UW EE CURRENTS

February 1999
Volume 1, Issue 4

Inside this Issue

This Newsletter appears three times per quarter. Please send any suggestions or comments to the editor, Veronica Young, at veronica@ee.washington.edu

University of Washington
Dept. of Electrical Engineering
Box 352500
Seattle, WA 98195-2500
http://www.ee.washington.edu

Bohringer Receives NSF Career Award

EE Assistant Professor Karl Bohringer has been honored as one of the United States most outstanding new science and engineering faculty members with receipt of the National Science Foundation's (NSF) Faculty Early Career Development (CAREER) award. CAREER awards were received by 338 faculty members nationwide in fiscal year 1998, given to exceptionally promising college and university junior faculty who are committed to the integration of research and education.

Karl Bohringer

"Methods and Mechanism for Micro Manipulation" is the title of Prof. Bohringer's winning proposal. The abstract explains how Bohringer plans to pursue his work in micro electro mechanical systems (MEMS) to build micromachines that can actively and accurately interact and change the physical world in a controlled and efficient way. Bohringer cites important applications that are difficult or impossible to realize with current technology and that are directly related to NSF strategic areas:1)techniques to efficiently move, sort, or mix small particles such as cells in biotechnology applications and 2)methods for massively parallel assembly of microfabricated components (for advanced manufacturing technology of high resolution display or imaging arrays). Bohringer plans to go in three major directions while pursuing this research: microfluidic manipulation of parts, a basis for analysis and synthesis devices in many biotechnology applications; massively parallel micro assembly, an enabling technology that will allow the efficient manufacture of a new generation of complex microsystems from simpler or standard components, and computational tools for modeling and simulation.

Ten current EE faculty have previously received NSF Career or Young Investigator awards:

Les Atlas
Murat Azizoglu
Richard Christie
Denice Denton
Blake Hannaford
Yasuo Kuga
Chen-Ching Liu
Eve Riskin
John Sahr
Denise Wilson

In addition, in 1996 Deirdre Meldrum won the Presidential Early Career Award for Scientists and Engineers (PECASE). This year, EE Adjunct Assistant Professor Chris Diorio also received this prestigious award, marking only the second time a UW faculty member has received a PECASE award.

Note: An article in our December edition failed to mention the following IEEE Fellows:

Thomas Pearsall
Ming-Ting Sun
Robert Spindel

ES^2 = K-12 Outreach

When Denise Wilson packed up and left the University of Kentucky in December, she not only brought her lab and household with her, she also brought an exciting new program that fits right in with the University of Washington's K-12 outreach focus.

Elementary Science for Elementary Students (ES^2) originated in January 1994 as a community outreach program designed to enrich and supplement math and science curricula of the schools in

metropolitan Atlanta. The program was started by Wilson, then a student at Georgia Tech. When Wilson accepted an Assistant Professor position at the University of Kentucky, she began a related program in Lexington which focused on two primary concepts in the elementary school systems of central Kentucky, namely:

•Exploring the fundamentals of electrical engineering via interactive demonstrations of electricity and binary (computer) basics.
•Exciting interest in engineering by equating fundamental concepts of interest at the Distributed Microsystems Lab at University of Kentucky with more intuitive concepts in the biological sciences.

ES^2 offered demos in these areas, free of charge, to elementary schools in central Kentucky. The program was supported by community outreach at University of Kentucky College of Engineering and by the education plan for Professor Wilson's National Science Foundation CAREER award. The program seeks to reinforce concepts presented in the elementary school curricula. Demonstrations offered by ES^2 give kids the opportunity to:

•**HEAR** the way it works.
(Interactive lecture format for understanding 2-3 fundamental concepts)
•**SEE** it happen.
(Visually intuitive and interactive lecture format)
•**MAKE** it work.
(Miniaturized experiments that reflect HEAR and SEE)

Professor Wilson is currently exploring funding options for such a program at the University of Washington. She is also searching for students who are interested in presenting the program at elementary schools locally. Her ultimate goal is to be able to reach students in rural and economically depressed parts of Washington with ES^2.

Students interested in getting involved with ES^2 may contact Professor Wilson at: wilson@ee.washington.edu.

EE Hires New External Relations Officer

Electrical Engineering has a new resource within the department, strengthening corporate and alumni relations and her name is Rosemary Coleman.

Rosemary has 13 years of experience in fund raising and public relations. Her background includes running her own consulting business, working for national non profit associations and working for a public relations agency. In her new role with the EE Department, she will be working with faculty, the College of Engineering and the office of Public Information to increase the department's revenue and visibility. Specifically, her job is to cultivate relationships with industrial partners, alumni and the EE community-at-large

Veronica Young will be assisting Rosemary in all external relations activities including preparing written materials, conducting building tours, event planning and conducting research.

Current external relations activities include forming a new EE Visiting Committee and Corporate Advisory Board, developing a new IEEE career development lecture series, securing sponsorship from Andersen Consulting and working with the College in securing a large donation of equipment from Intel's closing Fab5.

Rosemary is relying on faculty and students to give her input on their needs as well as notify her of potential opportunities. She can be reached at rosemary@ee.washington.edu. or (206) 221-5290.

MURI Project Focus on Acoustic Signal Processing

By Professor Les Atlas
atlas@ee.washington.edu

Our Center for Auditory and Acoustic Research (CAAR) is a consortium of researchers from three universities working in partnership with Department of Defense laboratories and industry. CAAR is funded by the Office of Naval Research through a 1997 Department of Defense Multidisciplinary University Research Initiative. This Center involves faculty, graduate students, and post-doctoral scholars from the University of Maryland, Boston University, and the UW Department of Electrical Engineering. The effort consists of multi-disciplinary experimental and theoretical investigations of the auditory system and computer-based acoustic signal processing. Researchers from areas as diverse as auditory perception, digital signal processing, and systems engineering have been teaming together with the aim of:

- capturing the functionality of the auditory system in the form of mathematical models and signal processing algorithms;
- implementing these algorithms in software and hardware, and evaluating the algorithms by comparing their performance to human performance and against a range of robustness and flexibility requirements;
- evaluating the usefulness of these implementations for a wide range of applications, including:
  1. acoustic diagnostic monitoring systems for machines and manufacturing processes,

2. battlefield acoustic signal analysis,
3. robust detection and recognition of multiple interacting faults, and
4. detection and recognition of underwater transients.

Our main focus at the UW is on the application of manufacturing sensing and signal processing, which was the main topic of a CAAR meeting at University of Washington December 1997 and December 1998.

Researchers From Three Universities Gather For CAAR Meeting At UW

The manufacturing application entails the sensing of acoustic signals emitted by machining processes and cutters with the goal of subsequently determining the identity or the state of the processes and whether any salient changes in its characteristics have occurred. This research has potential uses in numerous situations with significant financial implications such as the efficacy of cutting tools in aircraft part fabrication or within many other material removal processes. As has often been observed, the yield of many processes is highly dependent upon hearing and other senses of skilled machine operators. Important changes in the state of the process can often be heard by experienced operators, but past attempts to use accelerometers and other sensors, in conjunction with standard digital signal processing techniques, have not been useful for mimicking or augmenting the fine distinctions these skilled operators perceive. Thus, our CAAR group has approached this problem from the perspective of better understanding auditory processing of these types of sounds, abstracting the essential details of this processing into new digital signal processing theory, and testing this new theory on data provided by our industrial partners.

Our research has so far demonstrated the importance of the type of the signal representations used. For example, standard spectral analysis techniques do not have the richness to capture the combinations of types of acoustic and vibration events that accompany metal removal, while still successfully generalizing to new tools or materials. The auditory physiology experiments of Prof. Shihab Shamma (Center Director) of the University of Maryland and the auditory perception experiments of Prof. David Mountain (Center Co-Director) of Boston University have suggested totally new approaches to time-frequency signal processing theory which Prof. Atlas (Center Co-Director) of the UW has developed with Ph.D. students Jim Droppo and Brad Gillespie. This new theory has been put into use in a first set of experiments on metal milling data provided by Dr. Gary Bernard of Boeing Commercial Airplane Group's Manufacturing Research and Development Organization. Prof. Mari Ostendorf of Boston University and Prof. John Baras of University of Maryland have also contributed to this study, where final results will be discussed.

Sabbatical In Italy

By EE Professor Blake Hannaford

The main portion of my sabbatical leave was spent at Scuola Superiore di Santa Anna (SSSA), Pisa Italy. SSSA is a small elite research oriented University, closely affiliated with the University of Pisa (a large university about the size of UW). I worked there under the auspices of Prof. Paolo Dario who runs two laboratories, the Advanced Robotics and Technologies (ARTS) lab and the MITEC Lab (microfabrication).

During the time in Pisa, I wanted to learn more about the intellectual foundations of robotics. I spent a substantial portion of the sabbatical reading a body of recent literature in the area of "minimal robotic systems" - systems which are simple enough to permit complete mathematical analysis, but which have an element of "intelligence" which we associate with robots. In particular I read in the area of sensorless parts manipulation, work by Mason, Donald, Goldberg, Sanderson, and others. This work is very theoretical, but also of strong practical interest, since automatic parts feeding and orientation is still very difficult for industry. I plan to introduce this area in my advanced course EE544. This seems like a good fit since we have recently hired Karl Bohringer in our department who has done some important work exploring the implications of MEMs for minimalist robotics.

Blake Hannaford

It is interesting to note that library facilities at the University of Pisa and SSSA were greatly INFERIOR to our own (even though U. of Pisa is a state supported institution of about the same size with a full compliment of professional schools). It was difficult or impossible to locate many important journals, and the library facilities (except at SSSA) were generally run down. One assistant professor admitted to me that he was not pursuing a research area of great interest to him because "those journals are not available in Pisa." If this situation is typical of European Universities, it would seem that this has been a big strategic advantage for US institutions. However, as journals move to the internet, this advantage should evaporate.

I gave a series of lectures to the advanced graduate students in Pisa and used the occasion to improve the lecture notes that I use in EE543 and 544.
My second major activity was working with the students and junior faculty at the ARTS and MITEC labs. This resulted in the development of a 4-axis micro-gripper. We have submitted a joint paper to IEEE International Conference on Robotics and Automation, the most important robotics conference.

Professor Hannaford's Lab in Pisa, Italy

I also interacted with Prof. Massimo Bergamasco of the SSSA who is a world leader in the design of haptic devices (which is one of my research areas).

Finally, Prof. Dario and I are both interested in continuing collaboration. We have proposed exchanging personnel and one of my graduate students is currently planning a 3-month stay in Pisa next spring. Prof. Gaetano Borriello of UWCSE also spent a sabbatical at SSSA recently so the potential for interaction between the College of Engineering and SSSA seems strong.

EE, Law Firm Team Up On Intellectual Property Course

The Department of Electrical Engineering will offer a survey course on intellectual property issues for advanced undergraduate and graduate engineering students in spring quarter of this year. The course will be taught by attorneys working in the intellectual property division of Preston Gates & Ellis, a Seattle law firm. Timothy Nielander, an associate with Preston Gates & Ellis and EE Chair Howard Chizeck met several times, working to develop this course which is believed to be the first of its kind in the nation.

The EE department's motivation to present this course lies in the recognition that a large portion of today's engineering students will pursue careers involving the generation and application of intellectual property. UW EE students are likely to enter the technology sector and should have a basic understanding of the legal mechanisms which govern the creation, protection and exploitation of innovation.

The seminar is set to meet Mondays at 4:30pm in EE/CSE 037 during spring quarter. The section for undergrads is EE 400L while the section for graduate students is EE 500L.

Restructuring Committee Seeks Input

Electrical Engineering's restructuring committee wants to hear your ideas on changes to the organization and procedures in our department. A recent e-mail from the committee included a questionnaire to allow individuals to provide input to the committee. The questionnaire touches on each of the areas the committee is considering: technical services, academic advising, research administration, fiscal administration, and academic support. Completed questionnaires can be returned in the ways mentioned below:

- E-mailing it to question@ee.washington.edu
- Cutting and pasting the questionnaire into the comments box of the suggestion web page (listed at the end of this story).
- Turning a paper copy in to the receptionist in the main office (Room 253).

More detailed or specific suggestions can be made through a web page: http://www.ee.washington.edu/intrastaff/suggbox.html. In addition, the restructuring committee will be hosting a number of focus groups to obtain input. All staff, students, and faculty are encouraged to participate.

In Memoriam
Alistair Holden
11/08/28-2/04/99

Emeritus Electrical Engineering and Computer Science & Engineering Professor Alistair Holden passed away on February 4, 1999 after a brave battle with cancer. He was 70 years old.

Professor Holden was born in the Highlands of Scotland . He received his BSc degree from the University of Glasgow, after which he spent two years with the British Broadcasting Corporation's Engineering Division as a graduate apprentice in the research division. He received his MS from Yale and his PhD from the University of Washington. His research interests included artificial intelligence and speech recognition.

Holden was a moving force behind the introduction of the computer science program at UW, an effort headed by faculty from the math and electrical engineering departments on campus. He also served as director of the Minority Introduction to Engineering (MITE) program; an intensive two-week live-in program for high achieving minority and women high school seniors which gives those involved a realistic introduction to engineering studies while attempting to attract them to this career field.

Congratulations to the following expanded households:

- **Les and Janet Atlas** and daughter, Darcy.
- **Murad and Nasreen Yousuf** and son, Shahrukh.
- **David and Grace Murphy** and son, Drake.

Who's Who In EE Undergraduate Advising

The University of Washington's department of Electrical Engineering current has 420 students pursuing a BSEE. For these students, and others who are considering declaring a major in electrical engineering, the EE's Advising office, located in EE/CSE Room 215 is the place to ask questions and get answers. Here are some of the people who work hard on undergraduate issues:

Jason Kerber: Sitting at the front desk of the advising office, Jason's smiling face is the first one you see upon entering the advising suite. He is able to answer undergraduate students general questions and point them in the right direction if they need further information. He schedules appointments for the undergraduate academic counselor and has information for students on scholarships and degree requirements. Jason has served in this position since June 1997 and says his favorite part of the job is the international flavor; that is, dealing with a wide variety of students from various global origins.

Coming Soon!
IEEE Career Development Lecture Series

Helene Obradovich: Helene has served as EE's undergraduate academic counselor since November of 1997. She has a MA in Education from the University of Georgia. Her duties involve meeting with prospective students, making new students aware of degree requirements, and ensuring continuing students stay on the right course path so they are able to graduate. She also enjoys working with students on long-term career development issues and helping to connect them with resources if personal issues arise for which the student seeks assistance. Helene's main focus is on undergraduates: getting to know the students, finding out where they want to go and helping them get there!

James Ritcey: Professor Ritcey recently accepted the position of Undergraduate Coordinator for Electrical Engineering. Ritcey joined UW EE in 1985, after receiving his Ph.D. from University of California at San Diego. Matters he is currently working on in conjunction with this role include undergraduate admissions, the undergraduate studies committee and getting the department ready for the ABET reaccredidation visit in 2000. Professor Ritcey proudly states "The BSEE degree at the University of Washington is a difficult degree to obtain, due in part to the diverse nature of subjects one needs to grasp but with this degree students can start a good career wherever they want with the knowledge they've gained."

IEEE UW Student Chapter News

The IEEE Student Chapter recently hosted its "Back From the Dead" lounge renovation party, in an effort to update the IEEE student lounge. The IEEE will soon be hosting a series of seminars aimed at helping EE students transition through the department and onto the working world. Keep posted for information on a seminar with Anderson Consulting. Your comments, ideas, and suggestions for future seminar topics are needed! Contact the officers of IEEE at ieee@ee.washington.edu with any ideas.

As always, the IEEE has EE Department T-Shirts and sweatshirts for sale. Ordering and membership information are available on our NEWLY UPDATED web page: www.ee.washington.edu/student/ieee.

EEIC Event Features Pizza, Students & Industry

The Electric Energy Industrial Consortium (EEIC) will present its annual open house in the upper basement of the EE/CSE Building on Tuesday, February 23 at 3:30pm. The event will feature an energy group and economics graduate student poster contest (1st prize being an all-expenses paid trip to the IEEE summer meeting in Edmonton), industry information tables and feature presentations, the opportunity to interact with local industry leaders, and the chance to enjoy free pizza and beverages. For every information table or poster presentation visited, students will receive a ticket for entry into door prize drawings (prizes include pocket calculators and t-shirts) which will follow the poster award presentation at 6:45pm. All engineering students are invited to attend. For more information, contact Dena Petersen: dena@ee.washington.edu

Chair's Message

Our Seattle days are growing noticeably longer. The red and pink camellia blossoms have been joined by the first flowering crabapple trees on campus. The earliest of the daffodils begin to flower, and the rhododendrons are getting ready. Early spring growth is evident all around us. I am pleased to report that the department is growing and blossoming as well.

The faculty search is well underway. Several hundred applicants have applied for our 7 openings. Our very hard working Faculty Search Committee is now meeting twice weekly to screen applicants, extend invitations and make recommendations. By the time you read this, we will have interviewed at least 7 candidates, and another 15 visits will have been scheduled. There is real excitement about the outstanding quality of the candidates, from new Ph.D.'s to senior faculty of extraordinary international reputation. These new faculty will accelerate our effort to become one of the top Electrical Engineering departments in the world.

In order to grow and blossom, and tell the world how well we are doing, we have begun a new effort in our 'external relations' -- the combination of public, industrial, and alumni relations and development. As described in this newsletter, we have hired Rosemary Coleman as our external relations officer. Rosemary's job is to increase our visibility and our external revenue. She will work with the faculty and the college to help us to obtain the resources that are necessary to achieve true excellence. Rosemary will be building relationships with industrial partners and alumni. She will also assist our faculty and students in disseminating the results of our accomplishments to general public. I am extremely encouraged by the positive results that we have achieved in the past month. I encourage all of you to contact Rosemary with your suggestions.

Our research and teaching can only be as good as our faculty and graduate students. We are working hard to enroll all of a recent burst of superb graduate student applicants. We have begun new efforts to actively recruit outstanding graduate students from U.S. universities. In particular, the department is using gift monies to provide highly competitive new RA stipend supplements and fellowships. We hope to increase the number of these through development efforts.

The department restructuring effort is making good progress. Suggestions are being received from e-mail surveys, the web page link, personal meetings with the restructuring committee and focus groups. I urge you to provide your suggestions about department operations, if you have not already done so. Thanks to everyone who has already participated. The target date for the committee's recommendations to me is May 1, and we plan to implement changes in computing and technical support, academic support, advising and all other staff functions by the beginning of the budget biennium on July 1.

The faculty curriculum groups are working on a full review and renovation of our courses, in participation for the ABET accreditation visit in 2000. The rapid rate of change in electrical engineering technology makes frequent curriculum revision a necessity. In addition to 'regular' courses, there are several new educational initiatives that I am pleased to mention. One of these is the Intellectual Property course that will be offered this spring quarter, with the tremendous assistance of the IP group of the Preston-Gates-Ellis law firm. I encourage all of our students to consider attending. A second, less formal training effort is the new monthly undergraduate seminar/meetings that the are being organized by the IEEE student group. These sessions will include presentations by industry representatives about career opportunities, workshops on resume and interviewing skills, explorations of engineering ethics issues, instruction regarding compensation options and other career-related topics of interest.

I am seeking nominees and volunteers for a Student Advisory Committee. This committee will help the department to provide the very best quality of undergraduate and graduate education. If you are an EE undergraduate major or graduate student and would like to serve, please email me.

Best wishes to all as we finish the winter quarter, and begin spring.

-Howard Chizeck

February/March Events

February 26
Faculty Candidate Seminar
10:30-11:20 EE/CSE 403

March 1
Faculty Candidate Seminar
2:30-3:20 EE/CSE 403

March 2
Faculty Meeting
2:30 EE/CSE 003

March 10
Faculty Candidate Seminar
10:30-11:20 EE/CSE 403

March 12
Faculty Candidate Seminar
10:30-11:20 EE/CSE 303

March 16
Faculty Meeting
2:30 EE/CSE 003

March 19
End of Winter Quarter