hirschstein, longtime EE advisor - enjoy your retirement!!

April 17th is the application deadline for undergraduates planning to graduate June 19. Students planning a June graduation need to schedule an appointment with Lani in the Advising Office by the April 17th deadline. Students graduating in August who plan to attend the June commencement ceremony must complete their graduation application by April 24th.

The student picture program will be happening again in April. Students will be made aware of the date, time, and place when that information has been determined.

The Advising Office and the EE Department will be saying good-bye to Joy Hirschstein. March 8th will be Joy's last day as she is retiring from the University. Joy has been with the Department since 1975 and has been with the Advising Office since 1976. She has been an invaluable person to have in the Advising Office, and her knowledge, expertise and commitment to the Department will be greatly missed.

Joy has some exciting post retirement plans. In March she will be heading south to Mexico for two and a half months and then a European adventure is planned for next year.

Bon Voyage and best wishes, Joy. You certainly will be missed!

—Lani Stone, Advising Office

EE News hits the road...

Report from the 1991 Western Communications Forum

The 1991 Western Communications Forum was held February 4-6 at the Hyatt Regency Hotel in Phoenix, Arizona, and was attended by UW graduate student Srini Tridandapani and myself. (Kristine Brockscmidt had also been an invited guest of the National Engineering Consortium, but was unable to attend.) The conference is an event presented by the National Engineering Consortium designed to bring together people from all aspects of the communications field - research, marketing, manufacturing, management and education.

This year's forum consisted of 58 half-day seminars with over 250 different speakers. The seminars covered nearly all aspects of communications and included sessions on Virtual Realities, Fiber Survivability Technology, Emerging Lightwave Technology and Video Technology for the 1990's. The highlight of the conference (besides the 80 degree weather and the sunshine) was the opening night's Information Industry Banquet featuring keynote speaker Gary Ames, President and CEO of US West Communications, who addressed the need for adaptability within the communications industry and a reminder that everyone must keep the consumer in mind when bringing new technologies to the market.

—Dale Wilson

Women in EE receive recognition

The EE Department ranked first among electrical engineering programs at major U.S. universities in the percentage of women faculty (10%), according to a nationwide survey conducted by MIT.

In related news, effective March 1, 1991, EE Professor Irene Peden will be director of the Division of Electrical and Communications Systems in the Engineering Directorate of the National Science Foundation, in Washington, D.C. According to Peden, who calls the job "a wonderful challenge," the two-year appointment involves setting national policy directions and allocating division resources. She will return to the College during Winter quarter, 1993.

—Article courtesy of College of Engineering newsletter "data"

EE Course Evaluations available for browsing

The EE Course Evaluations, administered by IEEE and HKN in Winter and Spring Quarters of 1990 are currently available from IEEE and HKN for your browsing. Going through these published evaluations is a good way to see what your classmates thought about particular classes and professors who have taught them. Copies are available at the IEEE lounge as well as the HKN office (Rm 315 desk #9). Please come down during office hours if you would like to see them.

—IEEE

Health Tips from EE News

Cramming for an F

Cramming for a test can make you feel good, says a University of Florida psychologist, but the results can be disastrous.

"Plunging into a punishing week or two of round-the-clock cramming," says an advisor at the school's Counseling Center, "may help to atone for the guilt of not working during the term, but it will undermine your performance when you subject yourself to inadequate nutrition and sleep deprivation. It is not unusual for students to becom(so exhausted that they sleep through an exam."

He tells students to remind themselves that ...ests are not a life or death affair...

He tells students to remind themselves that 1) tests are not a life or death affair; 2) they must budget time to study for tests and complete projects; and 3) they should take study breaks and get adequate food and sleep.

The most anxiety-producing tests for students, he says, are oral presentations. Unlike multiple-choice exams which are relatively anonymous, he says, oral presentations require the student to put his/her ideas out into the open for public scrutiny.

—Article courtesy of Graduating Engineer Magazine

THE OTHER SIDE: Professsor Bill Moritz

Now I'm starting to wonder: how many professors teaching Electrical Engineering actually received degrees in Electrical Engineering? Taking ENGR 275 from Bill Moritz, I reasoned that he must have received some sort of degree in Computer Engineering, or Electrical Engineering. Actually, this 18-year UW professor received his B.S. at RPI in Aeronautical Engineering through the NROTC program, and became a commissioned officer after graduation. The Navy sent Moritz to earn his Master's and Doctorate from Stanford University, in which he had planned to continue the Aeronautical Engineering discipline. But while working on his Ph.D. at Stanford, his advisor left for Georgia Tech, leaving Moritz with only part of his project complete. He then linked up with a professor researching Biomechanics for the space program... specifically, the research investigated the ability for a human being to survive extended periods of weightlessness. For those of you Ph.D. students out there... try this one out for size: Professor Moritz wrote his dissertation in fifty pages. Whew!

... try this one out for size: Professor Moritz wrote his dissertation in fifty pages. Whew!

After obtaining his Ph.D. in Bioengineering at Stanford, Moritz served his active duty obligation at the Naval Medical Research Institute in Bethesda, Maryland. He was involved with computerized analysis of humans under water (monitoring physical stress of people under water, etc.) But by 1972 he realized that he was the only bioengineer in the Navy, and decided to end his career in the service.

Through the "grapevine", Professor Moritz found that the UW had positions open in the Bioengineering Department, which began his life as a University professor. After a time, he diffused into the EE department, and began teaching classes similar to the classes he teaches currently: ENGR 275, EE 372, and EE 479. In 1981, he realized that he was teaching engineering but hadn't actually experienced being an engineer. One of his policies, Moritz said, is not to ask someone else to do something that he hasn't first tried. So for four months in 1982, Moritz was employed at Hewlett-Packard in the Computer Systems Division. Four days of a typical week at HP, he would work as a staff engineer, assisting in the design and construction of the HP 3000 line of computers. But on the fifth day, HP gave him special permission to tour the company, visiting technicians and other engineers for the specific purpose of observation.

In 1985, Moritz took a sabbatical leave of absence to join HP again, this time at the Lake Stevens division. He worked on the manufacturing floor, and was developing a way, by automation, to create solder masks for a generic circuit boards (a solder mask is composed of goop that is placed on a board to protect the portions that need not be soldered).

As of January 1990, he became the Director of the Instrument Development Laboratory for the Child Development and Mental Retardation Center (CDMRC) at the University of Washington. This entitles him to support the instrumentation needs of seventy-five investigators of the CDMRC. He thinks that in order to improve the research process of Child Development and Mental Retardation, developments in image processing must be applied, especially in the area of three dimensions. Moritz said the application of image processing could greatly accelerate the research of pharmacology and fundamental cell physiology, two important aspects of research in CDMR.

Most of you know that Moritz is a cyclist. Most of you also know that Moritz bikes every day to and from the UW (30 miles round trip). But did you know that in 1990 alone, he rode over 6000 miles? He also enjoys skiing, canoeing, and backpacking in his spare time. Moritz is also actively involved in many environmental groups, including Sierra Club, and the Zero-population Growth Committee.

...students should demand a high quality education. "Don't accept mediocrity in the education you're getting."

Wrapping up the second day of our interview, I asked Professor Moritz if he had any advice for students (besides "following directions"). He emphasized that he thinks students should demand a high quality education. "Don't accept mediocrity in the education you're getting." And finally, he said that students should demand that every course/teacher be evaluated with the results sent to the chairman of the EE department... in this way, a higher quality education may be maintained.

—*Kathleen Dugan*

Coming soon...

The EE Forum

Students! This is your chance to express your opinions to the EE faculty members!

Keep you eyes open for more details.

Faculty and Departmental Announcements

Activities

• Professor J.A. Ritcey and graduate student John Moe recently presented a paper entitled "Applications of Acoustic Phase Conjugation to Wideband Signaling in Underwater Acoustics", in the Radar and Sonar Signal Processing Session at the 1990 IEEE Asilomar Conference on Signals, Systems, and Computers. The session was organized and chaired by Professor Ritcey.

• Prof. Robert J. Marks II has been appointed to membership in the *IEEE Technical Activities Board New Technology Directions Committee.*

• Professor T.P. Pearsall delivered an invited paper at the European Materials Research Society Fall Meeting in Strasbourg, France, on December 3, 1990. The paper title was "Silicon and Germanium Alloys and Heterostructures for Opto-electronics." Recent work by Professor Sinclair Yee on Si guided wave modulators was presented.

Publications

• Professor T.P. Pearsall has edited a 2-volume book on Strained Layer Superlattices. It was published by Academic Press as part of their Semiconductors and Semi-metals research series. Pearsall's volumes 32 and 33 were published in December. Look for them at your bookseller or library soon.

• J.N. Hwang, J.J. Choi, S. Oh, and R.J. Marks II, "Query based learning applied to partially trained multi-layer perceptrons", **IEEE Transactions on Neural Networks**, Vol. 2, pp.131-136, (1991).

• S. Oh and R.J. Marks II, "Dispersive propagation skew effects in iterative neural networks", **IEEE Transactions on Neural Networks**, Vol. 2, pp.160-162, (1991).

• J.R. Holm and J.A. Ritcey, "The Optimality of the Censored Mean-Level Detector", **IEEE Transactions on Information Theory**, January,1991.

• R.A. Iltis, J.A. Ritcey, and L.B. Milstein, "Interference Rejection in FFH Systems Using Least-Squares Estimation Techniques", **IEEE Transactions in Communications**, December, 1990.

• J.A. Ritcey and J.L Hines, "Performance of the Max-family of CFAR Detectors", **IEEE Transactions on Aerospace and Electronic Systems**, January, 1991.

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The *EE News* is published by the IEEE Student Branch at the University of Washington.

UNIVERSITY OF WASHINGTON — *Department of Electrical Engineering*

EE News

New Editors Needed for 1991-92!!!

May 1991 Volume 5, Number 6

1991 EE Forum Update

The annual EE Forum, where students and faculty get together to discuss departmental issues, was held on May 3rd in EEB 321. About 80 students and faculty attended. The faculty and staff panel consisted of Dr. Alexandro, Dr. Hannaford, Dr. Kim, Dr. Venkata, Dr. Noges, the assistant chairman, and Dr. Seliga, the department chairman. The moderator was Dr. Moritz. A brief review was given on the results from last year's forum (see related article on page 3), and many new issues were brought up in this year's.

The topic of course evaluations brought up the interesting question: just how are professors evaluated in their teaching ability? Student evaluations of courses are done on only a semi-regular basis. However, last year, each member of the faculty underwent peer review, which included input from student evaluations, fellow faculty sitting in on classes, and review of course outlines, homework, and handouts. Each faculty member then used this to evaluate his or her own teaching. According to Dr. Noges, the most valuable student input was not the bubble sheets, but the comment sheets, where specific issues could be addressed. Dr. Moritz pointed out that mid-term evaluations were very successful, because you could correct problems immediately for the students who had the problem.

The students were concerned over the amount of control they had over their education. How do students lodge a complaint? Dr. Noges suggested that if there is a problem, then the student or students could type up a letter and talk to him about it. Dr. Moritz pointed out that students should take initiative. "You are a consumer. You're paying for this. If you're not getting what you think you deserve, then it is really up to you to bring that to the attention of the people who are delivering the product."

Several issues were raised concerning computer equipment. The PS/2 lab in room 105 has had some problems with viruses, hardware malfunctions, and students putting passwords or changing configurations, which prevents others from using the computers. Dr. Alexandro pointed out that the students have a responsibility to police

EE Forum, continued on page 3

Industrial Affiliates Poster Contest Winners

The following students were the winners of the Poster Contest held at the Industrial Affiliates Program on May 16, 1991.

First place: Ralph Jorgenson and Chuck Jung for "Surface Plasmon Resonance as a Chemical Sensor"
Second place: Julie Chen for "MISIM: A Technology CAD"
Third place: Sue Yim for "Tomographic Imaging of Rain Fields"

Their faculty advisors are Prof. Yee, Prof. Yang, and Prof. Seliga, respectively.

The authors of each winning poster will receive a free trip to the technical meeting of their choice, with concurrence of their advisors. In the case of

***Poster Contest**, continued on page 2*

EE student wins NASA Fellowship

Richard West, Ph.D. student, was selected by NASA to receive a Graduate Student Researchers Program (GSRP) fellowship for his research proposal entitled, "Microwave Remote Sensing of Snow and Sea Ice." The 3-year fellowship includes a yearly stipend of $16,000 and funds to attend a NASA GSRP Symposium. Richard's advisor is Professor Leung Tsang.

—Leung Tsang

In this issue:

Poster Contest, from page 1

the first place poster (with two authors), only one trip will be provided. However, Ralph and Chuck supposedly have a deal worked out already!

The five industry judges were Dick Burger (Fluke), John Coltart (Chevron), Jim Fukusawa (Boeing), Greg Rahman (Bechtel), and Lael Saulsman (Puget Power). All the judges complained about the difficulty of their task, since so many of the posters received points from the five judges. The winners were rated best or second best by two independent judges.

Congratulations to the winners and to their faculty advisors. Many thanks to the student participants. All your efforts made for a very lively poster session and impressed our industrial visitors with the high quality of student research within the EE department.

—Prof.Martin Afromowitz, Chairman, Industrial Affiliates Committee

Prof. Spindel directs oceanic sound experiment

After travelling 18,000 kilometers through the deep ocean, sound signals transmitted near Antarctica arrived, faint but clear, at the East and West coasts of North America. The successful experiment, led by project coordinator and EE Professor Robert Spindel, (see EE News, Vol. 5 Issue 4, March, 1991) raises hopes that scientists can use this technique over the next decade to gauge whether the expected greenhouse warming has started.

U.S. and Australian researchers tested the idea in late January during a trial experiment near remote Heard Island in the Antarctic Ocean. An underwater transmitter emitted periodic signals about as loud as a foghorn, and 17 receiving stations around the globe listened for the weak sound. Scientists hope to use the timing of the signals' arrival to make precise measurements of the speed of the sound and then monitor future transmissions for any change in speed. A widespread increase in the sound speed over several years would indicate an oceanic warming.

Spindel says almost all the listening stations picked up the signal. The sound took about 3.5 hours to reach its most distant destinations, the North American stations. The researches are now conducting tests to determine whether the received signals came in clearly enough to allow a sufficiently accurate measurement of the sound speed. "It looks like the answer is yes."

Spindel and his colleagues hope to install the first of several permanent underwater transmitters in 1993, and then add several more transmitters around the globe as part of a long-term monitoring program. Because various ocean regions will respond differently to climate change, the researchers will need widespread coverage to catch signs of a global warming.

—Article courtesy of Science News, Vol.139

A report from the EE Spring Picnic:

A day under the sun...

The annual EE Spring Picnic, organized and sponsored by IEEE, was held on a sunny Saturday, May 11. About 50 EE students, faculty, friends and families showed up at Woodland Park to have some fun and to escape their daily routines.

The picnic began at around 11:00 AM. A net for volleyball was set, which ended up being the most popular activity of the day! Even a match of faculty vs. students was arranged, which actually turned out to be no match at all. The hamburgers, hotdogs, and salad were sufficient for everyone, with plenty of leftovers.

The Professor and TA of the Year awards were presented at the picnic. The elections held on May 6 and 7 showed that members of the EE department favored Professor Andrew Yang as the Professor of the Year and graduate student Arash Kia as the TA of the Year. Kia had also received the same award last year.

At the same time, Professor Mani Soma, having fulfilled a two-year term as faculty advisor for the IEEE-UW Student Branch, was presented a plaque as a token of appreciation for his devotion to the student branch. (The IEEE faculty advisor for 1991-92 will be Professor Eve Riskin.)

After the announcements, a pie eating contest was held, in which 5 couples (faculty member and student) participated. The pairs were: Prof. El-Sharkawi & Lee Tat, Prof. Riskin & Pamela Batti, Prof. Hannaford & Udo Sommer, Prof Christie & Cliff Ma, and Prof. Yang & Rod Spiger. One partner fed the other with both partners' eyes closed. In the first round the students fed the profs, and the roles were reversed in the second. El-Sharkawi & Tat won the first round, and Hannaford & Sommer took the second. Yang & Spiger, who almost claimed victory both times, displayed their marvelous tactics of eating off each other's hands instead of using spoons! Riskin & Batti scored poorly since they properly wiped off their mouths after each bite...no wonder they had 3/4 of their pies left after everyone else had finished!

In general, the picnic went well and everyone had a good time. The weather certainly helped! It was a good chance for students and faculty to get to know each other better in activities other than school. (Thanks to Peaches and the Univ. Bookstore for their donations!)

—Yasmin Karimli

EE Forum, from page 1

the equipment that they are using. An E-mail address was given for people to report trouble to (ryan@maxwell.ee). Another problem was with the EE 372 lab. In the past few quarters, over 45 students have enrolled in the course per quarter where there are only 12 computer stations. Increased interest in the class has led to pressures for increasing class size. Several suggestions were made to buy new equipment or upgrade the network ability of the computers, but presently there is no money available. All the original equipment was donated.

Dr. Hannaford started a discussion on cheating. During class evaluations, he asked several questions about cheating, and was astounded at how many people actually saw cheating and how many thought it affected them (see last issue of the EE News, Vol. 5 Issue 5 April 1991). Several ideas were discussed on how to reduce cheating, including reserving larger rooms for tests, using separate versions of tests, and student involvement. Dr. Hannaford pointed out that some schools such as Stanford have a student honor code, where it is the students', not the professors', responsibility to catch cheaters. Dr. Alexandro pointed out that the students here at the UW did not need to go public with their accusations, they could leave the professor a private note and let the professor deal with it.

...You are a consumer. You're paying for this. If you're not getting what you think you deserve, then it is really up to you to bring that to the attention of the people who are delivering the product.. .—Bill Moritz

A question was raised about the funding of graduate student trips to conferences. All such trips are currently paid for out of the research grant for a particular project. Dr. Kim said that a graduate student who is doing good work will receive funding for such trips.

Throughout the forum, the topic of class content and curriculum was discussed. Currently, the departmental curriculum is undergoing a major overhaul. Anyone wishing to review the proposed changes can drop by the EE main office and request to borrow a copy of the report. Student input is desired by the faculty.

This year's forum was slightly different that last year's. Last year, the students seemed to be more confrontational with the faculty, whereas this year, the attitude all around was that each student should get involved in their educational environment—if you see something wrong, try to get it fixed.

—Kerry Krell and Paul Szabo

Update from last year's EE Forum

To provide an update as to how our department is changing, IEEE—UW Student Branch President Kathy Dugan has prepared an EE Forum follow-up report. The discussed issues and the updates or implemented improvements are as follows:

• **Issue #1:** Limited office hours of the Advising Office...
• **Update:** More hours were added to the office hours. Now the office is open from 8:00 AM to noon and 1:00 PM to 4:30 PM daily.

• **Issue #2:** Inadequacy of EE 310 (Electronics Lab I) lab manual...
• **Update:** According to Dr. Noges, the lab manuals have changed over the last year due to changes in lab equipment, however, they are still making revisions. The circuit analysis course may be incorporated with these lab courses.

• **Issue #3:** EE 374 (Data Structures) instructors assume students taking the course are fluent in the use of Pascal,even though knowledge of that computer language is not a prerequisite...
• **Update:** The computer language currently used in the class is "C". According to Dr. Alexandro, the matter has been discussed, but no changes have been made. EE 374 is taught by the CS&E department.

• **Issue #4:** Late night wheelchair access to the building...
• **Update:** According to Dr. Seliga and Dr. Noges, this is still being worked on due to the implementation of the key card system.

• **Issue #5:** Improvement of core course consistency...
• **Update:** The department is currently undergoing a curriculum change. The new curriculum is being developed by the Undergraduate Studies Committee, of which Dr. Damborg is the Chairman. According to Dr. Alexandro, the issue of core course consistency will be addressed by this committee.

• **Issue #6:** Possibility of placing a student representative on the Student-Faculty Review Committee for planning the future of the EE department...
• **Update:** According to Dr. Seliga, no students are on this committee, however, the draft of the strategic plan development is currently being created. By the end of the month, it will be ready for review. At that time, Dr. Seliga said, student representatives from IEEE and HKN will be asked to review the plans.

Autumn Quarter Registration is just around the corner...

Some Special Classes for Autumn Quarter 1991

EE 440: Introduction to Statistical Signal Processing — *Professor Jim Ritcey*

This is a 4 credit course for seniors interested in signal processing. The goal is to build on EE 335, and to strengthen your Linear Systems expertise by applying frequency-domain filtering to the problem of filtering a desired signal from random noise. One design credit is received for a project in MATLAB.

The course progresses through three stages. First, we review Fourier Analysis, focusing on some basic Digital Signal Processing (DSP). Second, we learn how probablity is used to describe real-world signals in noise. This will be brief, and it may help to have completed STAT 390. Third, we will couple our knowledge of random variables with that of time waveforms to describe random signals.

MATLAB, on the HP workstations, is used to illustrate signal and noise generation, plotting, Fourier Analysis, poles and zeros, digital filters, simulating random variable, autocorrelation and power spectral density, and the design of statistically optimal filters.

This 4 credit class will meet MWTHF at 1:30-2:20. SLN 2535.

EE 488: Laser Electronics — *Professor Kelin Kuhn* (Not in Autumn Qtr Schedule!)

This course will provide an introduction to those aspects of optical electronics and quantum electronics important in the design and operation of laser systems. The design principles behind a number of laser systems, including Nd:YAG, Nd:Glass, Argon, He-Ne, semiconductor diode and dye laser will be discussed. Three to four design projects (tentatively: 1. frequency-stabilized single longitudinal mode Nd:YAG laser, 2. high power Nd:YAG or Nd:Glass laser, 3. 50 fs ring dye laser, and 4. an economical laser) serve as the design component of the course.

This is a 4 credit class - 2 design and 2 science credits - and will meet MTWF at 3:30-4:20 in Loew 201. SLN 7154.

EE 528: Advanced Semiconductor Fundamentals — *Professor Kelin Kuhn* (Not in Autumn Qtr Schedule!)

This course is the first in the solid state graduate sequence. This course will discuss those aspects of solid state physics and quantum mechanics essential for understanding modern electronic devices. The course includes the limits of classical physics; Schrodinger's equation and eigenvalues of simple systems; Dirac notation and operator methods; basic crystallography, reciprocal lattices, Brillouin zones and E(k) diagrams; effective mass equation and spin-orbit splitting. Theoretical formulations are balanced by practical examples including quantum wells, superlattices, and tunneling devices.

This 4 credit class will meet MTWF at 2:30-3:20 in Loew 105. SLN7102.

EE News Bulletin Board

Japanese Government Scholarships for Graduate Study at the Tokyo Institute of Technology

Scholarships consist of round-trip airfare, travel allowance, monthly stipend (approximately $1,350), and tuition. Applicants must be UW graduate students and US citizens. The period of award is January 1992 to March 1993. Application deadline is **August 30, 1991**. For additional information, contact Professor Akira Ishimaru, EEB 410, 543-2169.

Summer Position Opening

Student helper for the College of Engineering Dean's Office
$5.25-$6.50/hr, DOE.
Full time during Summer, 19.5 hrs/wk, Fall-Winter-Spring.
Work involved PC Support for secretaries and administrators using R:Base, Microsoft Word and Excel. IBM PC experience and excellent communications skills required. Call David Fray ASAP, 685-1724.

HKN Update

••• **New Officers:** The 1991-92 officers of the Iota Upsilon Chapter of the Eta Kappa Nu were elected at the HKN Spring Quarter Pizza Feed on April 22nd. The new officers are shown in the list below.

••• **Looking Back:** The year 1990-91 has been a very busy one for HKN. Some of the important events held this year were:

- Industrial trip to Portland
- Evaluations at the end of each quarter
- Winter Ski Trip
- Quarterly Pizza Feeds
- A booth at the Pre-Engineering Student Association Fair
- Initiation Ceremony for the new members
- Election of the new officers

••• **Upcoming Activities:** With our new group of enthusiastic officers, HKN looks forward to a year of many new and exciting activities. In the addition to the usual activities we are planning to organize a student paper contest.

••• **Spring Quarter Evaluations:** HKN and IEEE have been sponsoring a course evaluation program during the last year. The response from the students regarding the evaluations has been extremely helpful. We strongly encourage the students to participate in the Spring Quarter Evaluations by filling out the evaluation forms.

••• **Norman R. Carson Award:** HKN has nominated Haresh Sangani, a junior in EE, for the Norma R. Carson Award this year. Congratulations and good luck to Haresh!

Keep an eye open for the HKN T-shirt!

—Siva Bala Narayanan, Bridge Correspondent, and Samir Palnitkar, Corresponding Secretary

1991-1992 HKN Officers and e-mail addresses

President.....William Graylin (*graylin@maxwell.ee*)
Vice President.....Daryl Rochette (*pepsi@maxwell.ee*)
Treasurer.....Jeff Ichikawa (*ichikawa@maxwell.ee*)
Corresponding Secy. Samir Palnitkar (*samir@rainier.ee*)
Bridge Corresp......Siva Bala Narayanan (sivabala@*isdl.ee*)
Recording Secy......Victoria Yee (*felix@maxwell.ee*)
Faculty Liaison.....Julie Larson-Wiseman
Virtual Officers.....Mike Nakahara (*hightech@fizzle.ee*)
Aaron Pulkka (*pulkka@wolf.cs*)
Faculty Advisors.....Arun Somani (*arun@ee*)
Jim Ritcey (*ritcey@ee*)

Hey! EE Graduating Class of 1991! You are invited to the

When?: June 15th, 5:00pm - 7:00pm (right after Commencement)

Where?: HUB East Ballroom

Why?: WHY NOT?!

Get your tickets at the Advising Office TODAY!

Attention Juniors!

Here's your chance to come to the EE Graduation Party! We need Juniors (or other EE students who aren't graduating) to help set up, administer the entertainment, serve cake & punch, etc. For 1-1/2 hours of helping out on June 15th, you could also participate in all the other fun activities at the party! Contact any of the following committee heads:

- **Help in General**
  Mike Nakahara, 543-4977
  Linda Lee, 637-9582
- **Food and decorations**
  Kristi Brockschmidt, 869-2587
- **Publicity**
  Ken Sadahiro, 633-2236
- **Photography**
  Darwei Kung, 632-7942
- **Entertainment and Videos**
  Daryl Rochette,367-2167

We all want to make this event a fun, exciting, and most of all, a special one for the graduating EE class, so pitch in! Get involved!

—EE Graduation Party Committee

Advising News

• The undergraduate program is currently accepting applications for Autumn Quarter 1991. The department is encouraging all qualified applicants who meet the prerequisites for admissions to apply by the **July 1st** deadline.

• **July 12th** is the application deadline for students graduating in August who are not participating in the June commencement ceremony.

• A reminder that Summer Quarter begins June 24th and that Period I registration for Summer continues through May 29th. Period II for Summer is from May 30th to June 21st. Autumn Quarter begins September 30th. Period I registration for Autumn Quarter is May 21st through June 23rd and Period II registration for Autumn Quarter is June 24th through September 27th.

• Attention undergraduates! Summer would be a good time to schedule a time to see Lani to go over your curriculum chart and see how you're progressing in the program.

• A revised undergraduate curriculum has been approved by the EE faculty. A student representative has been appointed to provide student input regarding the transition between the old and revised curriculum. The revised curriculum may possibly go into effect Autumn Quarter 1992. Students already enrolled in the department will have the option to graduate under the curriculum that was in place when they entered the department. The department will do everything possible to make the transition between the two curriculums as easy as possible.

Good luck on finals and have a great summer!

—Lani Stone, Advising Office

Mystery of the Coke Machine: Is it gone forever?!

What's happening with the Coke machine? Will IEEE get it back? Chances are slim, but the effort is still flourishing.

Recently, members from the IEEE-UW Student Branch, as well as representatives from other academic student organizations (ACM, TAPPI, A&A), met with Vice President of Student Affairs, Ernest Morris. The topic of discussion centralized around the recent faculty/student petition which asked that University policy be changed to accommodate academic students group fund raising through the use of vending machines (i.e.: why can't IEEE use the Coke machine for profit?). Please note that in total, there were approximately seven hundred students and sixty faculty signatures from these petitions.

Morris' response? He explained that Pepsi machines currently installed bring in funds for the "whole of the student body". Having soda machines producing funds for student groups would only dig in to the pool of money for all students. Why don't student groups ask for money from their department? (FYI: the money from the Pepsi machines on campus is returned to Housing and Food Services.) He said that he would introduce the student/faculty plea to "the folks" (i.e.: UW administrators such as President Gerberding, etc.) and get back to the student representatives in the near future. (Refer to the copy of Ernest Morris' response to the student group meeting on the next page for more details.)

...Since the Coke machine provided the majority of the groups income (two-thirds for IEEE), they are not giving up their plight...

The next step for student groups? Since the Coke machine provided the majority of the groups income (two-thirds for IEEE), they are not giving up their plight. For the groups, publicity about the issue, continued meetings with UW administrators, and meetings with Pepsi are on the order of business for the near future.

Comments? Suggestions? Please contact an IEEE officer (e-mail: *ieee@ee*) or drop a note into the "Wonder Slot" on the cabinet door in the IEEE lounge. Also you may want to utilize the address of Mr. Morris provided on the next page—your direct feedback is very important!

—Kathleen Dugan, President, IEEE—UW Student Branch

A letter from the Vice President for Student Affairs

Reply to our Coca-Cola vending machine protest

This is a complete transcription of a letter sent to the president of the IEEE-UW Student Branch by the UW-Vice President for Student Affairs, Ernest R. Morris. It is a statement made in response to the recent controversy regarding vending machine sales by several student groups on campus, and in justification of the UW policy regarding such activities.

May 9, 1991

Dear Ms. Dugan (and IEEE-UW Student Branch),

After further consideration, following our meeting on April 26 regarding the use of revenues from soft-drink vending machines to fund student groups, I have concluded that the arrangement entered into recently by the Department of Housing and Food Services (HFS) and student groups is appropriate and should not be modified. The arrangement is consistent with longstanding University policy and the mission specifically assigned to HFS by the University.

The current policy permitting the installation of vending machines on campus was adopted in 1967. The policy provides for the award of exclusive vending contracts to private firms through a competitive bidding process. The policy also states that the University cannot permit the installation of coin-operated vending machines by other companies, individuals, organizations or departments when such contracts are in effect, and assigns responsibility for coordinating and maintaining the vending contracts to HFS.

A primary mission of HFS is to provide food service, including vending service, to the University community on a self-sustaining basis. The installation of vending machines by anyone other than the exclusive vendor is both a violation of the vendor's contract and an infringement upon HFS's role as the authorized provider of food service on the campus.

The revenues generated by the vending machines located in academic buildings are returned to HFS. This longstanding practice recognizes that the installation of a vending machine on campus, as a convenience to a department or building and as a means of extending food and beverage service to the campus, creates a situation whereby HFS is competing with itself for sales. The return of the commission of HFS offsets the effects of this lost revenue.

The policy governing campus vending machine service was instituted to benefit the broader University community. In opposition to the intent of the policy, revenue from unauthorized machines has been used for the benefit of small groups of students. Stated differently, vending machine revenues accruing to HFS are used for the good of the University as a whole, contributing to the provision of a convenient and reasonably priced food service to the entire campus community.

The Coca-Cola machines recently removed from campus were not only in violation of the legally binding contract with the ALPAC Corporation, they were also contrary to the University regulations governing the manner in which revenues are to be managed. The revenues generated by vending machines are considered University funds and, as such, under the control of the University. Such funds must be deposited and spent in accordance with University rules. Moreover, the use of state facilities for private gain, tax obligations and liability considerations are just a few of the other issues growing out of the placement of unauthorized vending machines on campus.

To address the concerns expressed by student groups with regard to lost revenue, HFS has agreed to a transitional period during which ALPAC may vend Pepsi products in designated areas for the same price at which Coca-Cola products were sold. During the transitional period, April 1, 1991 through June 17, 1991, revenues will continue to be shared with student groups in accordance with the amount received from their previous individual agreements with Coca-Cola. As of this writing, four of the seven student groups involved have accepted the installation of Pepsi machines.

In summary, it is my considered judgment that the negotiated agreement between HFS and student groups is fair and appropriate, and that no exceptions should be granted. Please share this letter with other interested students.

Best wishes,

Sincerely yours,

Ernest R. Morris

Vice President for Student Affairs, PB-10

Job Hunting Tips From EE Students

In today's ever tightening job market, EE grads are forced to search harder and longer to find a permanent, full-time engineering position. In past years, EE's were nearly guaranteed of being able to pick and choose between several quality job offers, but today a single offer is considered reason for celebration, even if it is not quite what the student was hoping for.

From the graduating seniors who have spent endless hours this past year searching for a job, I have compiled an informal list of their top 10 job-hunting pointers (in no particular order). Hopefully, those of you who are just beginning to search, or even just thinking about it, will be able to benefit from these hard earned words of wisdom. Many of them you may have heard time and time again, but this may help you understand their true importance.

1. **Start early.** Be prepared to begin hunting when you come back next fall, even if you are not graduating until next spring or summer.
2. **Use personal contacts**. The tighter the market, the more important it is to "know somebody" in the right places.
3. **Get a co-op or summer intern position**. Many graduates have taken jobs with the companies they have already worked for as undergrads.
4. **Don't rely on the placement center**. Most companies do not interview there, and even those that do often have limited, or no, openings.
5. **Mailing campaign**. Send out cover letters and resumes - lots of them, every quarter, even to the same companies. Like #4, there are hundreds of other companies that are hiring but do not come to campus.
6. **Projects**. Take info about any big projects you have done with you to the interview and be willing to leave some of it with the recruiter. Of course, you must be able to talk about it in some depth.
7. **Know the company**. The ability to ask intelligent questions about the company cannot be overrated. Don't be afraid to ask probing questions about the company's $$ problems, etc. - it shows you are truly interested.
8. **Practice your interviewing skills**. Again, this can't be stressed enough. You have a very short time to make a good impression, but don't stress if you blow one, it's bound to happen. Practice with friends, family or the mirror.
9. **Send thank you letters**. The students were pretty split on this one, but it certainly does not hurt, and is more important for smaller companies where your interviewer may be the same person making the hiring decisions.
10. **Apply at Boeing**. If you want to live in the Puget Sound region, it is hard to pass up. Even people who swore they would not work for Boeing are glad they applied because it is one of the few companies actually hiring.

Good luck!

— Dale Wilson

Final Editorial from A Graduating Senior...

Dale's B.S.(E.E.)

After 1760 days, roughly 2000 class hours, about 500 hours wasted reading *The Daily*, hundreds of resumés, cover letters and company applications, 53 classes, 8 jobs in 4 states, 6 roommates in 5 dorm rooms and 2 apartments, 5 grad school applications, 2 universities, and 1 marriage, I am finally finishing my undergraduate education. Yet, it seems like just yesterday...yeah, right!

Now it is with unbelievable joy that I say goodbye to the UW and move on to the bluer, drier skies at the University of Illinois. Once I drive out of Seattle, I will not look back, come back or even think about either except to laugh hysterically whenever I hear it is raining here. For everyone who enjoys living in Seattle—you can have it, along with the endlessly gray, claustrophobic skies, rainy decades, eternal traffic jams and the ground watchers. If this is the most liveable city... well maybe life just isn't worth living???

Despite the hassles, the weather, the petty assignments, the unintelligible exam questions, a few unmotivated professors and the idiotic labs, this has been an enjoyable experience. I actually had a great time - learning is exciting and the new EE technologies are particularly fascinating. I don't see how anyone would not want to keep learning more and more, and I am not just talking about Electrical Engineering. All of you students with a ways to go: learn as much as you possibly can and demand excellence from your instructors, and EE profs: many of you need to be more demanding of your students and stimulate them intellectually, most students actually wish they had been challenged more from their courses and their professors. The recent influx of new, quality professors has breathed some much needed life into the department; the changes since I began many moons ago are both astonishing and very promising.

...Despite the hassles, the weather, the petty assignments, the unintelligible exam questions, a few unmotivated professors and the idiotic labs, this has been an enjoyable experience...

Before I go, I want to thank Ken for all the work he put into the *EE News*, he was truly the driving force behind its production. I certainly hope someone (or two) will step forward to become next year's editor(s)—its an excellent opportunity, fun, rewarding, looks great on your resume and it even helped the two of us make $250 a piece! Take a chance, become an editor and someday you too can write a worthless editorial like this when you graduate.

Finally, to end on a *very* good note, about a week or two after Commencement I will be taking **THE** test - forget the GRE, SAT, MCAT and Moritz's finals, this is the one— parenthood. No withdrawals, no extra credit, no taking the course over in the summer and no 8-1/2" X 11" sheet of notes; but, it is something I am truly looking forward to. And, due to the amazing, wonderful products of other EE's, I have already seen my child on a couple of occasions (but have managed to avoid finding out its sex), seen and heard its heart beat, heard it move and kick, and even heard its hiccups! Absolutely incredible; nothing can compare to it. I highly recommend it if you ever have the chance. However, due to the rapidly increasing costs of a college education and figuring that it will take, oh, $1 million dollars to put my child through college in 2009, donations are now being gladly accepted for the DALE JR. COLLEGE FUND!

Best of luck to everyone, and if you ever leave Seattle, look me up.

— Dale Wilson

From The "Other" Editor: Dale, I wish you tons of luck with your life after UW-EE, and don't forget to send a picture of your newborn for the next issue! —*Ken*

Departmental Activities

Presentations

• R.D. Christie and C.C. Liu, "Roles for Expert Systems in a Deregulated Utility Environment," NSF Workshop on The Impact of a Less Regulated Utility Environment on Power System Control and Security, University of Wisconsin-Madison, April, 1991.

• Professors Shapiro and Haralick will present papers at the International Workshop on Visual Form in Capri, Italy, May 27-31, 1991.

•Professor Shapiro will chair the IEEE Workshop on Directions in Automated CAD-Based Vision in Maui, Hawaii in June 1991. She will serve on the program committee of an NSF Workshop on Challenges in Computer Vision, also in Maui.

Publications

• D.C. Park, M.A. El-Sharkawi, R.J. Marks II, L.E. Atlas and M.J. Damborg, "Electric load forecasting using an artificial neural network", *IEEE Transactions on Power Engineering*, vol. 6, pp. 442-449 (1991).

• M.E. Aggoune, M.A. El-Sharkawi, D.C. Park, M.J. Damborg and R.J. Marks II, "Preliminary results on using artificial neural networks for security assessment", *IEEE Transactions on Power Engineering*, vol. 6, pp. 890-896 (1991).

• D.C. Park, M.A. El-Sharkawi and R.J. Marks II, "An adaptively trained neural network", *IEEE Transactions on Neural Networks*, vol. 2, pp. 334-345 (1991).

• T.C. Folsom, "Machine Vision for Composites Manufacturing", 17th NSF Grantees Conference on Manufacturing Systems, San Antonio, Jan. 1991.

• T.C. Folsom, "Neural Networks for Machine Vision", Northcon Conference Record.

• T.C. Folsom, "A Modular Hierarchical Neural Network for Machine Vision", International Joint Conference on Neural Networks, San Diego, June 1990, vol. II, pp. 897-902.

We need enthusiastic editors for the *EE News* for 91-92!

Honestly speaking, this is alot easier than crunching out your Fourier Analysis for that low-pass filter or figuring out how many flip flops are needed to implement that shift register! All you need is enthusiasm! (Although a little Macintosh experience would be nice...) You get to stay on top of what's happening in the department and let everybody know about it! As Dale mentioned in his editorial, you may even end up earning a little money if you do a good job! The **fact** is, editing the *EE News* is truly a rewarding experience.

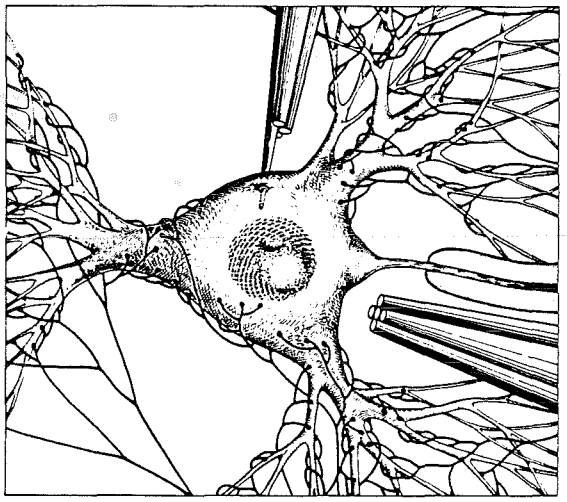
If you want to take a shot at being THE editor for the departmental newsletter, please IMMEDIATELY contact either one of the editors: **Ken** (633-2236, e-mail: *opcode@max.u*) or **Dale** (368-8690, e-mail: *wilsond@maxwell.ee*). We all want the newsletter to live, so make your move today.

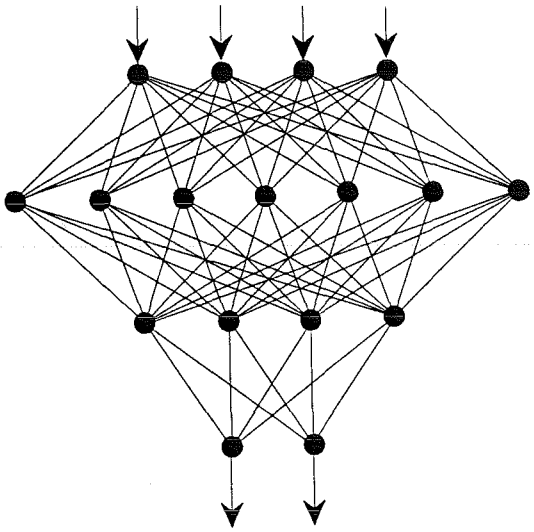
The *EE News* is published by the Student Branch of IEEE at the University of Washington, Seattle, WA, U.S.A.

INTRODUCTION TO ARTIFICIAL NEURAL SYSTEMS

a video shortcourse

- *An introductory course on the rapidly developing technology of artificial neural networks*
- *For those interested in emerging signal processing and pattern recognition algorithms and architectures, and for those involved in charting new industrial directions*
- *You will learn about the neurological basis for artificial neural networks, current and potential applications, and implementation of neural networks in various technologies.*





- ***Participants Comments:***

"INSTRUCTORS ARE EXCELLENT!", "... INFORMED", "... OBVIOUSLY KNOWLEDGABLE AND ENTHUSIASTIC","... RELAXED, APPROACHABLE".
"GOOD THEORETIC AND EXPERIENCE BASE."
"OVERALL, (THIS COURSE WAS) VERY USEFUL."

General Information

Researchers in computing and signal processing have long been intrigued by the computational and fault tolerant properties of the brain. There has recently been a surge of interest in processing architectures which are based loosely on biological neural networks. These artificial neural networks have been implemented successfully both electronically and optically.

Students of this course will learn the theoretical underpinnings of artificial neural networks and will be presented with the most relevant recent research results. Case studies of the suitability of neural network architectures for several different applications will also be discussed. Interdisciplinary contributions to recent results in artificial neural network research will be stressed.

Applications of artificial neural networks include signal classification, image recognition, speech recognition and optimization. Electronic, optical and hybrid implementations of neural networks are discussed.

Course Contents:

1. Introduction *2.* Preliminaries *3.* Applications to Combinatorial Search Problems *4.* Associative Memories *5.* Content Addressable Memories *6.* Discussion of Course Simulator *7.* Neural Network Performance *8.* Introduction to Learning *9.* Learning Algorithms and Some Applications 10. Introduction to Adaptive Resonance Theory 11. Silicon Neural Network Implementation 12. Optical Neural Network Implementation 13. Current Research Interests in Neural Nets

Course Materials:

- Six VHS Cassettes of lectures & copies of the lecture notes.
- An extensive forty-page bibliography of artificial neural network publications.
- A floppy disk including:
  - ♦ a neural network simulator for MS-DOS.
  - ♦ an ASC file of the bibliography.

- Copies of the following papers are also included: *"Neural networks for solving combinatorial search problems: a tutorial", "Geometrical interpretation of Hopfield's content addressable memory neural network", "Synchronous versus asynchronous behaviour of Hopfield's content addressable memory", "A performance analysis of associative memories with nonlinearities in the correlation domain", "Homogeneous and layered alternating projection neural networks", "Optical processor architectures for alternating projection neural networks"and "An artificial neural network for spatio-temporal bipolar patterns".*

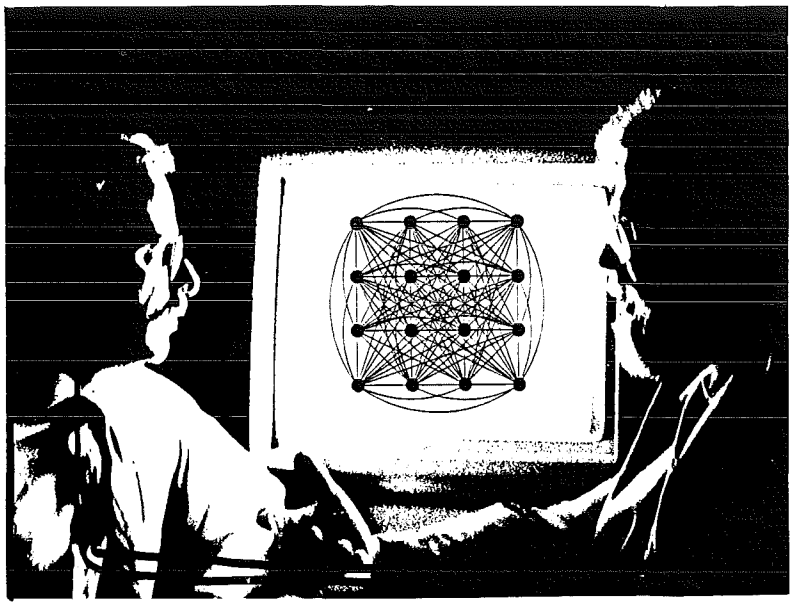
Instructors:

Les E. Atlas is an Associate Professor of Electrical Engineering at the University of Washington. His research interests include speech processing, auditory system processing and real time signal processor design. Dr. Atlas was recently involved in the restoration of voice transmissions from Korean Air flight 007. His work in neural networks is supported by a National Science Foundation Presidential Young Investigator's Award and, more recently, by the Washington Technology Center.

Robert J. Marks II is a Professor in the Department of Electrical Engineering at the University of Washington, Seattle. Prof. Marks is Chair of *the IEEE Circuits & Systems Society Technical Committee on Neural Systems & Applications* and has served as Chairman pro tem and Secretary of the *IEEE Neural Networks Committee.* This committee is responsible for coordination of the annual *International Conference on Neural Networks* which is the largest attended conference in the world on the topic. In 1984, he was presented with an *IEEE Centennial Medal.* He is a Senior Member of IEEE. He was a co-founder and first President of the *Puget Sound Section of the Optical Society of America* and was recently elected that organization's first honorary member. Dr. Marks has over eighty archival journal and proceedings publications in the areas of detection theory, signal recovery, optical computing and artificial neural processing. His research in artificial neural networks is in the areas of algorithmic development and optical & electronic implementation.

Purchase Information:

Cost (six videocassettes, simulator software, course notes, and reprints): $1250. One month rentals are $500. A preview of the course (the first tape in the series) can be purchased for $75. The price (and the first videocassette) will be deducted if the course is purchased at a later date. Contact Joan O'Brien, Televised Instruction in Engineering Director, University of Washington, FH-10, Seattle, Washington 98195 or phone (206) 545-2242. Please include check or purchase order made out to College of Engineering, University of Washington.



Order Form

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AMOUNT OF ENCLOSED CHECK OR MONEY ORDER (WASHINGTON RESIDENTS MUST INCLUDE SALES TAX)

$_____

E. E. NEWS VOL. 6 #3
FEBRUARY 1992

Student Debate:

Locker Policy Takes Hold

A new policy taking effect Winter quarter turned over administration of the student lockers in the Electrical Engineering building to Eta Kappa Nu (HKN), the E.E. honor society. Along with this came some changes in the management of the lockers. The following explanation should hopefully both clear up any questions and satisfy those students unhappy with the situation.

Formerly, the lockers (located on the third floor of the E.E. building) have been managed by the Department. No rental fee was charged to the students for locker usage. However, according to Thomas Seliga, chairman of the department, serious problems existed with this situation. First of all, management of the lockers required extensive time of the staff, and therefore was very expensive. Also, lockers were being occupied by other than current E.E. students, and the Department had no means to regulate this.

Given these conditions, Seliga reasoned that the lockers should be regulated by one of the student groups in the department (IEEE or HKN), and that some method of rent (max $5 per quarter) be instated to upgrade and maintain the condition of the lockers. Any remaining income following repairs, etc. is to be used for activities benefitting the entire student body, with student usage, receipts, and expenditures being strictly accounted for to insure this.

On a parallel note, both IEEE and HKN have requested from the department financial support of its student activities. However, the Department is not budgeted by the University for such expenses. Recent budget cuts have slashed support of these two student groups, and means for support of their activities needed to be found. IEEE was offered the chance to manage the lockers, but declined. HKN then willingly accepted the responsibility and conditions of the assignment. According to Seliga, "Either student group would have done a good job in leasing the lockers."

When HKN took over the lockers, they inherited the problem of outside students using them. HKN president Will Graylin stated," The old system was messed up. When we last cleaned out the lockers, we found locks that had been on for years, with moldy clothing in them (the lockers)." The new $5.00 per quarter fee is HKN's proposal to help clean up and regulate the lockers.

I asked Will Graylin why a $5.00 deposit wouldn't work - to only charge those who abused their lockers. Graylin replied that the quarterly fee would work better to even out supply and demand. People who put down a deposit could hang on to the lockers even if they no longer need them, keeping others willing to pay $5.00 on a long waiting list. This way, people who do not need the lockers will hopefully relinquish them. Graylin said,"It

Locker, continued on page 2

Ph.D Students Grab Awards

Jack Yao, a Ph.D student, was selected by Tektronix Corp. to receive a Graduate Fellowship for his research work on high-frequency simulation within MISIM, an integrated CAD system developed at the University of Washington. The fellowship, renewable every year, includes a yearly stipend of $15,000. Jack's advisor is Prof. Andrew Yang.

Julie Chen, a Ph.D student, was selected by IEEE ACM/SIGDA Society to receive a Graduate Fellowship for her research work on statistical yield assessment within MISIM. The fellowship includes a yearly stipend of $12,000. Julie's advisor is Prof. Andrew Yang.

In This Issue

Locker, from page 1

gives an incentive for people to use the lockers, or else they won't pay the $5.00."

Excess funds collected from the lockers will be used towards sponsoring lectures and barbecues open to the entire department. Events will be advertised throughout the building as they are organized.

The new policy requires re-registration each quarter for those already occupying lockers. Those not paying the $5.00 or failing to register automatically forfeit their locker, with locks being cut by the University Police. Those who would like to obtain a locker must sign up on the waiting list at the HKN office, EEB rm 315, desk #9. You will be notified when a locker is freed up.

Anyone with any questions or comments may contact any of the HKN officers, or drop a note in the HKN mailbox in the front office.

By Thomas Hall

The Other Side of the Coin

The following students are examples of students unhappy with the change in locker policy, especially the $5 charge per quarter:

"I think it stinks! I think it's unfair. None of the other engineering departments charge for lockers. I think there should be a refundable deposit. It wouldn't bother me so much if I knew the money was going towards new or more lockers."
Debbie Kurtz, Senior EE

"The money is collected from All EE students. HKN is for only 10% of the students. I think the proceeds should be used to benefit all students, and hope HKN keeps this in mind." Alice Salcido, 5th year EE student.

"I resent being charged $5 for a locker because of the other people's abuse of lockers. It was not clear to me that those posters referred to all students with lockers. Had I not gotten the news from a friend, I would have lost mine."
Susan Boxx-Ranson, 5th year EE

"Isn't a tuition increase of $200/quarter enough?" EE senior

"The lockers have been offered for free as a service to students for many years. Why should we start paying now? To get to the point, IT SUCKS!!"
Kerry Krell, senior EE

Lani Leaves!

Advisor Moves on to Chemistry Department

Lani Stone , the EE undergraduate counselor for the past 2 years, was recently promoted to work as a Senior Academic Counselor in the UW chemistry department. Lani moved to Seattle in 1984 and said she was attracted to Seattle because of its beauty and because it is culturally active. Choosing counseling as a career gave her the opportunity to work with students and a diverse group of people in general. She opted for working at the universting because "It is very stimulating to work in an academic environment." While working in the EE department Lani made a good number of friends with both faculty and students. Many of you may remember Lani as the one who advised you, or gave you one of those prized entry codes, but her job as an advisor was far more involved than you might think. Besides counseling, Ms. Stone was responsible for assisting in the coordination of time schedules, preparing admissions material, analyzing admissions material to see if everything was in order, conducting new student orientations, and a variety of other tasks. Oh, and by the way, she was the one who monitored your progress toward graduation. I guess you could say she was a little bit like Santa Claus, she knew if you'd been bad or good, so you had better been good for goodness sake.

Working in the advising office also provided her with some memorable experiences. One of these events took place on the day entry codes were given out. All day long she heard nothing but the incessant chant of EE372. Some begged and pleaded, while others demanded stating that it was a matter of life and death that they gain entry to this course. That night she had a dream(nightmare) she was in EE372 and couldn't figure out how she was going to pass the course. I told her it could have been worse, she could have dreamt she was in 478(a notoriously tough class). In asking Lani if she had any suggestions for her successor she noted the most important thing is flexibility. Advising means working with administration, faculty, and students and one must be flexible in order to perform his or her job well. As a final note Lani offered this statement:

I learned a great deal while working in the EE department for the last two years and thoroughly enjoyed working with students and faculty. I was truly impressedby the dedication and effort I saw coming from the students. Electrical Engineering is an obviously challenging degree that takes a great deal of effort and perseverance and I respect and admire people that can complete this rigorous program.

Additionally, I am pleased to see women going into the program. I had mixed emotions about leaving my posi-

See Advisor, Page 4

EE479 Deadline February 12, 1992

Students interested in taking EE 479 in Spring 1992 should fill out the course application form available in the EE Advising Office and return it to Advising by February 12, 1992, at 4:30 PM. Complete applications will be evaluated by the instructor based on the criteria available with the application. A list of students admitted (and alternates) will be published February 14 in advance of Spring Quarter registration.

BE AWARE that this course may not be offered in 92-93 because of insufficient faculty resources.

this admission process is necessary because there are often more students requesting the course than can be accommodated given the limited resources available to support the class. Enrollment is limited to 20. Last year 44 students applied.

The course builds on earlier course work - most notably EE 372 - and is designed to proved a quarter-long project experience culminating in the demonstration of a successful prototype system. Students work in two person teams. Projects are selected from a list which includes such perennial favorites as the hot-tub controller, the computerized automobile dashboard, a point-of-sale terminal, and a bank cash machine. Standard single board microcomputer systems (8086 and 68000) are used as the prototype hardware.

This quarter will feature an entirely new workstation environment with HP 9000?400 series machines connected to the department network. In addition, the latest HP emulators have been acquired to support the target processors. Languages supported include assembly and C. Additional hardware resources include a variety of terminals, A/D and D/A subsystems, mag card readers, and various controllable systems.

The focus of this class is software, Students serve as both designers (for their own project) and customers (for another team). They must present an oral design review and produce an extensive report including a User's Manual at the end of the quarter. There are no exams. Weekly team meetings with the instructor are required. Five credits - all design. Not for faint-of-heart!

-EE News thanks Bill Moritz for this announcement

Undergraduate Scholarships

by Bill Moritz, Undergraduate Scholarship Chairman

NOW is the time to apply for undergraduate scholarships for the next academic year. Application forms are now available in the EE Advising Office and the Dean's Office. The deadline for receipt of completed applications is March 1.

While we still do not know exactly how many scholarships we will have to give away next year, this year (91-92) 21 students received awards totaling about $30,000. Some scholarships also include the possibility of summer employment or coop experiences.

Here are some tips to help increase your chances of receiving an award.

1. Fill out the application COMPLETELY. Incomplete applications will not be considered. Make sure to include all relevant transcripts and sign the application.
2. Indicate as explicitly as possible what branch of EE you are pursuing. Examples might be: computer networking, analog electronics, or semiconductor manufacturing. Some scholarships are restricted to students interested in a particular specialty area.
3. Carefully prepare a written statement to include with your application. This ONE PAGE statement of your educational and career goals can be very helpful in matching your interests with those of a donor. The statement should be typed or printed and not contain spelling or grammatical errors.
4. Submit the application by the March 1 deadline.

Selections are based on the information in you application and the criteria for each award. Academic performance, citizenship, financial need, and area of interest are important items.

We hope to be able to announce awards by late Spring Quarter.

This is the last quarter for our distinguished IEEE Officers. Some will return to serve you next year, but others will be moving on to the real world. If you need to know anything (about the department) , please contact them!

IEEE - UW Student Chapter

1991 - 1992 Officers

Chairman	Kathleen Dugan	kate@maxwell.ee
Secretary	Kerry Krell	wert@maxwell.ee
Treasurer	Portia Romero	tia@maxwell.ee
Membership Coordinator	Yasmin Karimli	yasmin
Operations Coordinators	Sue Tseng	sufange@max.u
	Chinh Vu	ccvu@wolf.cs
Publicity Coordinators	Julie Marin	jmartin@maxwell.ee
EE News Editor	Thomas Hall	teej
Graduate Representative	Samir Palnitkar	samir@ranier.ee
ESC, USC representative	Paul Szabo	szabop@maxwell.ee
Faculty Advisor	Dr. Eve Riskin	riskin@maxwell.ee
Office/Lounge	EEB, Room 113	ieee@ee

IEEE NEEDS NEW OFFICERS!

ELECTIONS WILL BE HELD MARCH 2 FOR THE 1992-1993 OFFICES. ALL OF THE ABOVE OFFICES ARE OPEN, AND NEED TO BE FILLED BY NEW, ENTHUSIASTIC STUDENTS. PLEASE TALK TO ANY OF THE ABOVE OFFICERS, OR COME TO THE GENERAL MEETING (FEB 19, 4:00 PM, RM 321) IF YOU ARE INTERESTED IN RUNNING FOR ANY OF THESE POSITIONS. THE PAY IS NOT GREAT, BUT GAINING AN OFFICE LOOKS GREAT ON A RESUME, HELPS YOU BECOME ACTIVE IN THE DEPARTMENT, AND OFTEN GETS YOU GREAT CONTACTS FOR JOBS!

EE Deadlines & Dates!!

If you graduate in June, then the last day to apply for graduation is April 10th! If you graduate in August, but want to walk through ceremonies in June, then get on down to advising before April 10th! Any questions? See Michelle in advising.

ENTRY CODES!!.....Listen Up!!
SENIORS: Entry codes are available at 8:00 a.m. March 18
JUNIORS: Entry codes are available at 8:00 a.m. March 19th

The first day of Spring quarter is March 30th!

Advisor, from page 2

tion in the department but I am sure the next advisor will be great. I would like to offer best wishes to everybody and I inviteyou to drop by and visit me in Chemistry. Lani

- by Greg Green

PAPERCONTEST

Our department has been invited to participate in one of the most important regional paper contests, conducted by IEEE. The purpose is to offer undergraduate students the opportunity to exercise and improve their communication skills. Researching, writing and presenting a paper provides a student with valuable early experience in expressing ideas related to engineering.

All undergraduates are eligible to participate. Papers should cover technical and engineering subjects reasonable within or related to the areas with which IEEE is concerned, and with which you are familiar: either from courses, hobbies summer employment, or other similar experiences. However, you should not let the technical sophistication discourage you, since the paper contest's primary goal is improving your communication skills.

Papers from our IEEE student branch will be judged, with the winner being sent to the Seattle Section "Area Contest" held on April 18th in Seattle, to compete with 14 other schools. The winner of the "Area Contest" will receive $75, second place $45, and third place $30. In addition, the top finalists will enter the "Regional Contest" with schools entering from 4 states: Washington, Oregon, North Idaho and Alaska.

The deadline for submitting your papers is Friday, April 3rd. You may place 3 copies of your paper in the IEEE slot in the lounge. More information about the rules and regulation of this contest is available in the IEEE lounge (EEB Rm 111). If you have any questions, please contact me via e-mail at yasmin@maxwell.ee. *-Yazmin K.*

PUNK SIGNAL PROCESSING? The world awaits to see...

Imagine this: Mom and Dad are leaving for their Saturday evening date... they tell you and your siblings to be good, go to bed early, and be sure to take the TV dinners out at 7. You fake your best smile as they walk out the door, your stomach tingling slightly out of the hunger you're experiencing, but also out of the excitement of the evening which lies ahead. Saturday night with TV dinners, and what goes best with TV dinners???? TV!! Your child-like mind scheming, you envision "The Love Boat" ,'Fantasy Island" ... and maybe even "Saturday Night Live"!! It won't be an early night, come hell or high water! Your siblings proceed to arrange the food tray-tables in a semicircular array approximately 4 feet away from the television, and you race to take the dinners out of the oven at 7. Careful to peal the tinfoil off everything but the cherry pie dessert, your salivary glands are working overtime as you glance at the furiously bubbling turkey gravy and you bring the gourmet feast to the banquet tray-tables. Making sure your brothers and sisters are fastened to their seats, you do the ultimate honor and travel the extra four feet to pull the nob of your entertainment source for the evening, expecting to be greeted by the "Muppet Show" theme song and ever familiar high pitched buzz of the thing warming up. Instead, there is nothing. Nothing! Nothing!?? The evening is ruined!

At least, this is what most of us would think... but this is not how Les Atlas reacted when he was younger. When his parents left for the evening, his father would take out the tubes from the television set, assuring himself that no television would be seen. Professor Atlas proceeded to find Among the multiple musicians who benefitted from his amplified engineering skill, Howie Epstein became the most famous (the bassist for Tom Petty and the Heartbreakers).

Continuing to pursue his interests, Atlas attended the University of Wisconsin at Milwaukee and Osh Kosh for four years and sai "by the time I was 21 years old I realized I wanted to quit being a bum and straighten up...". He transferred to the University of Wisconsin at Madison, where he maintained a 4.0 GPA average, and graduated after 2 years of study with a BSEE. His interests in electrical engineering bloomed in the areas of signal processing and the coding of the ear. Upon graduation, he traveled to Stanford University in pursuit of his Masters and Doctoral Degrees.

At Stanford, Atlas developed his thesis on speech coding for prosthesis for deaf people which he described as "put(ting) electrodes in their ear, and mak(ing) them hear. My goal was to make them understand the speech". This type of research is an ongoing thing, he explained.

Currently, Professor Atlas supports nine graduate and six doctorate students. His research explores "quadratic signal processing for speech, sonar and factory sensor applications". Quadratic signal processing? What the heck is that? He explained that the conventional signal processing algorithms center around the Linear Time Invariant assumption, and the by product of this is that the time and frequency resolutions must suffer a kind-of "trade off". "By deviating from the LTI, you can side step this trade off... and quadratic is the easiest deviation to make." Five years ago, many people thought this was not a plausible and practical approach, but now there is definitely a solid group of followers of this new vision of signal processing, Professor Atlas said.

I asked him if he was the originator of this new approach to signal processing, and his reply was, "well, we thought we were", but Atlas described how Leon Kohn in 1966, a physicist, first created formulations of the general versions of Atlas's theories. Other researchers and theorists have brought a significant amount of insight into the theories, including Professor Marks (two dimensional transform theory) and Jim Kaiser of Bell Laboratories.

Atlas and his group of researchers are working on both the theory and applications of this new type of signal processing. Support of the theory research is supplied by the NSF Presidential Investigator Award. Much of the support of the applications of the theory comes from the Office of the Naval Research, Boeing, and U.S. West Advanced Technologies (for applications of speech coding).

In his spare time, he enjoys keeping his 1974 Jensen-Healey (Lotus engine included) running, taking it up to the mountains, ZZ Top blaring through his (most likely) Hi-Fidelity Stereo, and looking for American Cars to race. He also enjoys to bicycling.

So why is he a professor? He loves to work with students. He teaches EE 443 (design and applications of digital signal processing), EE 518 and 519 (graduate level introductory courses in DSP). He says working with students keeps him "from stagnating" . Also, he can maintain his trouble making rebellious nature, and still receive a salary. He contends that, "with the right kind of actions, being a rebellious trouble maker in research can be one of the best ways to contribute to society."

When asked his opinion of what the future holds in signal processing, he forecasts that "the axioms of Linear Time Invariant Systems (will be) treated as rules to learn and then break." He thinks that these newer forms of signal processing will improve the performance of systems analyzed, and "stepping away from the notion of LTI Systems will allow people to better model the function of the ear and its coding." He believes that the field really needs rebels, those willing to challenge the system and perform research with a different approach... "radical, punk signal processing", says Professor Atlas, is the way to go...

- by Kathleen Dugan

Departmental Activities

Publications:

S. Oh, R.J. Marks II and D. Sarr, "Homogeneous alternating projection neural networks", *Neurocomputing*, volume 3, pp. 69-95 (1991).

L. Tsang, Z. Chen, S. Oh, R.J. Marks II & A.T.C. Chang, "Inversion of snow parameters from passive microwave remote sensing measurements by a neaural network trained with a multiple scattering model", *Proceedings of the 1991 International Geoscience & Remote Sensing Symposium*, 3-7 June 1991, Espoo, Finland.

Z. Li, R. Krishman and R.J. Marks II, "A modularized RNS-decimal number conversion algorithm and its implementation", *Proceedings of the IEEE Pacific Rim Conference on Communications, Computers and Signal Processing*, pp. 319-322, May 9-10, 1991, Victoria, B.C. Canada.

D.C. Park, O. Mohammed, M.A. El-Sharkawi and R.J. Marks II, "Adaptively trained neural networks and the application to electric load forecasting", *Proceedings of the International Symposium on Circuits and Systems*, 11-14 June, 1991, Singapore, volume 2, pp. 1125-1128.

S. Oh, M.A. El-Sharkawi & R.J. Marks II, "Electric load forecasting using an adaptively trained layered perceptron", *Applications of Neural Networks to Power Systems, (Proceedings of the First International Forum on Applications of Neural Networks to Power Systems*, July 23-26, 1991, Seattle, WA, (IEEE Press, pp.3-6).

S. Oh, R.J. Marks II & M.A. El-Sharkawi, "Query based learning in a multiplesed perceptron in the presence of data jitter", *Applications of Neural Networks to Power Systems, (Proceedings of the First International Forum on Applications of Neural Networks to Power Systems)*, July 23-26, 1991, Seattle, WA, (IEEE Press, pp. 72-75).

D.C. Park, O. Mohammed, M.A. El-Sharkawi &R.J. Marks II, "An adaptively trainable neural network and its application to electric load forecasting", *Applications of Neural Networks to Power Systems, (Proceedings of the First International Forum on Applications of Neural Networks to Power Systems)*, July 23-26, 1991, Seattle, WA, (IEEE Press, pp. 7-11).

Short Courses

Neural Networks and Their Applications to Power Engineering, Power Industry Computer Applications (PICA) Conference, Baltimore, MD, May 6, 1991 (R. Eberhart, M.A. El-Sharkawi & R.J. Marks II).

Artificial Neural Networks in Electric Power Systems, Decisions Systems International, Monaco, July 1-3, 1991 (M.A. El-Sharkawi & R.J. Marks II).

Honors

R.J. Marks has been chosen as a 1992 IEEE Distinguished Lecturer.

E.E. News Staff

Editor
Thomas J. Hall

Reporters
Kathleen Dugan
Yazmin Karimli
Greg Green

Thanks to:
Jeff Flaskerude
Bill Moritz
Jay Chang

The EE News is published by the Student Branch of IEEE at the University of Washington, Seattle, WA, U.S.A.

In Memoriam

Clarence E. Douglass, professor emeritus of general engineering, died September 28, at the age of 86. He had served on the faculty for 32 years, till his retirement in 1971.

A native of Zillah, Washington, Professor Douglass studied civil engineering and mechanical engineering at Washington State College, earning a bachelor's degree in 1927. Following several years as a hydrographer for the state of Washington and as a senior engineer for the United States Geological Survey, he returned to WSC and received a five-year normal teaching diploma in 1937.

During his career, Professor Douglass served on many committees in the general engineering department, authored and co-authored several texts on descriptive geometry, and served as course supervisor for engineering graphics. He was a licensed professional engineer and a member of the American Society for Engineering Education.

1989 Events

College Calendar

January	13	All-University Visiting Committee Day
February	19-25	Engineering Week
	22	Engineering Alumni Association Annual Dinner
April	6	Corporate Associates Day
	7-8	Engineering Open House
May	3	Dean's Dinner
	3-4	Visiting Committee
	17	Aeronautics & Astronautics Awards Banquet
June	15-16	Chemical Engineering Reunion

Summer gifts reported

Gifts received by the College between July and September 1988 are listed below, individual gifts over $500 and corporate gifts over $1,000.

Individual Gifts

Apperson, Norman E.
Backlund, Ernest
Beck, William & Victoria
Benjamin, Todd
Church, Stephen & Ceil
Delimitros, Tom & Jeannette
Drowley, Dempster & Sylvia
Geier, Carol & Melton, Ron
Glocking, Teresa
Goddard, Kenneth & Tamara
Harries, Gerald & Virginia
Hawkins, Neil & Ann
Heiser, William & Leilani
Johnston, Welcom (Estate)
Laudan, Phillip
MacNamara, Thomas & Sharon
Purvis, John & Carol
Ratner, Buddy & Teri
Resos, Eugenio
Rohrbaugh, David & Colleen
Sells, John & Carol
Whitmire, Paul M.

Corporation and Association Gifts

American Society of Civil Engineers
Apple Computer
ARCO
Bechtel Foundation
Boeing
Council for Chemical Research
ESCA Corporation
Hewlett-Packard Foundation
Honeywell
IBM
Longview Fibre
Microsoft
Minnesota Mining & Manufacturing
Perkin-Elmer Corporation
Physio-Control
Prosthetics Research
Puget Sound Power & Light
Rockwell International
Shell Development Company
Shell Oil Company Foundation
Soros Foundation
SSC, Inc.

Deadline

Deadline for the December **data** is November 31. Please send or telephone news items to Ann McCreary, 13 Engineering Library, FH-17, 3-2520.

data

College of Engineering, University of Washington/November 1988

$5 million gift from Lyla Fluke announced at WTC groundbreaking

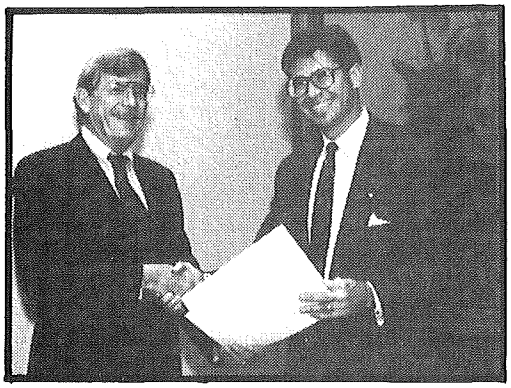
The John M. Fluke Endowed Technology Fund has been established with a gift of $5 million to the University from Lyla Fluke. Announced at the October 13 groundbreaking ceremony for The Washington Technology Center facility, the gift will be used for faculty or graduate student support, equipment purchases, technology transfer, or other activities that involve the University and the WTC. The new WTC facility, to be completed in 1990, will be named the John M. Fluke Hall in recognition of the gift.

Lyla Fluke receives a photo montage from UW President William Gerberding at the WTC groundbreaking ceremonies.

The building will house both research laboratories and administrative offices for the five-year-old center, which to date has operated without a centralized facility. The WTC was created by the Legislature to encourage statewide collaboration among academic and industry experts in science and engineering, to promote research, and to stimulate technology transfer from the state's research universities to the private sector.

A strong supporter of the College of Engineering and the WTC, the late John M. Fluke, Sr. was an electrical engineering graduate of the University and founder of the Everett-based John Fluke Manufacturing Company.

Grant from ARCO to increase support for minority freshmen



Dean Ray Bowen accepts a grant of $47,800 from Charles Helget, ARCO's director of government/public affairs Northwest.

Thanks to a $47,800 grant from the ARCO Foundation, the Minority Engineering Program (MEP) will initiate a mentoring program for entering freshmen, and expand tutorial services and adjunct class instruction. "The ARCO Foundation grant will enable MEP to assist students in a significant way during the freshman year, usually the time of highest attrition," says Cheryl Berg, director.

This year, MEP counts nearly 80 freshmen in the program. These students will be paired with more advanced MEP students, who will provide tutoring, counseling, and personal support. The mentoring program will be developed and managed by a minority graduate student.The College was one of 24 U.S. colleges and universities to receive ARCO Foundation funding to recruit and retain minority students.

NSF awards $230,000 for Washington MESA middle school program

Washington MESA received $230,000 from the National Science Foundation for the second year of the "Washington Middle School Engineering Program" grant, according to Patricia MacGowan, director, MESA statewide. The grant is designed to enhance mathematics and

Engineering Information Services, FH-17; Ann McCreary and Carol Weiland, co-editors

science curricula in middle schools and provide support for teachers to work with engineers in developing hands-on projects. Project key staff include MacGowan, Thomas Stoebe, professsor and chair, MS&E,and Nancy Cook, MESA state coordinator.

MacGowan recently attended the National Association of Pre-College Directors (NAPD) regional seminar, where she presented four outstanding teaching awards. The seminar, held in Chicago, October 17–18, focused on the theme of enriching mathematics and science education through school, college, and industry collaboration.

Peden named NRC commissioner, ABET Fellow, NASA advisor

Irene Peden, professor, EE, recently received three separate appointments in national organizations. She has been named to the Commission on Engineering and Technical Systems (CETS) of the National Research Council (NRC). CETS is the largest of the 16 commissions that comprise the basic operating units of the NRC, whose role is advising government agencies.

Peden has been elected a Fellow of the Accreditation Board for Engineering and Technology (ABET), one of 44 members of the first such group in ABET's history. The new Fellows will be inducted at the December 2 meeting of the ABET Board of Directors in Washington, D.C.

Peden is also a member of the NASA Space Station Crew Selection Advisory Panel. The panel establishes criteria and guidelines for the selection of astronauts who will work together in larger groups and for longer periods of time in space than has been the case in previous phases of the U.S. space program.

Council for Chemical Research elects Sleicher to Governing Board

Charles Sleicher, professor and chair, ChemE, has been elected to the Governing Board of the Council for Chemical Research. The Council is an organization founded in 1980 to support university research in chemical sciences and to promote better communication, understanding, and cooperation between the chemical industry and chemistry and chemical engineering departments in research universities. Its membership consists of the chairmen of chemistry and chemical engineering departments throughout the country, and corporate representatives from the chemical industry.

Heideger assumes advising center directorship

William Heideger, professor, ChemE, was appointed director of the engineering advising center at the beginning of Fall Quarter. Heideger succeeds Robert Joppa, who became professor emeritus of aeronautics and astronautics upon his retirement last June.

Marks is first honorary member of Puget Sound Optical Society

Robert J. Marks II, professor, EE, has been awarded the first Honorary Membership in the Puget Sound Section of the Optical Society of America for "his efforts in founding the Puget Sound Section and his excellent performance as the section's first president." The award was made by current President R. Aaron Falk, of Boeing Aerospace, at the Section's bimonthly meeting on August 2.

Bollard serves as secretary of faculty

President William Gerberding has appointed John Bollard, professor, A&A, as secretary of the faculty. Bollard will act as a liaison between faculty and the administration and as an advocate for the faculty. Chair of the department of aeronautics and astronautics from 1961 to 1976, Bollard will continue teaching courses in the department.

Wenk lectures nationally, advises NASA, Congress

Ed Wenk, Jr., professor emeritus, CE and public affairs, was recently named to two lectureships. As First Stuckenberg Distinguished Lecturer on Technology and Human Affairs at Washington University, St. Louis, he spoke on the "Politics of Technology and the Technology of Politics," October 17. Wenk has been appointed Regents Distinguished Lecturer for 1989 at the University of California at Berkeley.

In addition to lecturing this year at colleges, corporations, and professional societies across the country, Wenk has been serving as advisor to NASA on economic benefits of the U.S. space program, and advisor to Congress on technological issues of the next century. He has also been commissioned by *Encyclopedia Britannica* to rewrite the extensive entry on "Engineering," for its next edition, to be published in 1989.

data

College of Engineering, University of Washington/November 1987

At the eighth annual Engineering and Science Career Day, October 22, in the HUB Ballroom, about 1500 students met with professionals from industry to get a firsthand look at career opportunities. Forty-six corporations and organizations participated.

Aksay garners international ceramics award

The Richard M. Fulrath Award of the American Ceramic Society (ACerS) has been granted to Ilhan Aksay, professor, MS&E. The Fulrath Awards are presented each year to one American and three Japanese ceramists, with the purpose of fostering the development of discussions, goodwill, and friendship between Japanese and American ceramic scientists.

The awards are made in conjunction with a Memorial Symposium, both of which honor a former professor of ceramic engineering at the University of California, Berkeley, who developed a strong rapport and understanding with the Japanese ceramic community. The program is administered by the ACerS Northern California Section and the materials science and mineral engineering department at Berkeley.

Fulrath awardees, chosen by a Japanese committee and an American committee, spend time in each other's countries exchanging ideas and information and take part in Ceramic Society functions in the host country. Each of the 1987 award recipients spoke at this year's Memorial Symposium, which was held October 29 at Berkeley, before the section meeting, and repeated November 2 in San Diego, at the ACerS Pacific Coast Regional Meeting. Aksay's topic was 'Microdesigning of Ceramics with Colloids.'

BioE to celebrate 20th anniversary, November 23–24

The center for bioengineering will mark its twentieth anniversary later this month with a two-day celebration that will include the inaugural lecture in the recently established Robert Rushmer Lectureship series.

On Monday, November 23, a luncheon will be held for faculty, students, staff, and friends of bioengineering, at the Urban Horticulture Center. Following the luncheon, a presentation is scheduled for industrial affiliates and other off-campus visitors, on new directions in bioengineering research.

Monday's activities will be capped by the first Rushmer Lecture, to begin at 4 p.m., in Hogness Auditorium, Health Sciences Center. David Auth, director, Biophysics International, and affili-

Engineering Information Services, FH-17; Carol Weiland, Editor

ate professor, BioE, will speak on 'The Fantastic Voyage of Catheter Based Surgery.' The public is invited to attend, and admission is complimentary. A reception will follow in the Health Sciences lobby.

Tuesday's program will consist primarily of student and faculty meetings with David Auth. For further information, please call the bioengineering office, 5-2000.

Stensel honored for best paper on water pollution control

The 1987 Harrison Prescott Eddy Award, of the Water Pollution Control Federation, was presented to H. David Stensel, professor, CE. The federation grants the award each year, to the author of the best research paper published in its journal the previous year. Stensel's paper was entitled, 'Aeration and Substrate Utilization in a Sparged Packed Bed Biofilm Reactor.'

Marks heads local Optical Society chapter; chairs IEEE committee

The Puget Sound Chapter of the Optical Society of America has been officially chartered by the national chapter of the Optical Society of America. The founding officers are Robert Marks, professor, EE, serving as president; Leung Tsang, professor, EE, serving as secretary-treasurer; and R. Aaron Falk of Boeing Aerospace, serving as president-elect.

Marks has also been named chairman of the newly formed IEEE Circuits and Systems Society's Technical Committee on Neural Computing. A June conference in San Diego on neural networks, held in cooperation with the Circuits and Systems Society, drew over one thousand participants, with the conference proceedings filling four volumes.

Bruckner presents paper, survives hurricane at Brighton conference

Reporting on a conference he will never forget, Adam Bruckner, research associate professor, A&A, recently informed **data** of his participation in the 38th Congress of the International Astronautical Federation, October 10–17, in Brighton, England. Bruckner presented a paper on the 'Ram Accelerator Direct Launch System for Space Cargo,' based on work he has been doing for NASA as part of the NASA/University Space Design Project and a separate research grant.

The last day of the meeting was cancelled because of the hurricane that ripped through southeast England the morning of October 16. Bruckner says the storm, the strongest to hit Britain since 1703, arrived about 2:30 a.m. with 100-mile-an-hour winds that caused power outages, breaking glass, and crashing furniture at the 114-year-old clifftop hotel where he was staying. Fortunately, the building was still standing when the storm abated four hours later, unlike countless trees and many houses and other structures throughout the region. The hurricane caused 17 deaths in England and over a half billion dollars in damage.

September Gifts to the College

Donations or endowments to the College during September—individual gifts over $500 and corporate gifts over $1,000—are listed below.

Individual Gifts

Beard, Samuel J.
Hornbeck, Robert & Nadean
Jensen, James H.
Mehegan, James M.
Myers, Dale & Marjorie
Rohrbaugh, David & Colleen
Scott, William D.
Weber, James & Marilyn
Whittemore, O.J. & Barbara

Corporation and Association Gifts

Church & Dwight Co., Inc.
Cray Research
ESCA
IBM
Physio-Control
Seattle City Light
Shell Companies Foundation
Structural Engineering Association
TRW Space & Defense
Weyerhaeuser Foundation

Bradt lectures at AMTU

Dick Bradt, Kyocera Professor of Ceramic Engineering, presented an invited lecture, 'Considerations for Design of and Design with Ceramic Materials,' at an annual conference on design with advanced materials. Hosted by the Advanced Materials Technology Unit (AMTU) of Queen's University, the conference took place in Kingston, Ontario, Canada, October 7–8.

Taya coordinates ASME composites symposium

Minoru Taya, associate professor, ME, is organizing a symposium on 'Performance of Composites in Severe Environments,' for the American Society of Mechanical Engineering Winter Meeting, December 13–18, Boston. Thirty-one technical papers and two keynote speeches will be presented at the symposium.

Co-op and STC granted funds for database system

A database management system for the engineering cooperative education and minority internship program will soon be installed, thanks to a grant from the U.S. Department of Education in the amount of $61,600 for the first year, with the possibility of renewal for a second and third year.

The system—consisting of five IBM PS/2 microcomputers and three printers, connected by a local area network, and using a database software package—will automate much of the office's routine paperwork, and help co-op staff make more precise matches between student applicants and potential employers. It will also allow students to enter their resume information into the system and conduct their own searches for suitable employers.

David Farkas, associate professor, STC, is principal investigator for the grant; he wrote the proposal with the help of Helene Beaver, director of the co-op and minority internship program, and Jim Mock, computer support services manager. In addition to providing a more labor-saving operation for co-op, the database management system will give STC graduate students an opportunity to conduct research on the computer-human interface.

Instrumentation grants awarded for use in composites research

Two instrumentation grants were recently awarded to faculty in mechanical engineering and materials science and engineering. Albert Kobayashi, professor, and Minoru Taya, associate professor, ME; and Richard Bradt, Kyocera Professor of Ceramic Engineering, received a Department of Energy Research Instrumentation Grant in the amount of $235,291, including UW matching funds. The grant will be used to build a high-temperature impact testing system and to purchase a scanning electron microscope and a general purpose coating device. The testing equipment will be used to characterize the mechanical properties of advanced materials, including high-temperature composites in severe environments.

Kobayashi and Taya have also been awarded an NSF Equipment Grant of $115,291, including UW matching funds, for the purchase of an ultra high speed camera. The camera will be used for assessing the fast fracture process in composites.

Control theory expert to present Walker-Ames Lecture, November 18

'Automation and Optimization' will be the title of a public lecture, sponsored by the University's Walker-Ames Lecture Series, to be presented at 8 p.m., Wednesday, November 18, at 220 Kane Hall, by Arthur Bryson, a world leader in the development and application of engineering control theory. Bryson is the Paul Pigott Professor of Engineering in the departments of aeronautics/astronautics and mechanical engineering at Stanford University.

Author of more than a hundred technical papers on fluid mechanics, flight mechanics, and automatic control, Bryson also wrote **Applied Optimal Control**, the standard reference in the control field. He is a fellow of the American Institute of Aeronautics and Astronautics, and of the American Academy of Arts and Sciences, as well as a member of both the National Academy of Engineering and the National Academy of Sciences. His appointment in 1985 as the AIAA Dryden Lecturer is a tribute to his ability to present a mathematically complex subject in simple, meaningful terms.

Bryson is a Walker-Ames Professor through the department of applied mathematics.

Calendar of Events

November	**14**	UW Alumni Event at UCLA
	23	Robert F. Rushmer Lecture by David Auth, 'The Fantastic Voyage of Catheter-Based Surgery,' 4 p.m., Hogness Auditorium (see p. 1)
February	**22–26**	Engineering Week
	24	Engineering Alumni Banquet
March	**3**	Vistas Lecture by Robert Marchessault

Deadline

Deadline for the December **data** is November 24. Please send or telephone news items to Carol Weiland, 13 Engineering Library, FH-17, 3-2520.

[ ]
Newsletter of the Puget Sound Section
of the Optical Society of America

EDITOR'S COLUMN

This is the second issue of the newsletter of the Puget Sound Section of the Optical Society of America. The blank between the brackets is the newsletter's name: we don't have one yet. But we're working on it, as the Message from the President shows. The logo on the back of the folded newsletter is from Donald C. O'Shea's text Elements of Modern Design, John Wiley & Sons, 1985, p. 120 Fig. 4.1.

Our October 8 Meeting program features Emil Wolf. The excerpt from Optics News about him was contributed by Aaron Falk, our President-elect.

It is a pleasure to share with you all the official letter of recognition for our Puget Sound section from the Optical Society of America headquarters. The gavel has arrived and was used enthusiastically at the August meeting.

Ted Houk, Editor

Message from the President:

The OSA National Meeting is coming up the week of October 19th in Rochester. At these annual meetings, local sections get together to discuss things. Exactly what, I'm not sure. The high frequency of other travel and commitments to a wife and three children have led me to decide not to attend this gala celebration. Dr. Ted Houk, our esteemed newsletter editor, has agreed to represent our section at the Rochester meeting and report to us the happenings. Thank you Ted.

Shira Broschat, the elected student representative of our local section, pointed out that our menu announcement for the Emil Wolf dinner meeting included pork *lion*. Yes ... it's a misprint. We're having the less exotic dish of pork *loin*. The prospects of having Wolf, lion and mouse at the same dinner, however, remain quite intriguing. Speaking of which ... if our menu offends your dietary traditions, vegetarian dishes are available. Just inform the person from whom you buy the ticket.

This, I believe, will be our last newsletter without a name. We'll decide the name at our next meeting. I personally favor *Sound Optics* because it's a pun with three levels of meaning. *Light Reading* and *Emerald City Optik* are also good. Or how about *Sound Light Reading*? Let's take nominations and vote on it next time we see each other.

Aaron Falk is approaching some superb speakers for our December meeting. We're considering putting a pinch of Christmas in that meeting by having an unorthodox present exchange during the dinner. And no ... I will not be talked into playing Santa Claus.

I must go now. There is a nibble on my line.

Robert J. Marks II

Emil Wolf elected OSA honorary member

Emil Wolf, professor of physics and professor of optics at the University of Rochester, has been elected an honorary member of the Society in recognition of his "preeminent service in the advancement of optics." Wolf, who has been involved in the field for nearly 40 years, is known primarily for his work in electro-magnetic theory and physical optics, especially diffraction and the theory of partial coherence.

Emil Wolf

An OSA fellow and former Society president, Wolf is also the recipient of this year's Max Born Award for works dealing with the theory of partial coherence in the space-frequency domain, scattering and inverse scattering, phase conjugation, radiation, and radiometry.

After completing his studies at the University of Bristol and the University of Edinburgh, Wolf began his career at Cambridge University as a research assistant, then became Max Born's research assistant at the University of Edinburgh. Later, Wolf and Born coauthored *Principles of Optics*, one of the best-known optics textbooks.

In addition to nearly 200 published papers, Wolf is editor of *Progress in Optics*, a series that began in 1961. He is also a member of the Advisory Editorial Board of *Optics Communications* and the Editorial Board of *Advances in Optoelectronics*.

A native of Prague, Czechoslovakia, Wolf has taught at the University of Rochester since 1961, except for one term as visiting professor at the University of California at Berkeley and another at the University of Toronto. He was recently named the Wilson Professor of Optics at Rochester.

Wolf was the 1977 recipient of the Frederic Ives Medal, OSA's highest award for overall distinction in optics. Beyond honors bestowed by the Society, he received the Franklin Institute's Albert A. Michelson Medal in 1980 and is a fellow of the American Physical Society, the British Institute of Physics, and the Franklin Institute, and an honorary member of the Optical Society of India.

Wolf's election to honorary membership in OSA will be formally acknowledged in a presentation at the Society's annual meeting in Rochester this October.

Student Profile:

Name:	William H. Nicholls
Citizenship:	United States
Areas of research interest:	VLSI Design and Test
Present area of research:	VLSI Design and Test
Degrees obtained:	B.S.E.E., M.S.E.E.
Current degree program:	Ph.D. in E.E., U.W.
Expected date of completion:	December 1988
Future plans or goals:	Research and Development
Favorite novel(s):	Dune et. al, Tolkien trilogy
Favorite movie(s):	Blade Runner, Brewster McCloud
Favorite food(s):	Curried food, lasagna, Thai food
Favorite music:	Folk, classical, rock, punk, Balkan
Favorite city/cities:	Seattle
Hobbies:	Reading, dungeoning, hacking
Languages:	English, Scheme, C
Special skill(s):	PC Wizard
Favorite fantasy:	Design (and drive) the first space car.

OPTICAL SOCIETY *of* AMERICA

EXECUTIVE OFFICE
1816 JEFFERSON PLACE, N. W.
WASHINGTON, D. C. 20036
202—223-8130

May 6, 1987

Robert J. Marks, II
President Pro Tem.
Dept. of Electrical Eng., FT-10
University of Washington
Seattle, WA 98195

Dear Robert:

On behalf of the Board of Directors of the Optical Society of America, congratulations to you and the other officers and members of the new Puget Sound local section upon being officially recognized as a local section of the Optical Society of America. The Board approved your constitution on May 2, 1987. I will order for your local section an engraved gavel, to be passed on from president to president.

Please note that regular correspondence from our office will go to your local section secretary, currently Leung Tsang. It is his responsibility to appropriately share these materials to other officers and section members.

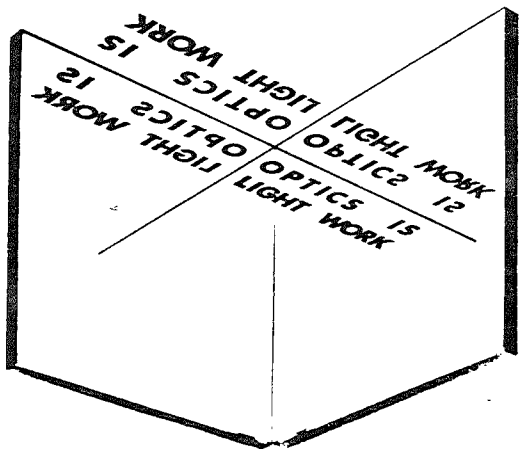
Once again, congratulations on becoming the 27th local section of the Optical Society of America.

Sincerely Yours,

William A. Borrelle
Technical Activities Manager

WAB/lse
05067mar

cc: Paul S. Angello
Leung Tsang



The trend in Engineering

University of Washington

Volume 39, Number 1, Spring 1988

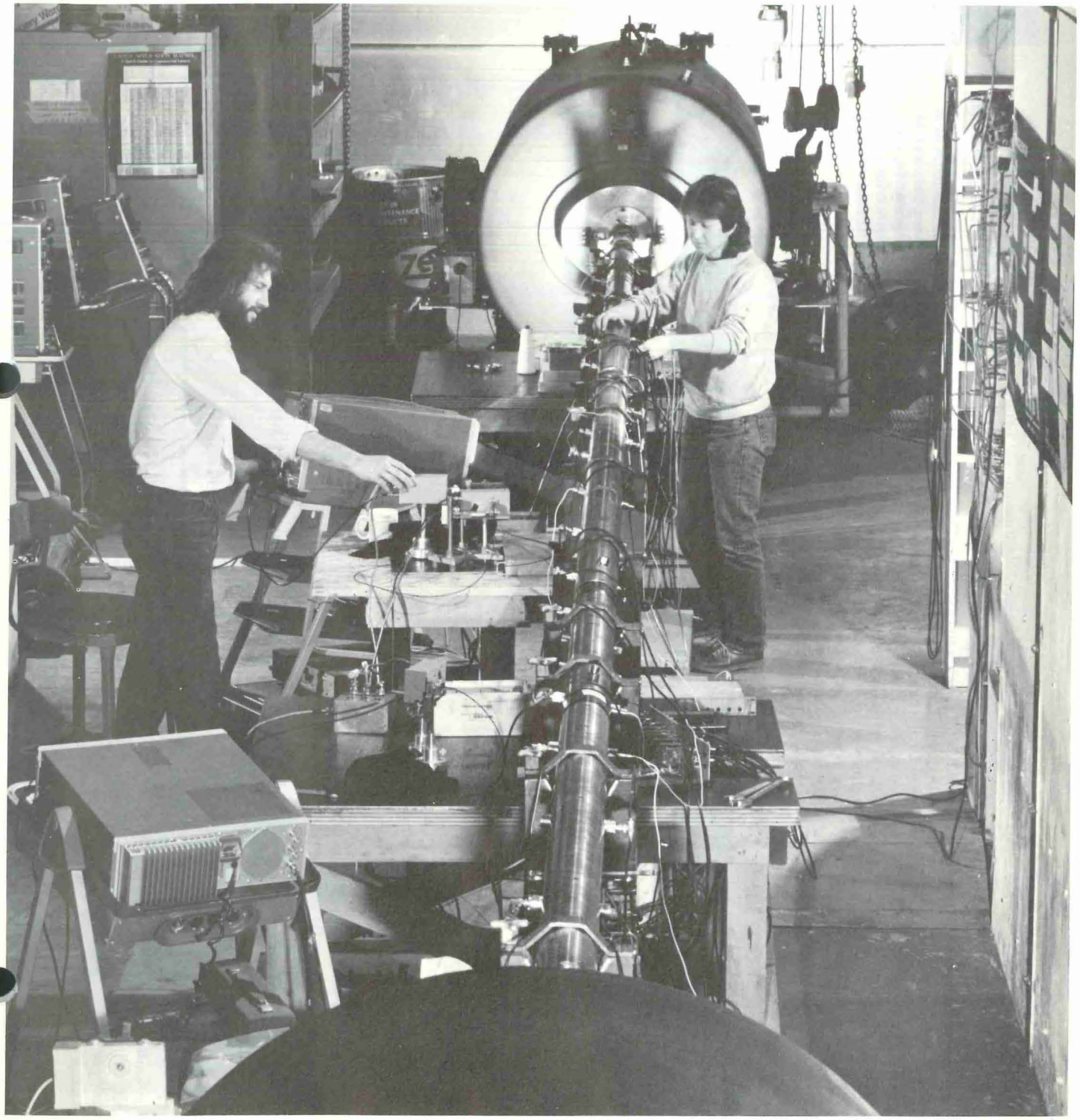


Photo Mary Levin

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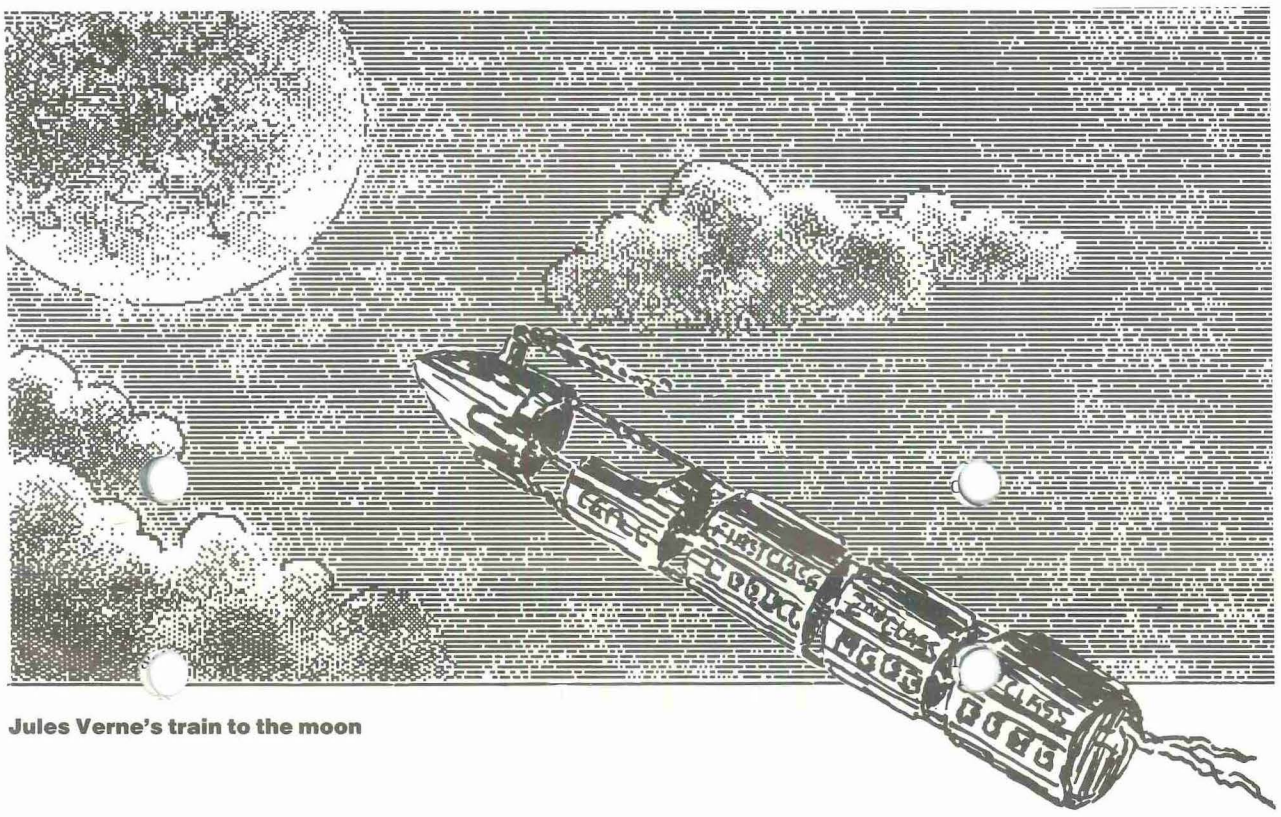
Ram Accelerator: space launch system of the future

by Mary Cooksey



Jules Verne's train to the moon

At first glance, the ram accelerator in the aerospace and energetics research laboratory (AERL) looks like an incarnation of the "big gun"created by Jules Verne in his story, *From the Earth to the Moon*. In Verne's 1904 story the hero, Impey Barbicane, came up with a splendid idea—to send a "trainload" of people up to and around the moon, using an enormous buried gun.

The shot to the moon in the story was successful, with the projectile containing the people, including Barbicane, returning to earth unharmed. In real life, of course, neither the projectile nor the passengers could have survived even the launch, let alone re-entry.

Nevertheless, the idea of shooting a projectile into space remains, and is, in a way, being realized here at AERL. The ram accelerator is not a gun and will not carry people, but it is a radical new method of sending acceleration-insensitive payloads into space, that is, payloads that don't deform under high launch acceleration. The accelerator was conceived, and a laboratory scale version built, by a group in the Aerospace and Energetics Research Program (AERP). The group, includes Abraham Hertzberg, director of AERP; Adam Bruckner, research associate professor of aeronautics and astronautics; David Bogdanoff, research engineer (now working at NASA Ames), and nine graduate students.

Sending people and delicate instruments into space requires protecting them from the forces necessary to launch and enter into orbit. A rocket such as the space shuttle must be designed to protect its contents and must carry all its own fuel and oxidizer. Because of this load, only a small fraction of a rocket's space is available to carry payload. Consequently, carrying anything on the space shuttle is very expensive—approaching several thousand dollars per pound. Payload costs using the ram accelerator would be significantly less, perhaps below $100 per pound, according to the AERL group.

Because 70 - 80 percent of all the supplies needed for building and maintaining a large, permanent space infrastructure are acceleration-insensitive, the ram accelerator is the perfect option for delivering these materials into space. "We need," says Hertzberg, "a 'pipeline' to carry insensitive loads into space, loads that can survive 1,000 times the force of gravity (or 1,000 gs), such as, water, fuel, raw materials, and food—even Campbell's chicken soup."

In operation, the accelerator will be a 4 kilometer-long tube through which a 2,000 kilogram payload-bearing projectile is launched into space. Using the controlled release of chemical energy, the ram accelerator operates on a propulsive cycle similar to that of a conventional ramjet engine, but it is unlike any ramjet ever flown. A conventional ramjet looks like a stovepipe, with a sculptured centerbody attached to an outer cowling, and it must be moving through air to operate; the air scooped up by the ramjet is ram-compressed inside the engine (hence the name ramjet). When fuel is added and burned, a high velocity exhaust jet is produced which creates forward thrust.

The ram accelerator resembles a ramjet, in which the centerbody has been detached from the cowling and the cowling has been lengthened into a long stationary tube. The centerbody, which is now the projectile, flies through the tube (see diagram, page 11). Bruckner explains, "It's a traveling centerbody in a very long cowling. The same forces (as in a ramjet) are at work, but there is no fuel on board the projectile. The fuel and oxidizer, both gaseous, are premixed and fill the entire length of the tube. As the projectile travels through the tube, the combustible gas mixture burns behind the projectile, creating forward thrust."

Originally, the concept was called the ram cannon, but the group changed the name to ram accelerator to avoid any misconception. The accelerator is *not* a gun. A gun doesn't efficiently couple energy from

to page 11

In Brief

The artificial neural network concept is a hot topic in science and industry

A computer that can recognize and classify everything from bushes to voices is fast becoming reality. Using sophisticated techniques in optics and speech recognition, UW researchers are "wowing" their supporters with impressive neural net performance. See story on page 4.

Department of Energy forges closer ties with the University

D.O.E.'s Pacific Northwest Laboratories, with Battelle Memorial Institute, and the University of Washington are beginning a new era of mutual cooperation in the interests of improved interdisciplinary research efforts. For details of a new agreement see story on page 9.

Distinguished alumnus, Carl Hansen, featured in alumni profile

As a globe-trotting trouble-shooter, Carl Hansen can be found assessing earthquake damage in Peru one day and repairing a fire damaged U.S. Embassy in Moscow the next. His career is highlighted on page 10.

Benjamin Linder engineering scholarship supporters hope for $50,000 endowment

The first scholarship in memory of Benjamin Linder was recently awarded to a graduate student in civil engineering. A number of groups have combined their efforts to build an endowment in support of the scholarship. Story on page 10.

College Calendar

Friday, May 6	Golden W Reception*
Thursday, May 19	Vistas Lecture Mr. Dale Myers, NASA 210 Kane Hall, 7:30pm
Thursday, May 19	Corporate Associates Day 5:00 dinner
Saturday, October 29	Engineering Alumni Association Homecoming Reception*

*Call Jerry Ann Graham for details, (206) 543-0167.

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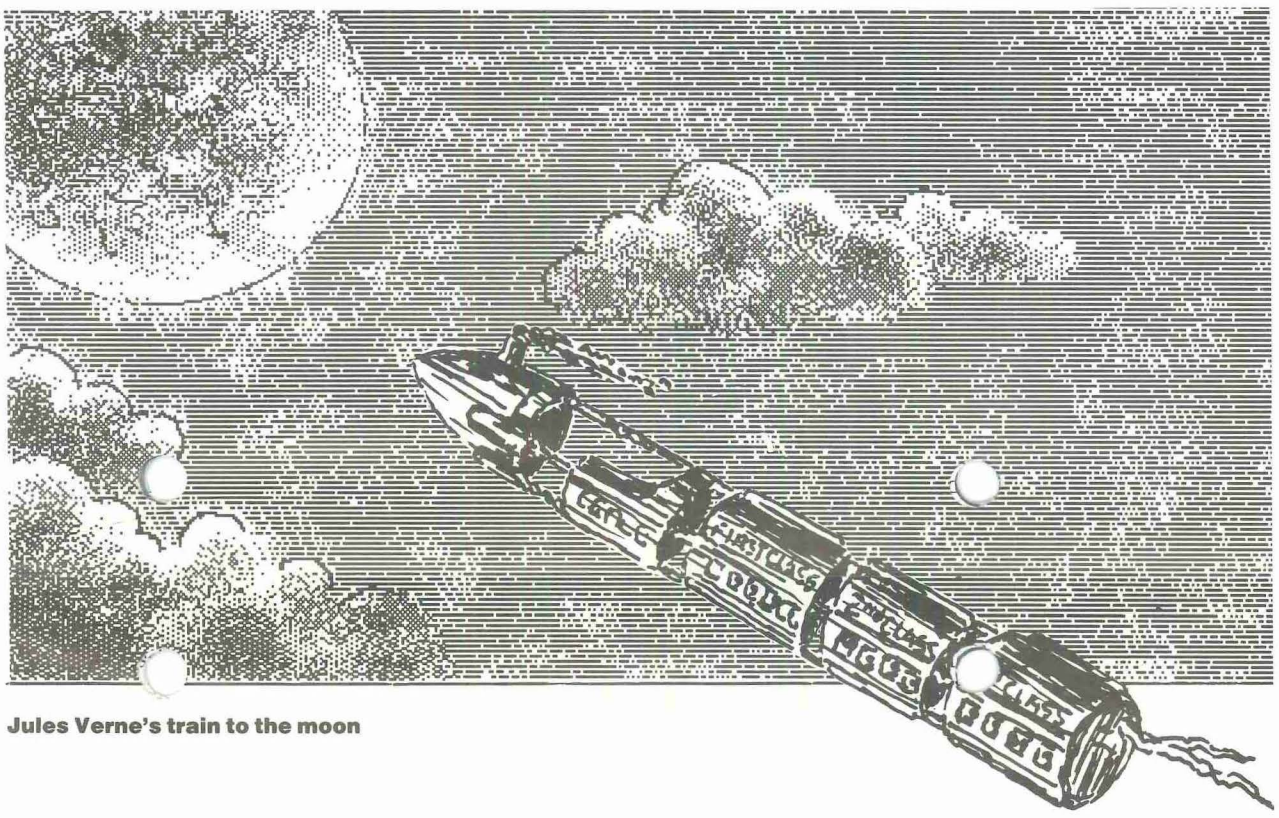
by Mary Cooksey



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As a globe-trotting trouble-shooter, Carl Hansen can be found assessing earthquake damage in Peru one day and repairing a fire damaged U.S. Embassy in Moscow the next. His career is highlighted on page 10.

Benjamin Linder engineering scholarship supporters hope for $50,000 endowment

The first scholarship in memory of Benjamin Linder was recently awarded to a graduate student in civil engineering. A number of groups have combined their efforts to build an endowment in support of the scholarship. Story on page 10.

College Calendar

Friday, May 6	Golden W Reception*
Thursday, May 19	Vistas Lecture Mr. Dale Myers, NASA 210 Kane Hall, 7:30pm
Thursday, May 19	Corporate Associates Day 5:00 dinner
Saturday, October 29	Engineering Alumni Association Homecoming Reception*

*Call Jerry Ann Graham for details, (206) 543-0167.

Industry leaders appointed to Visiting Committee

Valued advisors to the College

Robert V. Myers serves as chair of the 1987-88 Visiting Committee Photo David Spengler

The College of Engineering Visiting Committee comprises 36 men and women. These honored individuals, nominated by the College as leaders in the profession of engineering, are appointed by President Gerberding to serve as advisors to the College. Upon their appointment, members are asked to attend at least two quarterly meetings of the Visiting Committee and additional subcommittee meetings dealing with special topics.

The 1987–88 Visiting Committee is chaired by Puget Sound Power & Light Sr. Vice President Robert V. Myers. "I think that the Visiting Committee works as well as it does because it is such a diverse group," says Myers. "We not only have a lot of players from the region but we also have people of national stature who are willing to come and participate in this process: Gerald Harries from IBM in California; Harold Forsen from Bechtel in California and Klaus Mai, from Shell Oil in Texas, to name a few. There must be a sense of accomplishment derived from serving on this committee or you wouldn't have these kinds of people willing to devote their time (and their company's money) to come and participate.

"The other reason that it is fun to get involved," says Myers, "is the meaningful role this committee plays with respect to the College. You get the feeling, when you are involved with Dean Bowen and his staff, that you are getting a full understanding of what is happening in the College and what its problems are. Your input is not only solicited, but it is also valued.

"I have a lot of respect for Dean Bowen. I see Ray as an example of a fundamental change in the role of the Dean. Nowadays, a dean must not only be technically qualified and esteemed by his peers, but needs to understand the political process, particularly in a state like Washington where so much of our funding comes from the legislature.

"Ray is a new kind of dean in that respect. I am always amazed at his judgment when we talk about what needs to be done. He and his advisors are pretty accurate in their appraisal of whether it is time to solicit assistance from the visiting committee to go down to Olympia and meet with individual legislators, or whether it is time to just let the process work. Fundamentally it is Ray's ability to deal with people and his understanding of the political process that makes everything work."

For 1987–88, the visiting committee is structured into four sub-committees. The Directions in Engineering Education Committee, chaired by Donald C. Wilson, executive vice-president, Pacific Northwest Bell, will be examining the College's curriculum in view of its primary role in training world-class engineers. The Strategic Planning–Facilities Committee, chaired by J. Charles Preble, vice-president of operations, Honeywell, Inc., is concerned that the College's buildings and laboratories have not kept pace with technological change. This committee will look at needs and priorities in the context of the University's facilities planning and projected state appropriations and other funding sources.

The International Collaboration Committee, chaired by Charles H. Knight, Jr., president and CEO, Concrete Technology Corp., will examine the issues of international transfer of science and technology, and aid the College in developing avenues for mutually beneficial exchange. Finally, the Development Committee, under the leadership of John M. Fluke, Jr., CEO and Chairman, John Fluke Mfg. Co., Inc., will continue to assist the College in its fund raising efforts.

What motivates a busy executive like Bob Myers to sacrifice time and energy to serve on the visiting committee? He explains the obligation that remains for all engineering graduates: "We didn't even come close to paying the full cost of the education we received. It was expensive to educate engineers when I graduated, and it is a lot more expensive now. Those of us who get into a position to put something back into our college or university need to do that. It can be done through service to the university or through the donation of cold hard cash. There are lots of opportunities for people to do one or the other—hopefully both."

And for every individual serving on the visiting committee, there is usually a corporate commitment involved as well. "Companies like Puget Power need the products a university turns out: highly skilled graduate engineers and high caliber research," says Myers. "The people who serve on the visiting committee are highly placed people in their corporations. I think that they represent, as I do, their corporation's commitment to putting something back into the university which serves their needs."

University of Washington
Engineering Alumni Directory

The 1988 UW College of Engineering Alumni Directory is available for distribution. Approximately 23,000 alumni are listed alphabetically and cross referenced by degree and year of graduation. A list of the current faculty is also included.

The bad news is—only a very few books remain for sale. To order your copy send a $20.00 check to the UW Alumni Association, Engineering Directory, 1415 N.E. 45th St., Seattle, WA 98105, or call 1-800-UWAA and charge to VISA or Mastercard.

The trend in Engineering

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Seattle, Washington 98195

The **Trend in Engineering** *is published twice yearly by the College of Engineering at the University of Washington to reflect its teaching research, and community-service activities.*

Dean of the College of Engineering . . . . . *J. Ray Bowen*

Director, Engineering Information Services . . . . . *David P. Spengler*

Co-Editors . . . . . *Mary Cooksey*
. . . . . *Annalise Dickey*
. . . . . *Sharon Kasper*
. . . . . *Carol Weiland*

Congratulations to **Irene Peden**, professor of electrical engineering, who was recently named a Fellow of the American Association for the Advancement of Science (AAAS). After finishing her doctoral studies she came to work for the UW and became the first female professor hired by the College of Engineering. She is also the first American woman engineer to do field work in the Antarctic interior.

The 1988 Haraden Pratt Award for leadership and outstanding contributions to the Institute of Electrical and Electronics Engineers (IEEE) will be presented to Peden on May 9 in Boston at the IEEE Awards and Medals Presentation. For 1988, she is also serving as the Vice President and President-elect of the IEEE Antennas and Propagation Society.

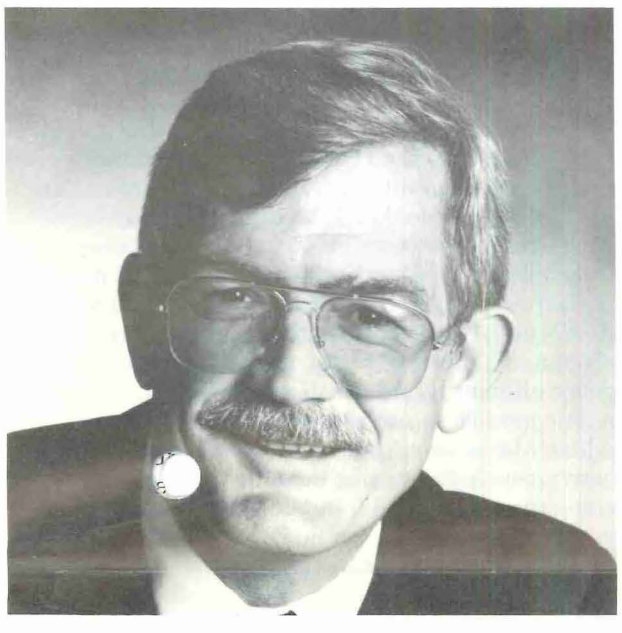
Among her many affiliations, Peden is a Fellow of the IEEE and a Fellow of the Explorers Club. She is also a member of the Defense Science Board and the board of directors for BDM International Corporation.

Peden specializes in the applications of electromagnetics to geophysical problems including subsurface scattering and antennas, and tunnel detection. Using radar signals, she is learning as much as possible about what exists below the earth's surface. Her pioneering work conducted near the South Pole focused on radio wave propagation at low frequencies. That data was used to study the ice sheet and the rock beneath the ice.

Irene Peden

A letter from the dean

Increased enrollment: a social imperative



Dear Friends:

Within the engineering community there exists an increasing concern over the decline in undergraduates enrolling in engineering studies. From roughly 1973 through 1983, engineering enrollment increased dramatically each year, and the number of bachelors degrees awarded in engineering almost doubled, reaching 78,000 in 1986. Over the next decade and perhaps even beyond, there is a likelihood that engineering enrollment and undergraduate degrees granted will continue to decline, unless current trends are reversed.

The reasons for this pessimistic outlook are partly demographic. The 18–22 year age pool peaked in 1983 and a year-to-year drop in freshmen enrollment began, which will affect the number of degrees awarded in 1987 to 1988. Based on current K-12 enrollments, one may expect the decline to continue through the beginning of the 21st century, if roughly the same fraction of high school graduates opt for engineering study.

Another reason to anticipate a continued decline in the award of engineering degrees is the changing attitudes of the nation's youth toward engineering study. The 22nd annual survey of college freshmen, sponsored by the American Council on Education, indicated that the percentage of freshmen opting for engineering careers has declined from a high of 12 percent in 1982 to 8.5 percent in 1987.

The enrollment of women in engineering colleges increased almost tenfold from 1973 to 1983 and was a significant factor contributing to the total enrollment growth. The number of bachelors degrees awarded to women peaked in 1985 at 11,500 which was about 15 percent of the total degrees awarded. Unfortunately, the interest of women students in engineering has begun to decline. At the UW, the participation of women in engineering has shrunk from a high of 21 percent of the total enrollment in 1983 to 15 percent in 1986.

The participation of underrepresented ethnic minorities had also grown over the decade 1973–1983, and the number of bachelors degrees awarded to these groups increased by a factor of three over that period. However, their participation in engineering study and the profession falls far below population parity.

Moreover, increased participation may become an imperative. Without increased enrollment and completion of engineering studies by women and minorities, the nation's ability to compete in an increasingly technologically based world economy will be severely hampered.

The nation as a whole must respond to this problem. The quality and content of high school science and mathematics courses must be upgraded; the number of teachers in these disciplines must be increased. High school students, particularly women and the underrepresented minorities, must be encouraged to study and to prepare for careers in science and engineering. The University must also engage in active measures to reverse the trends of declining interest and enrollment. Recruiting of underrepresented minorities must continue at the highest levels, and major cooperative development projects such as the Center for Women in Engineering must receive continued support from both government and corporate entities (see related article in News and Notices). For any societal problem, more than half of the solution rests with the recognition and characterization of the plotting of the corrective course and implementation of action to respond to the issues. That process has begun.

J. Ray Bowen

Alumni association highlights years' accomplishments

The Engineering Alumni Association (EAA) has gone through a transformation from a start-up organization to one with some solid accomplishments. It is now the second largest organization within the University of Washington Alumni Association. Some of the first year's highlights were the Homecoming reception; publication of the Engineering Directory, EAA Newsletter and College of Engineering History book and finally Engineering Week punctuated by the Alumni Banquet on February 24, 1988.

The Banquet was scheduled not only to support Engineering Week, but also to allow the presentation of the first EAA Engineer of the Year Award. This award is presented to the UW Engineering Alumnus who has achieved outstanding technical accomplishments during the past year. For 1987, the individual selected was David T. Cass, BSME, 1960.

Cass was recognized as Engineer of the Year for designing the Undersea Service Tunnel Machine used as a boring device on the English Channel Tunnel. He was the Chief Engineer on the design project for Robbins Company from the start of the project in November, 1986 until the shipment of the machine to France in the Fall of 1987. Guest speaker at the Alumni Banquet, John M. Fluke, Jr., gave an intriguing talk on education, describing business aspects in Japan and the United States.

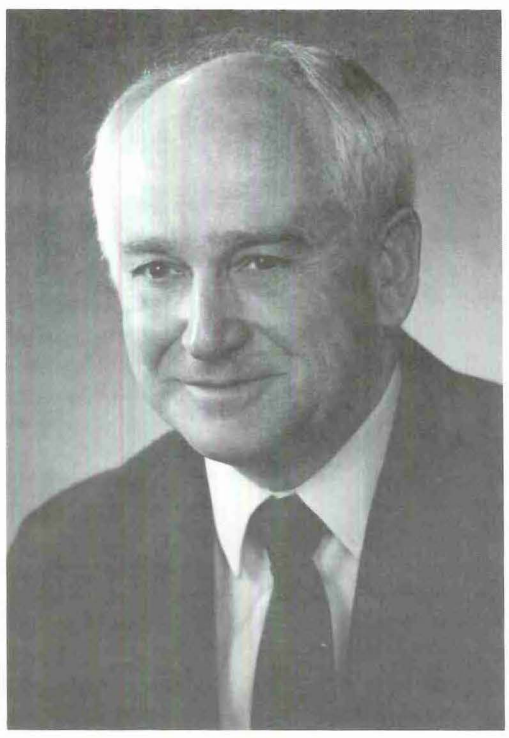


Photo Rich Hansen

Accepting the Alumni Engineer of the Year award for David T. Cass are son Aaron and wife Sidney

Artificial neural networks model the human brain

by Sharon Kasper

The problems of the traveling salesman have long been a subject of considerable speculation and humor. But one such problem, that of mapping out a minimum-distance route among 30 or 40 cities, is part of the serious research effort in the field of optical computers. The Traveling Salesman Problem (TSP) represents the type of puzzle that a computer modeled on the neural network of the brain could solve with ease.

Robert J. Marks II, professor, and Les Atlas, assistant professor, both of electrical engineering, are combining their skills in optical computers and speech recognition to help uncover the secrets of neural networks. One possible outcome of their work might be a computer which could deal with problems of even greater complexity than the TSP.

Developing a computer that can deal with such complexity requires an understanding of the human (biological) brain and the way in which its billions and billions of neurons interact. Each neuron is connected to a large number of other neurons that make up individual neural networks. And the operation of the network is based on the changing status of each individual functioning neuron and its ability to sense changes in those neurons to which it is connected.

Professors Marks and Atlas, working with a team of graduate students, have developed and are training an *artificial* neural network in their Interactive Systems Design Lab (ISDL). Their model is called the APNN or Alternate Projection Neural Network. Marks points out that much conventional training is based on sets of rules, "but if you had to give rules by which something was a bush or a tree, it would be very, very difficult." It is necessary, then, to program a neural network in the same way that humans are programmed. "You show the neural network a bush and you say, 'That's a bush,' and you show it a tree and you say, 'That's a tree,' and you show it another tree and you say, 'That's another tree,' and after a while the neural network begins to learn to distinguish all by itself; it learns by example as opposed to learning by rules."

The motivation for developing an artificial neural network computer model of the biological network is plain. Every day the scientist can observe the results of human neural networks in action—a human can identify a tree or a bush in a picture that contains both trees and bushes. And, although we are naturally equipped with the ability to classify in this way, a non-biological neural network must be trained to make such distinctions.

Optics, Marks' specialty, will be used to 'show'images to the computer and to manipulate the data internally. "At the front end of the computer, where you gather the data," Marks explains, "there might be an array of photo-detectors that would detect the image. Internal manipulation of the data that is conventionally done electronically would be done using light instead of electrons. It's obviously faster; you can't get much faster than light."

More than just a search for speed is involved in modeling the internal architecture of a neural network. The hundreds of electronic connections required between the neurons, using a conventional computer, would be impossible due to interference, but using photons rather than electrons eliminates that interference. The basic artificial neural network consists of many nodes or neurons that do very simple operations, and in some models, every neuron is connected to every other neuron. Using conventional connections would require the impossible: electrons going through electrons. Marks describes the advantage of using optics: "If you do it optically, photons can go through photons. Light can go through itself, so using light gives you the nice ability to have the natural physics for intense interconnections of the nodes or neurons."

One technology available with the neural network is parallel rather than serial processing. "One neuron doesn't have to wait for what another neuron does; they all kind of do their own thing and come out with a really neat answer."

Reaching "a really neat answer" in neural network parlance is called converging, and Atlas and Marks' APNN outperforms previous thermodynamic models of neural networks in accomplishing convergence efficiently and consistently. The thermodynamic models use an energy reduction approach which Marks says, "doesn't prove uniqueness of convergence, that is, one time the neural network converges to one thing, and another time it converges to something else. So in that sense it's a relatively poor model." Marks elaborates, "Our model of the APNN draws upon a wealth of mathematical theory, including projection onto convex sets, which is a recent field of interest and analysis from which we've been able to borrow."

Besides convergence, the ability of a neural network to generalize is a requirement of any efficient classification network. Marks describes generalization between the two modeling systems, "It's easy to train a classifier to respond to training data. What's important, however, is how it responds to new data. Can it recognize a totally new bush?" A disadvantage of the conventional neural network is that determining how it will respond can only be done empirically. "You actually have to expose it to the new material and see if it responds correctly. However, with the APNN, the math is so well developed that we can predict the manner in which the network generalizes, and we can write down math equations that show whether and in what manner the network generalizes to other than the training data."

The ability to generalize to new data or environments is a problem that conventional computers respond to poorly. Even the recent developments in artificial intelligence, such as expert systems, have this problem. "Neural networks offer the theoretical potential to control and design the specifics of generalization," according to Atlas. "However large amounts of data from many real-world environments are needed to test and refine this theory."

Training a network by example requires incredible amounts of time to pass through the data, and the problem with conventional neural nets is that they can forget the earliest data by the time they are exposed to the final data. This forgetting requires repetitive passes through the training data. However, repetitive passes are not required for the APNN, because it has an elephant-quality memory. It never forgets. A single pass through the training data is sufficient.

Improved memory within the actual computer architecture is another advantage of the APNN. The associative memory capability of the artificial neural network could allow the APNN to identify a black and white picture (similar to a digitized picture) of the Mona Lisa, given only her smile. "We have a matrix of neurons," explains Marks, "that can take on gray levels. In this matrix every neuron is connected

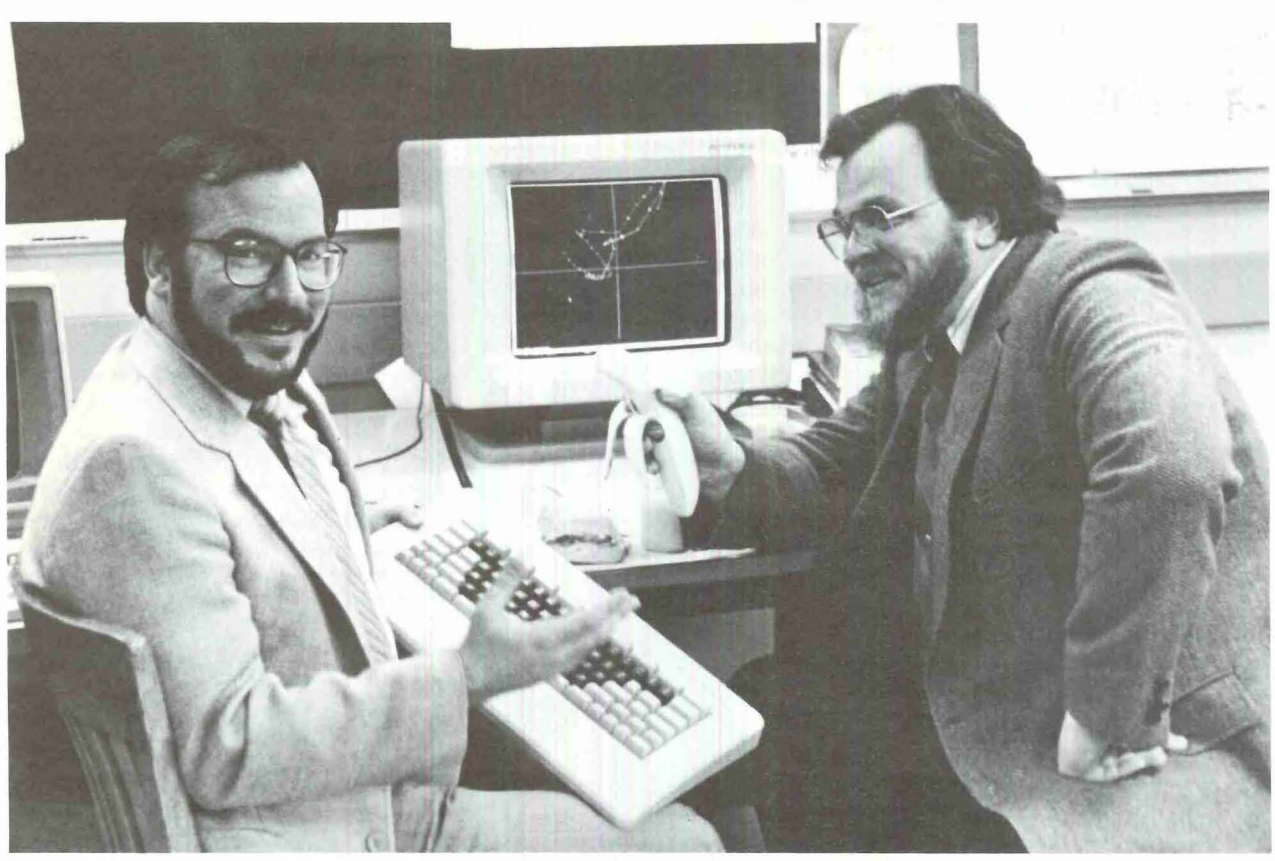


Photo David Spengler

Working lunches led to neural network research partnership between Les Atlas and Robert J. Marks

to page 9

Department of Energy Professorship to Aksay

by Keith Robison

A memorandum of understanding was recently signed between the University of Washington and the U.S. Department of Energy's Pacific Northwest Laboratories (PNL). Designed to encourage closer cooperation between the two institutions, this agreement establishes new jointly-funded professorships, graduate fellowships and research contracts. The first of the new professorships, for which the DOE will provide $50,000 in annual support, has been awarded to Ilhan Aksay, professor of materials science and engineering.

His selection as the first PNL Professor is in recognition of Aksay's strengths as a researcher, and his ongoing work with Battelle Memorial Institute, which runs PNL for the Department of Energy. Aksay has been working with the laboratory in the development of its d[illegible] Molecular Sciences Research Center and has played a major role in starting three interdisciplinary programs through the lab. According to Aksay, the professorship will allow increased access to Battelle's facilities and research, freeing the lines of communication between the lab and the UW, thus improving both research efforts of both. In short, the new arrangement will make it easier for him to continue the kind of cooperative work he has been doing for some time.

Aksay, a UW faculty member since 1983, teaches and conducts research in the science of processing ceramics (see *Trend* article, Autumn 1986). As director of the Advanced Materials Technology Program of The Washington Technology Center, Aksay is investigating new techniques for making ceramic materials. The designing of ceramics, he says, is being reduced to smaller and smaller scales, down to the level of locating individual atoms within a ceramic composite, in order to control precisely the composition of the materials. This control will enhance the materials' electrical properties and prevent their premature failure. In 1987, Aksay received the Richard M. Fulrath Award from the American Ceramic Society in recognition of his contributions to the microdesigning of ceramics using colloidal techniques.

Ilhan Aksay receives professorship Photo David Spengler

Aksay graduated from the University of Washington in 1967 with a B.S. in ceramic engineering. By 1973, he had completed his M.S. and Ph.D. at the University of California, Berkeley. After working at the Xerox Webster Research Center from 1973 to 1975, Aksay taught at the Middle East Technical University in Ankara, Turkey for five years. He then spent two years as a visiting associate professor in UCLA's materials science and engineering department before coming to the UW.

In addition to the new professorship, the agreement between PNL and the UW provides for two $15,000 graduate fellowships—one in materials science and the other in chemistry. The first has been awarded to Bradley L. Thiel, a graduate student. Thiel's work on the electron microscopic characterization of superconducting ceramics has already resulted in several joint publications with the PNL researchers. The winner of the fellowship in chemistry is Brad Tenge, who plans to graduate in the spring of 1989. He is conducting research on the use of fiber technology in analytical chemistry.

Another result of the agreement will be a number of new research projects on campus. According to Deborah Illman, associate director of the UW Center for Process Analytical Chemistry (CPAC), the Battelle Institute is taking steps to collaborate closely on CPAC research. The center's focus on d[illegible]loping chemical sensors and analytical monitors for chemical manufacturing processes is of interest to Battelle in its nuclear operations.

"We have signed a kind of umbrella agreement which covers all the eventualities of our working with Battelle," Illman said. "It spells o[illegible]ch things as what would happen if an invention c[illegible]e out of the joint work." She added, "We're particularly pleased to work with Pacific Northwest Laboratory because of their proximity and because they have tremendous resources and people."

The department of civil engineering is also conducting Battelle-funded research on the design of systems that monitor the transport of contaminants in surface water and ground water. The results of the research will be useful to the DOE in managing sites where radioactive waste is stored.

The comments of Gene Woodruff, dean of the UW Graduate School, seem to mirror those of everyone involved: "Battelle and the University have always had a special and close relationship. We all believe this memorandum of understanding will further strengthen those ties."

Neural networks *from page 4*

to every other neuron, and each neuron can assume a value that relates to a gray level. So, having been given a picture of the Mona Lisa, the gray levels of that picture are imposed on the neurons and the information is stored in the interconnects," (these interconnects correspond to the synapses that connect the neurons in the biological brain) "and remarkably, if the network is then given only the Mona Lisa's smile, the APNN could then extrapolate the entire face of the Mona Lisa."

The future of the APNN, is being extended to some real world applications: A *speaker-independent* system of speech recognition is being developed by Atlas and his team of graduate students. Using a large data base containing many words from many speakers, the team plans to have a demonstration system ready in two years. In order to make the system commercially acceptable, it is necessary to keep the rate of recognition errors to a minimum. It is also essential that the remaining errors be as "natural" as possible. "Human voice interaction is not error-free either," Atlas explains. "A key problem with conventional recognizers is that their errors are not at all like natural human errors. We feel that the APNN has the potential to behave as a human does, which would include the errors that naturally occur in human speech recognition." Other applications of the APNN include efficient routing of computer links and an automatic system to identify irregularities in electrocardiograms (EKG's).

Funding for Atlas and Marks' APNN comes from a variety of sources: The National Science Foundation, The Office of Naval Research, Physio Control Corp. and the Washington Technology Center. Although a considerable amount of research remains to be done, based on the available funding and the incredibly high level of interest in the field, Marks and Atlas are optimistic that neural network computers will be commercially available in the near future.

Continuing Education Courses

	May
AHERA Inspectors Training	2-4
AHERA Management Planners Training	5-6
Ground Safety Management	9-20
Cold Regions Engineering	12-16
Asbestos Certification Course	24-27
	June
AHERA Inspectors Training	6-8
AHERA Management Planners Course	9-10
Mobile Hydraulic Troubleshooting	6-10
Designing On-Line Documentation	9-10
System Safety Management	13-24
AEA/UW Engineering Management	19-24
	July
Surface and Colloid Science	11-17
System Safety Analysis	18-28
	August
International Combustion Symposium	14-19
System Safety Analysis	22-31

For further information, call (206) 543-5539.

Carl Hansen: Around the world in 18,250 days

by Annalise Dickey

At almost 79 years of age, civil engineering alumnus Carl C. Hansen has proven that you're never too old to do what you do best. For Hansen, a Washington, D.C. based consulting engineer, that means building new things and remodeling the old. For more than fifty years, in over sixty countries, he has done everything from consulting to climbing around on ladders.

Hansen was born in Bellingham, Washington in 1909 and grew up in the Pacific Northwest. His father was a mechanical engineer, and by the time Hansen entered the University of Washington in 1926, he already knew that civil engineering was his career choice.

Hansen is among the many alumni who recall the particular influence of Professor Charles More on their academic careers. He was in the last class to have More for all three years of coursework in structural engineering. "He was terrific, a great teacher, very strict, very severe," says Hansen. "If you didn't follow his instructions, you just lost that day's work. There were times when we thought he was unreasonable, but as soon as we were out of school we appreciated everything he taught us. His strict rules were the exact ones we needed on the job."

"One of the happiest moments in my life," Hansen adds, "was when I heard they named a new hall after him. They couldn't have made a better tribute."

Carl Hansen recounts 50 years as civil engineer

Hansen graduated in 1930 with a B.S. in civil engineering. Although the Depression hadn't quite hit yet, jobs were scarce. But Hansen was lucky, for the week after graduation he landed a job with Harold Worthington and George Runciman in Seattle. In 1931 he went to Washington, D.C. to work for the Supervising Architects Office within a branch of the Treasury Department. That office programmed, designed, and built all of the public buildings for the government, except the military. He helped remodel the Denver Mint, restored the Philadelphia Mint, designed all the structural elements of the Bullion Depository at Westpoint and worked on the gold depository at Fort Knox.

The next step in his career was chief civil and structural engineer for the National Capitol Housing Authority, the public body for lower income housing. Hansen applied for a commission with the Navy in 1944 and was assigned to Okinawa as an executive officer of a military government team whose mission was to provide the 75,000 natives with food and sanitary facilities.

When Hansen returned to Washington, D.C. two years later, he joined Mills, Petticord, and Mills as chief civil and structural engineer in charge of 35 engineers and draftsmen. He did several hundred designs for the Army Corps of Engineers during the mobilization for the Korean War. "The job had lots of variety," recalls Hansen, "ranging from 1,000-foot wharfs to railroad engine repair shops."

In 1953, with a wealth of experience behind him, Hansen decided to start his own consulting engineering firm. He did the structural design of the U.S. Embassy in Lima, Peru in 1959. Seven years later there was a huge earthquake in the area and Hansen was sent to investigate the damage. There was in fact no structural damage, only cosmetic. Hansen has been consulting and trouble-shooting for the Department of State ever since. He has visited 66 different countries in this capacity and has found "chasing earthquakes and repairing the damage from terrorists to be very rewarding and interesting work."

"But the most interesting job," says Hansen, "came in 1978, when the Foreign Buildings Office called in the middle of the night to say 'pack your bags, you're on your way to Moscow.' " A fire had broken out in the U.S. embassy, completely destroying the tenth floor and the roof.

"It was late August and we had to finish the repair job before the snow began. No cranes or lumber were available in Russia: they were preparing for the 1980 Olympics and couldn't spare anything."

Hansen drew up the plans to redesign the roof and teletyped a complete bill of materials to Helsinki, Finland; within two days they had three truckloads of lumber. With additional supplies from West Germany, Denmark, and the States, the team worked day and night. They finished the roof two days before the snow started to fly. Hansen is proud of the way that particular job went, describing it as "engineering by the seat of your pants."

But Hansen's advice to young engineers reflects what he learned from Professor More: "Start forming good work and study habits now, for you have to keep up with this profession all the time by constantly reading, studying, and attending seminars. The day I don't learn something new is a lost day."

Benjamin Linder Engineering Scholarship

Oswaldo Chavez, a master's degree student in the transportation program in civil engineering, has been chosen as the first recipient of the newly established Benjamin Linder Engineering Scholarship. The scholarship was initiated by the University Faculty and Staff for Human Rights in Central America (FACHRES-CA) and the Nicaragua Technical Aid Group (NICATECH) in memory of Benjamin Linder, 1983 mechanical engineering graduate who was killed in Nicaragua last April.

The Linder Scholarship will provide tuition and partial support for living expenses to one Nicaraguan student in the College of Engineering each year. The intent is to allow engineers to be trained in specialties such as developing micro-hydroelectric facilities as a means of rural electrification, a project that Linder was engaged in at the time of his death.

Linder had worked for three years in Nicaragua and served as project engineer for the Cua Bocay Integral Development Project.

According to Charles Sleicher, professor and chair of chemical engineering and one of the initiators of the scholarship, the group hopes to build an endowment of $50,000. A reception featuring Giovanni Costigan, professor emeritus of history; David Linder, Benjamin's Father, and Oswaldo Chavez raised about $8,400 for the endowment.

The scholarship is endorsed by the family of Benjamin Linder, and administered by the College of Engineering with the assistance of a board consisting of the sponsors and one College faculty member. Sleicher is serving as the first faculty board member.

Contributions to the scholarship fund, made payable to the University of Washington, can be sent to the College of Engineering, FH-10, University of Washington, Seattle, WA 98195.

Alan Nelson, associate professor of bioengineering, and adjunct professor of electrical engineering and pathology, under the sponsorship of Britain's Royal Society, has established a research and exchange program with Queens University of Belfast, Northern Ireland in the field of biomedical imaging. A prestigious appointment as Visiting Scientist to the Royal Society supported Nelson's three-month research visit to Ireland.

As a part of the exchange program, Roger Telford, associate director for computer science at Queens, spent one month at the UW studying biomedical imaging processes at the Center, and will model the program at Queens on the University's program.

The biomedical imaging effort represents an interdisciplinary effort among bioengineering, electrical engineering, and biomedicine. Monetary support from the **Siemens Corporation** has allowed Nelson and **Yongmin Kim**, associate professor of electrical engineering and adjunct associate professor of bioengineering, to implement a new technology for a three-dimensional display of the spine.

Alan Nelson Photo Sharon Kasper

Ram accelerator *from page 1*

the propellant to the projectile, and hence a high muzzle velocity can be achieved only with projectiles that are tiny in relation to the size of the gun. "In the ram accelerator concept," Bruckner says, "the energy release (in other words the combustion) travels with the projectile. The projectile goes through the tube, picking up the energy it needs from the combustible gas as it goes along. This results in very efficient energy coupling, which allows the accelerator to be easily scaled up in size." Carl Knowlen, lead graduate student on the project, elaborates, "the projectile is surfing through the tube on a wave of combustion."

The experimental ram accelerator facility in AERL has a 12.2 meter (40 ft.) long tube (see cover photo) with a bore diameter of 38mm (1.5 in.). Methane, oxygen, nitrogen and helium in various proportions are mixed, and injected into four segments of the tube which are sealed off by thin plastic diaphragms. A conventional light gas gun shoots a 50 gram projectile into the accelerator tube at about 700 meters per second, and the projectile gathers speed rapidly as it flies through the varying mixtures of gases.

Gases all have different speeds of sound, so by tailoring the composition of the propellant mixtures, the projectile can be made to accelerate at a nearly constant rate. Much like shifting gears in a car, keeping the Mach number of the projectile within narrow limits optimizes the performance.

In raw velocity, the accelerator is now performing at 2.4 kilometers per second, (the equivalent of Mach 7 in air) making it the fastest ramjet in the world. Projectiles have been accelerated to as high as 30,000 gs, using a propellant fill pressure of 22 atmospheres. Hertzberg and his colleagues expect to attain as much as 4 kilometers per second with their current device.

The velocity range of operation depends on the type of combustion mode, or thermodynamic cycle, that is used. All the shots until now have employed a thermally choked subsonic combustion mode, which means the combustion behind the vehicle occurs at a speed lower than the speed of sound relative to the vehicle, although the vehicle is traveling faster than the speed of sound. This mode will probably get the vehicle up to about 3.0 kilometers per second. Other combustion modes, developed by the AERL group involve oblique detonation waves. These modes will operate in succession with a thermally choked mode and are expected to propel the projectile to speeds perhaps as high as 12 kilometers per second. Knowlen's dissertation study is primarily concerned with the transition between the different modes of combustion.

Hertzberg conceived the basic elements of the ram accelerator in 1983, as he was searching for an alternate solution to achieving nuclear fusion by the impact method. Standard accelerators such as light gas guns aren't capable of creating the velocities necessary to generate an impact powerful enough to fuse the nuclei of two objects, so Hertzberg thought maybe a ramjet-in-a-tube could. Seeing the possible application for sending payloads into space, Hertzberg, Bruckner, and Bogdanoff all started working on the project.

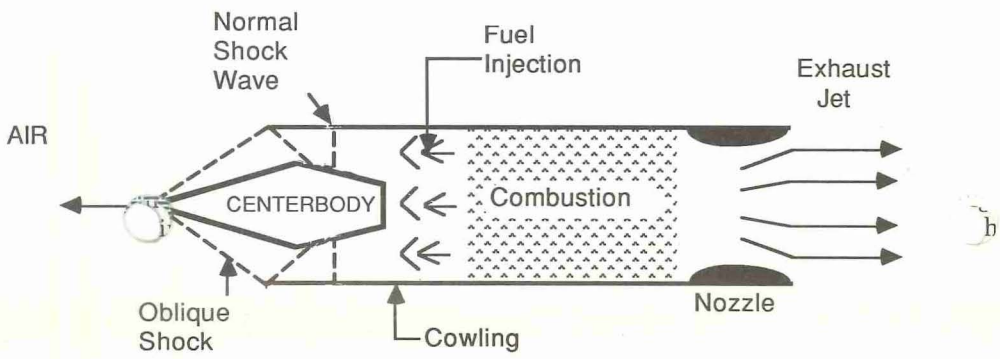
Bruckner contributed the idea of premixing the fuel and oxidizer and filling the tube with the mixture. This concept was met with much skepticism by outside colleagues because they said that as soon as the moving projectile entered a tube filled with fuel *and* oxidizer, the whole tube would go off like a bomb. It doesn't!

Bogdanoff came up with the concept of using oblique detonation waves to accelerate the projectile to the 12 kilometer range. Although to date the AERL group has studied the detonation propulsion modes only theoretically, plans are in place to begin proof-of-concept experiments this spring.

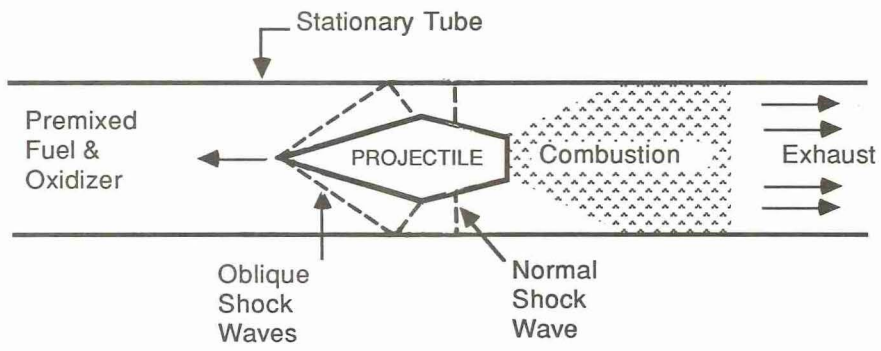
Begun in 1983, the ram accelerator project had humble beginnings. The Air Force was the first sponsor in 1984, and has supported the effort on and off since then. Other sponsors include the Department of Energy, NASA, and more recently, the Olin Corporation has provided some research funds. With the first funding, the group built the facility in the basement of the AERL. After beginning experimentation, there was a serious problem in getting the propellant gas in the accelerator to ignite properly; although the first "hot shot," or experimental shot, was fired in October 1985, the accelerator didn't perform successfully until June 1986.

In the spring of 1986, Hertzberg was known to frequently say, "If we have to sell this experiment now, we'll probably get 50 cents and a cup of coffee in a cheap restaurant." Finally, what the group calls their "starting trick" was discovered, and ever since, the accelerator has been operating as well as, or better, than calculated. The "trick" is proprietary and is now under patent application, as are other aspects of the ram accelerator concept.

The project was kept quiet for a long time, partly due to the proprietary nature of the work, and partly due to the period of failure to ignite the accelerator. Now, however, Hertzberg, Bruckner, and Bogdanoff are going public with their findings and have already published several technical papers on their work. Bruckner says when he attended the International Astronautical Federation Conference in Brighton, England, last fall, he was overwhelmed by the enthusiasm and level of interest generated by the ram accelerator.



a) Conventional supersonic ramjet. Centerbody is attached to cowling. Fuel is carried on board.



b) Ram accelerator. Projectile flies through a tube filled with premixed fuel and oxidizer gases.

Hertzberg stresses that this project is a classic case of team effort. "Everyone involved has contributed important ideas." He says about the nine graduate students, "Their enthusiasm is incredible. It was really their enthusiasm that boosted our morale during that fallow period when Adam, Dave, and I were going around shaking our heads, asking ourselves, 'What are we doing wrong?' The students would come in bright-eyed and say, 'What should we do next?' Their zest did a lot to buoy us up, to persevere to the point where we came up with these other ideas that enabled the technology to succeed."

Remarkably, this small group of researchers has been successful in proving a concept that many in the space community said was impossible. Perhaps the group was inspired by Jules Verne's Impey Barbicane who said of the great gun he proposed building, ". . . however great may be the difficulties in the way, our mechanical genius will readily surmount them." Of course Verne didn't know that his projectile could never have reached the moon and that his methods would have annihilated the people aboard his projectile, but the enthusiasm and vision of his (however fictional) venture is remarkable. The ram accelerator isn't fiction; it's the real thing. It will help us maintain our preeminence in space, because with this innovative method of getting materials there, our position in space will be secured.

The trend in Engineering

University of Washington

Volume 39, Number 1, Spring 1988

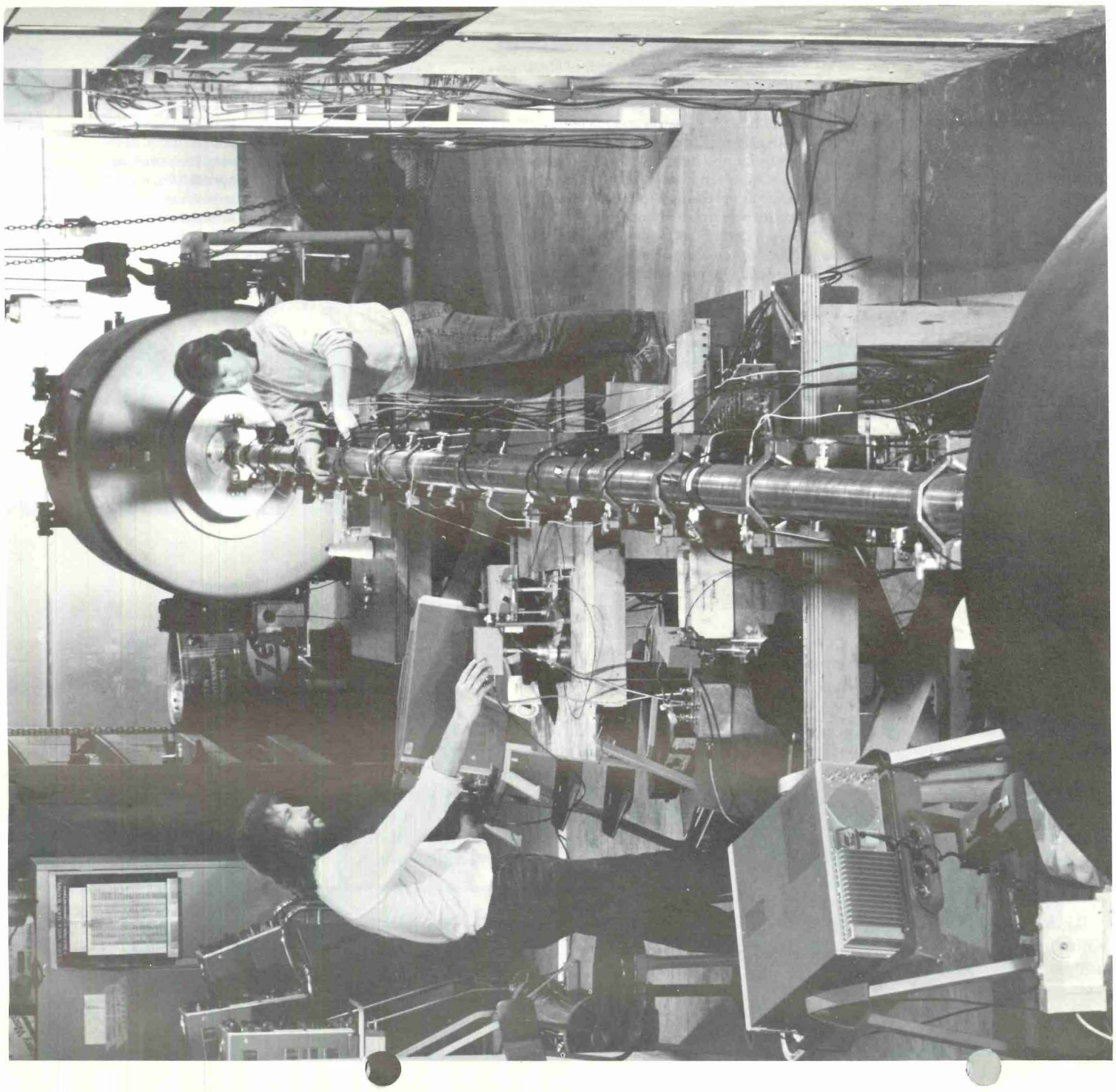


Photo Mary Levin

The trend in Engineering

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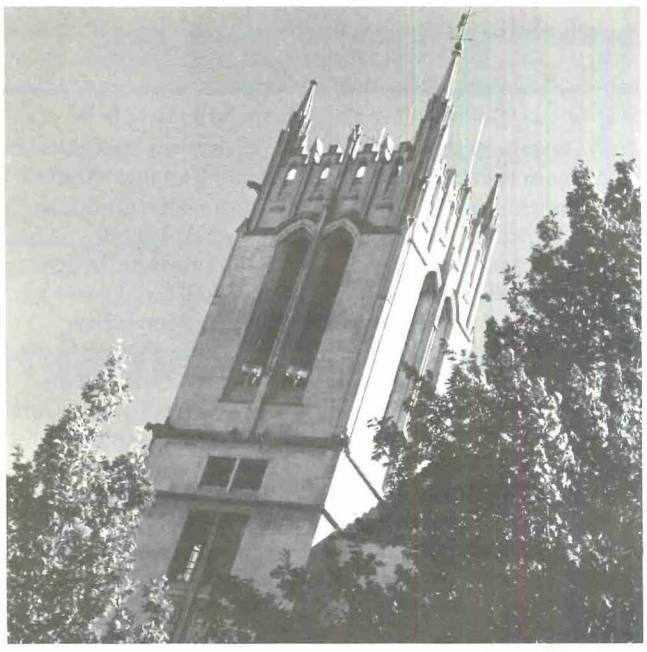


Photo David Spengler

Cover photo: Carl Knowlen and Kelley Ann Scott, aeronautics and astronautics graduate students, prepare test firing of the ram accelerator in the aerospace and energetics laboratory. Story, page 1.

The trend

News and Notices from the departments and programs

Aeronautics and Astronautics

The **F.K. Kirsten Wind Tunnel** is celebrating its 50th anniversary this year. From its opening, the UW wind tunnel has been intimately involved in the development of all Boeing airplane models, and many aircraft and vehicles of other manufacturers.

Run by undergraduate students, primarily of the department of aeronautics and astronautics, it has provided valuable industrial experiences and training. Former employees of the tunnel have made, and continue to make, valuable contributions to the field of aerodynamics, as well as many other engineering disciplines.

A dinner gathering of present and past employees, customers, and friends of the Kirsten Wind Tunnel is planned for Monday, July 25, 1988 at the UW center for urban horticulture. During this time we hope many of our old associates will pay us a visit and join in the festivities. Also, anniversary tee shirts and sweat shirts have been designed and produced by one of our present student employees.

For information, please contact Professor **William H. Rae, Jr.**, Associate Director, Kirsten Wind Tunnel, University of Washington, FS-10, Seattle, Washington 98195, (206) 543-0439.

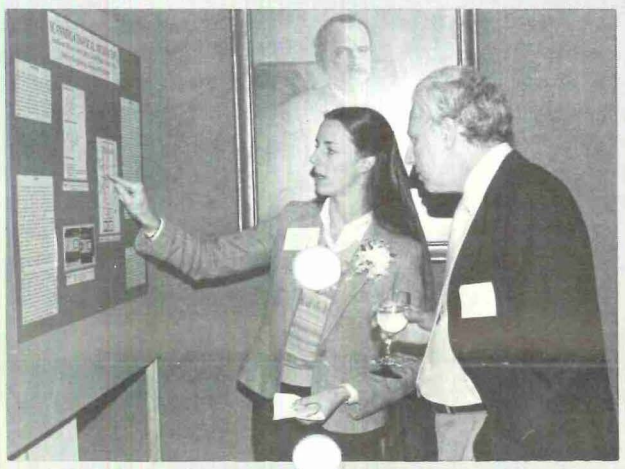
James C. Hermanson joins the faculty as a research assistant professor. In 1977 he received his B.S. from the University of Washington; in 1980 he earned a M.S. followed by a Ph.D. in 1985, both from the California Institute of Technology. His areas of specialization include: fluid mechanics, propulsion, combustion, propeller-hull interaction, turbulent reacting shear flows, and bubbly ship wakes. His expertise has led to an association with the Applied Physics Laboratory as Engineer IV.

Bioengineering

Dale Johnson, professor of bioengineering and adjunct professor of materials science and engineering, was appointed Associate Dean for Academic Programs and Research in the University's graduate school. Johnson took over the position last August from **Joe Norman, Jr.**, who is now the Dean of the College of Arts and Sciences. In 1976, Johnson joined the UW faculty and spent the past three years as assistant director of the Center.

Alan Mackenzie, research associate professor, is involved in an embryo-freezing program at Swedish Hospital Medical Center, not Harborview Medical Center, as stated in the Autumn issue of the Trend. The editors regret this error.

The Center held its **20th anniversary party** on November 23 and 24. The festivities included a luncheon for faculty, students, staff, and friends of bioengineering and the first annual lecture in the Robert Rushmer Lectureship series. **David Auth**, affiliate professor and director of Biophysics International, spoke on "The Fantastic Voyage of Catheter Based Surgery." The lecture series is open to the public and admission is complimentary. Another lecture will be scheduled for Fall of 1988.



At the poster session, Ann DiMarco describes her research to Alan Kagonov, Baxter Healthcare Corp.

Chemical Engineering

E. James Davis, professor of chemical engineering, and **Michael Pilat**, professor of civil engineering, hosted the 1987 meeting of the American Association for Aerosol Research at Kane Hall in September. Pilat served as general chair and Davis chaired the technical program.

The meeting attracted nearly 340 professionals from all over the world, and over 250 papers were presented. Discussions and papers covered a wide range of topics from tobacco smoke to nuclear winter.

The **Polymeric Composites Laboratory** (PCL), directed by **James Seferis**, professor of chemical and polymer engineering, increased its repertoire of research activities recently, when it acquired a new injection molding machine manufactured by Battenfeld of Austria. **Jan-Anders Manson**, research assistant professor, who has had several years' experience in industry and who holds several patents related to injection molding, will be co-directing this new area of research in the laboratory.

Injection molding is an established manufacturing technique that has great potential in upgrading for processing advanced structural materials used chiefly in the aerospace industry. The PCL team will be using the technique to study the manufacturing of high performance, advanced structural composite parts.

The basic injection molding machine was purchased by Seferis' group from Battenfeld for a joint project with Boeing Manufacturing Research and Development division. Battenfeld has also joined the PCL list of industrial sponsors and is expected to assist with equipment support and expertise in what promises to become a novel area for injection molding technology development.

Civil Engineering

Colin Brown was appointed chair of the department of civil engineering in September. Last year he served as chair of the faculty senate and has been a member of the faculty since 1969. During his tenure, Brown has taught and conducted research in structural engineering and mechanics and probabilistic design methods.

Brown succeeds **Ronald Nece**, former acting chair, who is currently on sabbatical leave in England.

G. Scott Rutherford, associate professor, has stepped down as the Washington State Department of Transportation (WSDOT) research director. In 1983 Rutherford received his appointment as both research director for WSDOT and Washington State Transportation Center (TRAC) director. The joint selection was a move to help establish a rapport between WSDOT staff and researchers from UW and WSU.

Under Rutherford's direction both organizations experienced such growth that full-time directors are now required for each. Rutherford remains the TRAC director, while John Doyle, formerly WSDOT's chief economist succeeds him as director of WSDOT. "The challenge," said Doyle, "is to keep the momentum going that was established by Rutherford."

Joining the faculty as assistant professor is **Charles Jahren**. He earned a B.S. in 1977 and an M.B.A. in 1982 from Minnesota, followed by a Ph.D. in 1987 from Purdue. An expert in waterfront and marine construction and temporary structures, he teaches classes in construction engineering and management.

H. David Stensel received the 1987 Harrison Prescott Eddy Award, of the Water Pollution Control Federation (WPCF). His research paper, "Aeration and Substrate Utilization in a Sparged Packed Bed Biofilm Reactor," was judged as the best paper published in the Federation's journal in the previous year. The article appeared in the November 1986 issue of the WPC journal. Stensel received his award at the WPCF annual convention held in October in Philadelphia.

The Workshop on Modeling Physical Oceanography of Puget Sound was co-organized by **Wen-sen Chu**, associate professor; William Lavell, National Oceanic and Atmospheric Administration (NOAA); and Roy Walters, United States Geological Survey. Fourteen speakers and seventy participants attended the workshop held in November at the NOAA Western Regional Center in Seattle. Experiences in field observation and analytical, physical and numerical modeling works related to Puget Sound were presented by the speakers.

In December, Chu visited the National Taiwan University (NTU) in the Republic of China (ROC) for three weeks. He acted as the visiting principal investigator for a research project on the real-time operation of the two major water supply reservoirs in

UPI

"Pappy" Boyington 1912-1988

World War II flying ace **Gregory "Pappy" Boyington** (A&A 1934), died in Fresno, California, January 11, at the age of 75. Boyington was credited with shooting down 28 Japanese planes and won the Navy Cross and Medal of Honor.

After graduating from the UW, Boyington worked as a draftsman at The Boeing Company for a year, then enlisted in the Marine Corps as an aviation cadet. While flying in 1941 with the Flying Tigers, Gen. Claire Chennault's volunteer group in China, Boyington was credited with shooting down six Japanese planes.

When Marine surgeons told him he must end combat flying because of a broken leg, Boyington gathered a group of pilots rejected by other squadrons, and formed them into the "Black Sheep," a unit that operated in the Solomon Islands in 1943 and 1944. That unit was later the subject of the TV series, "Baa Baa Black Sheep." Boyington spent the final one and a half years of the war as a Japanese prisoner after his plane was riddled by bullets and crashed in Rabaul Harbor, New Britain, in January 1944.

northern Taiwan. This research will be conducted along with professors Jan-Tai Kuo and Nien-sheng Hsu of NTU from 1987 until 1990 and is funded by the ROC's Water Resources Commission.

Nancy Nihan, professor, traveled to Washington, D.C. in February, to attend a meeting at the U.S. Department of Transportation (DOT). The meeting was held to establish a Regional Transportation Center for the states of Alaska, Idaho, Oregon, and Washington. Nihan will serve as director of the center, which will be doing research in intermodal transportation. The center expects to receive $1 million per year for four years from the DOT, plus matching funds from local sources.

Electrical Engineering

Robert Porter receives naval research appointment

Robert Porter, chairman, has accepted a two-year appointment to the prestigious Naval Research Advisory Committee. The committee serves as an advisory group to the Secretary of the Navy, the Chief of Naval Operations, the Commandant of the Marine Corps, and the Chief of Naval Research.

James H. Webb, Jr., Secretary of the Navy, explains that Porter's participation will entail, "not only developing the Navy's research and development program, but also providing advice on significant challenges confronting the Navy."

In December 1987, **S.S. Venkata**, professor, spent five weeks in India. During his stay there he spoke and presented papers at several events in Calcutta and Bangalore. Upon his return, he was elected to a two-year term as Region 6 North (Pacific Northwest Region) Chapter Representative of IEEE Power Engineering Society. His term will run through January 1990.

Akira Ishimaru, professor, was one of 500 participants in Moscow's *Space Future Forum* last October. Scientists from around the world were invited to attend the event, which was sponsored by the Soviet Institute of Space Research. *Time* magazine featured the "extravaganza" as the cover story in the October 5 issue. The major focus of the forum was on international cooperation in space.

Robert Spindel, professor of electrical engineering and adjunct professor of oceanography, was appointed director of the Applied Physics Laboratory (APL) this past summer. Prior to his appointment at the UW, Spindel was the chair of the Department of Ocean Engineering at Woods Hole Oceanographic Institution, Massachusetts.

Spindel oversees a diverse staff, many of whom hold joint appointments in various colleges and schools across campus. The major areas of expertise on the APL staff include ocean science, ocean acoustics and ocean technology. The lab is now a part of the College of Ocean and Fishery Sciences. The facilities are unique and coordinate research both at the lab and in the Arctic polar region.

The Optical Society o[illegible]merica now has an official Puget Sound Chapter, thanks to the efforts of **Robert J. Marks II**, professor; **Leung Tsang**, professor; and **R. Aaron Falk**, from Boeing Aerospace. Marks is serving as president of the new chapter. Anyone interested in information about the Society should contact Secretary/Treas[illegible] David Capps at Boeing Aerospace Co., P.O. Box [illegible]99, M/S 87-50, Seattle, WA 98124.

Marks has also been named chairman of the IEEE Circuits and Systems Society's Technical Committee on Neural Computing. He will be attending the International Symposium on Circuits and Systems in Helsinki in June, where special sessions and tutorials will be devoted to neural networks.

David Johnson, professor, is on sabbatical at the University of Nantes, France from March 15 until June 15. His work there will include lectures, symposia, and colloquia related to the University's efforts to establish an artificial intelligence curriculum.

Industrial Engineering

Woodrow Barfield has joined industrial engineering as assistant professor, becoming the College's primary human factors engineering faculty member. He received a bachelor's degree in engineering psychology from UCLA in 1976 and a master's degree in engineering psychology from California State University at Los Angeles in 1980. Barfield earned his Ph.D. in industrial engineering in 1986 from Purdue University, and taught for two years at George Washington University, in Washington, D.C., where he was director of the laboratory for human factors research. Most recently he received the Presidential Young Investigator award. (See related article under Other College Activities)

Barfield's specialty is human/computer interaction. Other University faculty members involved in human factors studies are Theus Doolittle, associate professor in the Department of Environmental Health; Beth Kerr, associate professor; Earl Hunt, professor; and John Palmer, assistant professor, all of the Department of Pyschology; and Mark Haselkorn, associate professor and director of the Program in Scientific and Technical Communication.

Materials Science and Engineering

The second phase of the **Roberts Hall** renovation is still underway with the completion planned for July. The 1920s building is being redesigned and reinforced to meet the current seismic codes. The $6-million project was designed to retain the appearance of the building, while making it safer and more space efficient.

Ilhan Aksay, professor, was recently presented the Richard M. Fulrath Award from the A[illegible]rican Ceramic Society. The award is for his co[illegible]butions to the microdesigning of ceramics using colloidal techniques.

Richard Bradt, professor, will be awarded the 1988 T.J. Planje-St. Louis Refractories Award on May 20 at the St. Louis Refractories Sympo[illegible]m. The award is the most prestigious honor a[illegible]able in the field of refractories. Bradt will predict future trends in refractory materials in his acceptance speech.

Bradt, who is also the Kyocera professor of ceramic engineering, delivered the keynote address at the Canadian University-Industry Council on Advanced Ceramics on February 25 in Toronto.

The Materials Research Society sponsored a conference on Atomic and Molecular Processing of Electronic and Ceramic Materials last Fall. **Tom Stoebe**, professor and chair, chaired the conference which attracted about 100 scientists and engineers from both industry and academia.

Ilhan Aksay and **Bill Scott**, professors, and **Michael Kaufman**, assistant professor, were members of the organizing committee. Some of the main topics included: surface structural chemistry applied to microelectronics, epitaxial growth and processing of III-V compounds, and the current understanding of unique materials such as superconducting ceramic oxides.

Mechanical Engineering

The 22nd International Symposium of the Combustion Society will be held August 14-19 in Kane and Meany Halls. Among the topics of special interest to be discussed during the coloquia are: reaction kinetics in combustion, turbulent reacting flow, combustion generated particulates, and combustion diagnostics.

Information regarding the symposium can be obtained from the Department of Continuing Education, (206) 543-5539.

Albert Kobayashi, professor; **Minoru Taya**, associate professor; and **Richard Bradt**, Kyocera professor of ceramic engineering, were awarded a Department of Energy Instrumentation Grant of $235,291 plus University matching funds. The grant will be used to build a high-temperature impact testing system, to

NCR

John R. Parshall

John R. Parshall (EE 1968), was appointed director of Product Management in December 1987, for NCR Corporation's Microelectronics Division. Parshall joined NCR in 1974 as a design engineer at the Engineering and Manufacturing organization in Wichita, Kansas. Prior to his new position, he was technical systems manager for the General Purpose Systems Development and Production Division.

purchase a scanning electron microscope, and a general purpose coating device. Kobayashi and Taya have also been awarded an NSF equipment grant of $115,291, including UW matching funds, for the purchase of an ultra high speed camera. The camera will be used for assessing the fast fracture process in composites.

Cornelius Nevrinceanu has been appointed assistant professor in the department. His specialties include design methodology, application of artificial intelligence to machine design, computer-aided engineering, and manufacturing planning and troubleshooting. He received his INB in 1975 from the Traian Vuia Polytechnic Institute in Timisoara, Romania; his Di[illegible] Ing. in 1978 from Stuttgart; and his Ph.D. in 198[illegible]om the University of Minnesota.

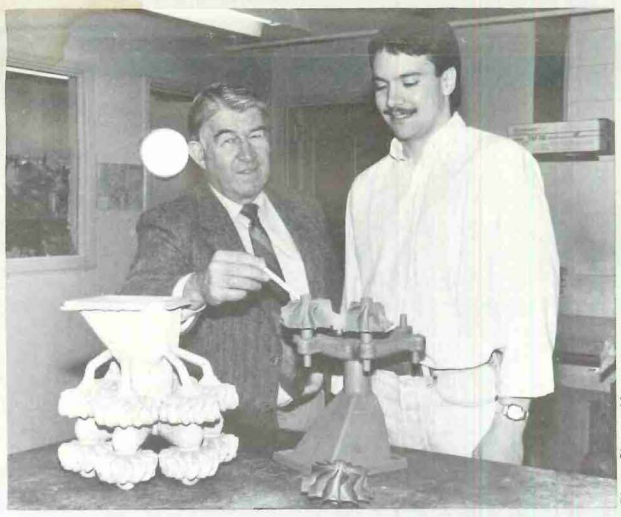


Photo Sharon Kasper

William Chalk and scholarship winner Jason Hennig

Mechanical engineering student, **Jason Hennig** has been awarded a $1,000 scholarship by the International Gas Turbine Institute. He was elected as a candidate for the honor by the American Society of Mechanical Engineers (ASME) UW student chapter. Hennig became interested in gas turbines through his classwork at the UW. He will be graduating in June, and plans to work for Boeing.

Nuclear Engineering

Albert Babb, professor, was featured in a recent National Institute of Health (NIH) publication, "Forty Years of Achievement in Heart, Lung, and Blood Research." Babb and the extracorporeal hemodialysis device he developed for the treatment of sickle cell disease were pictured in a commemorative volume celebrating the 40th anniversary of the National Heart, Lung, and Blood Institute and the centennial celebration of the NIH.

Milton Kayama from the State University of Campinas, Brazil, has recently joined the department as a postdoctoral visiting scientist. He will be working in the nuclear fusion plasma physics group with **Fred Ribe**, professor and **Brian Nelson**, research associate. Kayama's specialty is field reversed plasma configurations.

Benedikt Kronast, professor of physics at Bochum University in West Germany, is on sabbatical at the department from April through August. Kronast, a recognized authority on diagnostics of basic plasma physics phenomena, will work with **George Vlases**, professor and **Z. Adam Pietrzyk**, research professor.

Scientific and Technical Communication

The cooperative education and minority intern program will be receiving a d[illegible]ase management system for the engineering cooperative education program as the result of a $61,000 grant from the U.S. Department of Education. The grant will provide five IBM PS/2 microcomputers, connected by a local area network, with a database software package.

The new system will ser[illegible]a twofold purpose: to match student applicants [illegible]n the co-op program with potential employers, and to provide graduate students in STC an opportunity to conduct research on the computer-human interface.

David Farkas, associate professor, STC, as principal investigator for the grant, collaborated on the proposal with **Helene Beaver**, director of the co-op and minority internship program, and **Jim Mock**, computer support services manager.

Mark Haselkorn, associate professor, director; **David Farkas**, associate professor; **James Souther**, professor emeritus; and **David Spengler**, director of engineering information services, will serve on the steering committee for the IEEE Professional Communication Society 1988 International Professional Communication Conference (IPCC) to be held in Seattle October 5-8.

"On The Edge: A Pacific Rim Conference on Professional & Technical Communication" will focus on the unique problems of cross-cultural communication.

Mary Coney, associate professor, tied for first place in the 1987 Best Article Competition of The Association of Teachers of Technical Writing (ATTW) for her article, "Contemporary Views of Audience: A Rhetorical Perspective." Coney received the award in March at the Conference on College Composition and Communications held in St. Louis.

Judy Ramey and **David Farkas**, associate professors, will present papers at the International Technical Communications Conference (ITCC), "Freedom to Communicate," to be held in Philadelphia, May 11-13. Ramey's paper, "Interactive Interfaces: Hybrid Interfaces" will be presented in conjunction with a discussion of categorizing and assessing interfaces. "A Course in Computer Based Composing Strategies" will be presented by Farkas, and he will also lead a discussion of the Research Education and Training Professional Interest Committee.

The ITCC expects attendance of approximately 2,000 members and invitees.

The Washington Technology Center

Ilhan Aksay, professor of materials science and engineering, has been named Academic Engineer of the Year by the Puget Sound Engineering Council. The award was made in part, for Aksay's efforts to increase academic funding in the materials science programs, for his contributions to ceramic processing technology, and his work with the WTC. The Center extends congratulations to Aksay for this recognition.

The **Long Range Research Planning [illegible]mmittee** of the WTC will hold a meeting in Seattle on May 25. Over 50 participants are expected to attend. The meeting is a culmination of a series of discussions held by the seven high technology advisory committees of the WTC. At the meeting, the committee will review existing programs and recommer[illegible]roposals for the Center's future research.

Other College Activities

J.Ray Bowen, dean, chaired the American Society of Engineering Education's (ASEE) task force studying a projected decrease, over the next two decades, in undergraduate engineering enrollments. Dean Bowen presented the recommendations of the ASEE's Engineering Dean's Council at the Engineering Deans Institute in Puerto Rico in March.

The effort to develop a Center for Women in Engineering (WIE) is being directed by **Suzanne Brainard** serving as assistant to the dean. The development strategy is in place which seeks funding for the WIE Center from three sources: contributions from national corporations and foundations, contributions from state high technology companies, and funding from federal government agencies.

A proposal for funding, submitted to the National Science Foundation, is in the review process and word is expected in June. Corporate contributors to date include Aldus Corporation and Hewlett-Packard. The goal is to have the center operational by Fall.

Philip L. Bereano, associate professor, has been named to the Hanford Clean Up Task Force. The task force is coordinated by the Heart of America Northwest and is sponsored by the state's Congressional Delegation and Govs. Gardner and Goldschmidt (Oregon).

The group will analyze the benefits of cleaning up the site, and will also be responsible for coordinating the effort of the individuals and groups who share either concern or responsibility for the effort.

The statewide director for Mathematics, Engineering, Science Achievement (MESA), **Patricia MacGowan**, has been elected to chair The National Association of Pre-College Directors (NAPD).

In recognition of his achievements in Engineering, former Boeing Vice president of Engineering **George Martin** (A&A 1931) received the Pathfinder Award at a banquet on November 21 at the Museum of Flight. The award was established by the Museum in 1982 to recognize individuals who have made significant contributions to Northwest aviation. Also receiving Pathfinder awards were former Boeing test pilot, Tex Johnston; and founder and president of Pacific Northern Airlines, Arthur Woodley.

George Martin graduated cum laude from the University of Washington in 1931, a member of the first graduating class to receive the newly established B.S. degree in aeronautical engineering. His career at Boeing began that same year with a beginning assignment as a stress engineer; after 41 years, he retired as Corporate Vice President of Engineering. During his service with Boeing he held positions in both the B-17 and B-29 programs during WW II, and later the B-52 and Dash-80 development projects.

Most importantly, he played a pivotal role in the design and development of the XB-47 jet bomber, a project that the museum noted represented the greatest single advancement in long-range high-speed aircraft in history. The XB-47 provided the basis for every Boeing jetliner and jet bomber design that followed.

Arthur Bryson, a Paul Pigott professor of aeronautics and astronautics and mechanical engineering at Stanford University, lectured on "Automation and Optimization" at the November 18 Walker-Ames lecture series. Bryson is a world leader in the development and application of engineering control theory and is a Walker-Ames professor through the department of applied mathematics.

NAPD operates enrichment programs in 35 states, and in the 1986-87 school year served 40,000 students in grades 6 through 12. MacGowan will serve as chair through June 1989.

Nancy Cook has been named the new middle school statewide coordinator for MESA. Cook will direct a NSF grant designed to update and revitalize the middle school mathematics curriculum. The particular focus of the project will be to increase minority student enrollment in ninth grade algebra programs throughout the state.

Photo David Spengler

Cheryl Berg—director minority engineering program

Cheryl Berg, director, minority engineering program, was honored recently for outstanding results in college recruitment and retention of minority students. Berg received the 1987 Award for Professional Excellence from the Society for Hispanic Professional Engineers (SHPE) at the 1987 SHPE Awards and Installation Banquet held in Richland, Washington.

The editors of the Trend would like to apologize to Cheryl for an incorrect identification accompanying the Autumn Trend photo showing a gift presentation from Westinghouse to the minority engineering program (MEP). She was out of town at the time of the presentation, and Patricia MacGowan, statewide director of MESA, accepted the gift in her place. MacGowan was incorrectly identified as director of MEP.

The **Olympus Project** officially ended in March, leaving behind a legacy of IBM computers throughout the College of Engineering. About $8 million worth of computer equipment and software was added to the computing facilities on campus during the last three years as a result of the Project. The UW was one of 19 universities participating in this grant from IBM.

The second Vistas in Engineering speaker for the 1988 series will be **Dale D. Myers** deputy administrator of the National Aeronautics and Space Administration (NASA). He will present a public lecture on May 19, and is scheduled to meet with faculty and students on May 20.

An aeronautical engineering graduate of the University of Washington (1943), Myer's distinguished career includes service to the aerospace community not only within NASA, but also as president of North American Aviation and as under-secretary of the U.S. Department of Energy.

Most recently, Robert Marchessault, Xerox-NSERC professor of Chemistry at McGill University, Montreal, and an expert in textile and fiber chemistry, explored "The Public and Social Responsibility of Industrial Research Organizations" in his public lecture of March 3. In his technical lecture the following day, he discussed the technique of biomimetic imaging, a reproductive process involving chemical recognition.

Congratulations to **Lynn Hogan** College of Engineering director of development. Lynn has accepted an appointment as UW director of corporate/foundation relations. Lynn's three years of service are greatly appreciated by the College.

Steven Kramer, assistant professor of civil engineering and **Woodrow Barfield**, assistant professor of industrial engineering are recipients of National Science Foundation 1988 Presidential Young Investigator (PYI) awards. The awards, which last up to five years, can provide up to $100,000 a year in a combination of federal and private matching funds. The purpose of the awards is to finance research by faculty members beginning their careers.

The UW garnered seven of the 148 PYI awards for 1988, placing the UW third nationally. In the five years that the PYI program has been in existence, 26 awards have been granted to UW faculty, 11 to faculty in the College of Engineering, 14 in the College of Arts and Sciences, and one in the Health Sciences Center.

Jerry Paulson and well-wishers Photo Sharon Kasper

Jerald O. Paulson, administrator, engineering dean's office retired after 22 years of service with the College of Engineering—a total of 27 years of service with the UW. Two farewell gatherings were held to mark Jerry's departure: a well-attended retirement party and an impromptu send-off on his last day. (see photo)

Jerry's future plans include travel to Civil War battle sites, or "wherever else my wife wants to take me." His position will be filled by **Mary Melanson**, former business manager of university extension and summer quarter.

The office of engineering information services (EIS) extends best wishes to **Carol Weiland**, **Mary Cooksey**, and **Anna-Carol Wittenberg**. Carol left for her maternity leave. Mary is pursuing her career in technical communications at IBM, and Anna-Carol will be graduating in June.

Annalise Dickey and **Sharon Kasper**, both STC interns, joined the team to finish this edition of the *Trend*. With Mary and Carol, they served as co-editors of the Spring issue.

David Spengler will also be leaving his position as director of EIS in June. Will the last person to leave the EIS office please turn out the lights?

In Memoriam

Louis Trimble

Professor emeritus Louis P. Trimble died in Totnes, Devonshire, England, on March 9. A retired member of the Humanistic-Social Studies faculty, Professor Trimble is survived by his wife, Mary, of Totnes and his daughter, Victoria Trimble-Beetz, of Seattle. He was 71.

Louis, who joined the HSS Department in 1955, served it and the University for 25 years before he retired in 1980. In the 1960s, he and Professor Larry Selinker, then a member of the Department of Linguistics, designed courses for teaching scientific and technical writing to foreign students. Their experiments and continued research in English for Science and Technology (EST) led to joint publications that drew worldwide attention, followed by requests to present papers and to serve as consultants and lecturers in Europe, Africa, Latin America, and the Orient.

In 1973-1974, Louis took professional leave to lecture in Yugoslavia and to serve as consulting author-editor of a Croation textbook in EST. In the summers of 1975 and 1976, he and his wife, Mary Todd Trimble, conducted at the University an international Institute on Teaching EST. He remained active in the field after he retired: his latest book was *English for Science and Technology, a discourse approach*, published by the Cambridge University Press in 1985. Now and then he also found time for another favorite activity—writing popular fiction, of which he had published over 50 titles.

Jack Leahy

Jack T. Leahy, professor in the Scientific and Technical Communication Program, died on February 20 at the age of 57. He is survived by his wife, Margaret; two sons, Timothy and Peter, of Seattle; and a daughter, Kay Smithson, of Everett.

Professor Leahy had served the University for 30 years, most of which he spent on the faculty of the Department of Humanistic-Social Studies. Toward the close of his career, he served as department head of HSS and then as the director of the Engineering Advising Center. He also was an adjunct professor of English.

Jack was always active both on campus and off: he served on the ASUW student publications board; published a novel based on Pacific Northwest Indian culture, *Shadow on the Waters*; wrote prize-winning short stories; did book reviews for *The Seattle Times* and was drama critic for *The Argus* from 1963 to 1966.

As a teacher, he became well known in earlier years for his course on the theater. In late years, he began the study and teaching of literature from the Third World and, with wife Maggie, traveled extensively in the Orient and Latin America. Always a great friend of students, Jack also was a favorite of theirs.