Electrical Engineering

Fall 2008

The Integrator

UNIVERSITY OF WASHINGTON
COLLEGE *of* ENGINEERING
A Community of Innovators

Faculty and Students Help Improve Energy Efficiency for Local Industry

Pictured (L to R): Brian Pepin (undergraduate student), Ryan Campbell (graduate student), Alexander Mamishev (associate professor), Gina Hicks (undergraduate student).

The UW Industrial Assessment Center (IAC), led by Associate Professor Alex Mamishev, is playing a significant role in helping local industry improve energy efficiency for manufacturing processes. In the climate of rising energy prices, the energy assessments provided by the IAC maintain the health and competitiveness of Washington industry. In the last two years, the IAC provided 114 energy-saving improvement recommendations to 20 companies, representing a total annual savings of $895,011 in electricity charges, and $378,546 in natural gas costs.

In addition, the assessment process provides a means for students to further their education and to work with other UW researchers. Engineering students obtain hands-on experience in systems analysis. Engineers not involved in the IAC can also benefit through the center's unique ability to find early adopters and field trial sites for cutting-edge technologies. In this way, the IAC serves as a launching pad for new and innovative technologies developed at the UW.

In this issue

Lytle Lecture Series Commences

We are thrilled to report that generous alumni, friends, and family of the beloved Dean Lytle have contributed more than $100,000 to the Dean Lytle Electrical Engineering Endowed Lectureship. The inaugural lecture is Monday, September 29, 4:30–6:00 p.m. in Sieg Hall 134. Vince Poor, dean of the School of Engineering and Applied Sciences at Princeton University, will present "Anytime, Anywhere: The Wireless Revolution."

We hope you will join us for the lecture and the wine and light hors d'oeuvres reception that follows. To kick off EE's Technical Colloquium Series, Dr. Poor will deliver a more technical lecture at 10:30 a.m. on Tuesday, September 30 in EEB 125.

Message from the Chair

Continuing to bolster our education program is our key focus, providing our future leaders the vital tools to become successful contributing members of society. Evidence that we are already making progress on this front is in the 2009 *US News and World Report* rankings—the UW EE Undergraduate Program has moved up a spot from 17th to 16th. Having just watched our most recent graduates (148 BSEEs, 66 MSEEs, and 25 PhDs to be exact!) receive their diplomas last June, I feel proud to know that some of the nation's finest electrical engineers are coming straight from UW EE.

Highlights of the 2008 Graduation Ceremony included our very own William Mortensen (BSEE '08), who carried the Engineering banners as the 2008 Dean's Medal Winner. We were also fortunate to have alumnus Keith Rattie (BSEE '76) return to campus and speak at Commencement about his success as CEO of Questar Corporation, an $11 billion dollar energy company.

In less than one year, our Professional Masters Program (PMP) has doubled in size to nearly 100 students, showing a real need in industry for increased expertise in specialized EE fields. An advisory board is also in the works to ensure that the PMP is well-tailored to industry needs.

And finally, as we gear up for the new academic year, I would like to encourage you to attend one or more of the excellent lectures offered this quarter (the Dean Lytle Electrical Engineering Endowed Lectureship, and the 2008 Engineering Lecture Series). Vince Poor, dean of the School of Applied Sciences at Princeton University will give the inaugural lecture for the Lytle Lecture Series, and Associate Professor Babak Parviz will speak about his work at the 2008 Engineering Lecture Series. Additional information about these lecture series is covered in this issue of *The Integrator.*

Leung Tsang
Professor and Chair

2008 Engineering Lecture Series: *"ENGINEERING INSPIRED BY NATURE"*

Back to Nature for the Next Technology Revolution

Babak Parviz, Associate Professor, Electrical Engineering
Wednesday, November 19, 2008
7 p.m., Kane Hall room 110

Just 40 years ago, a computer had 2,000 transistors. Today's CPUs have one billion and tomorrow's units will have billions and billions of tiny components. But they can't be manufactured with today's technology. So where do we turn? Engineering researchers such as Babak Parviz are studying nature on the nanoscale to create the next technology revolution. Imagine using DNA as a template to "grow" electronic devices, or custom designing molecules to build transistors. It could transform our future.

Co-sponsored by UW Engineering and the UW Alumni Association. The lecture is free, but seating is limited and registration is required.

*Register online at **UWalum.com** or call **206-543-0540.***

Other lectures in the series are October 16 and 30.

For information, visit:
www.engr.washington.edu

Development Update

June brought an end to Creating Futures, an eight-year campaign during which generous alumni and friends contributed an unprecedented $2.68 billion to the University of Washington! We are grateful to all the passionate advocates of the Electrical Engineering Department whose generosity has helped us enhance student, faculty, and program support in significant and meaningful ways. During the campaign gifts from 2,370 alumni and friends of EE totaled $13,248,510.

New EE Endowments

- The Donald W. & Ruth Mary Close Endowed Professorship
- The Paul C. Leach Electrical Engineering Fellowship
- The John & Laurel Coltart Endowed Scholarship
- The Robert & Kristine Shanafelt Endowed Scholarship

Recent EE Fund Expansions

- Nearly $55,000 contributed to the *Akira Ishimaru Endowed Fund*
- More than $28,000 contributed to the *Professor Chih-Chi Hsu Memorial Scholarship*
- Nearly $55,000 contributed to the *Professor Irene C. Peden EE Fellowship*
- More than $100,000 raised for the *Dean Lytle Electrical Engineering Endowed Lectureship*

For more information on how you can support the EE department, visit our online giving site:
www.ee.washington.edu/supportee
Or contact Kelly Oswald at:
(206) 685-9816 or kyoswald@u.washington.edu

2008 Awards & Fellowships

Awards

2008 Dean's Medal -
William Mortensen
Teaching Assistant Innovator Award -
Ken Eguro
Faculty Innovator for Research Award -
Professor Mari Ostendorf
2008 S. Sterling Munro Public Service Teaching Award -
Professor Denise Wilson
Intel Foundation SRCEA Scholarship -
Ying Su
2008 Distinguished Achievement Award from IEEE Geoscience & Remote Sensing Society -
Professor Leung Tsang
Distinguished Masters Thesis Award from the UW Graduate School -
Charles Pascal Clark

Fellowships

Intel Fellowship -
Arun Sathanur, Cherry Wakayama, Jeffrey Walling
Microsoft Fellowship -
Anna Pyayt, Amar Subramanya
EE Rushmer Innovator Fellowship -
Katherine Lugo Obando
Achievement Rewards for College Scientists (ARCS) -
Adam Greenhall
Grainger Fellowship -
Scott MacPherson
Nanotechnology Early Bird Fellowship -
Daniel G. Kelly
College of Engineering Boeing Fellowship -
Julie Medero, Christopher Lydick, Jeffrey Mills
College of Engineering Gellert Fellowship -
Kwang Soon Park
College of Engineering Gray Fellowship -
Ryan Ricchiuti
College of Engineering Kaiser Fellowship -
Herman Buchanan

Photo by Kyle Johnson

Education Amplified

Undergrad Applies EE Coursework to Develop Verellen Amplifiers

EE undergraduate student Ben Verellen started playing in bands at age 13 and has always been interested in what makes musical instruments work, particularly tube-driven guitar amplifiers. After graduating high school, he debated on how he could apply his education to music. This prompted the Tacoma native to enroll in the UW EE undergraduate program.

Learning about circuitry in EE 331 spurred Verellen to find a way to work vacuum tube technology into his coursework. "I literally emailed every professor in the EE department asking if anyone was interested in vacuum tubes," says Verellen. Assistant Professor Brian Otis, himself an avid vacuum tube enthusiast, responded and sponsored a special projects course. Three months later, Verellen had a working (but ugly) tube amp and some raw analysis of its workings. "Professor Otis has been helpful on different levels. He's really pushing me to analyze and simulate these

devices and circuits, which is great," says Verellen.

The next steps for Verellen and Otis will include building CAD models for the vacuum tubes that are similar to transistor models used in advanced integrated circuit design. Their goal is to simulate complex circuits and capture subtle effects that are not obvious by manual inspection of a schematic. "This will help unravel the 'magic' of some of the classic amplifiers and ultimately allow Ben to design new and better amplifier topologies," says Otis.

So why vacuum tubes over silicon devices? Although silicon amplifiers exhibit superior linearity (lower distortion), many musicians feel that tube sound is far more pleasant. "What makes tube distortion musical is the harmonic distribution caused by the asymmetrical soft clipping," says Verellen.

Verellen has already established a business, Verellen Amplifiers, which he runs out of his home in Wallingford. He tailors his custom-made amplifiers to the underground music culture. "I've spent at least as much time on tour and in recording studios as in classrooms over the last 15 years, making friends with like-minded musicians," says Verellen. "I think that gives us a unique insight, and access to a huge pool of really good ideas as well as valuable opinions."

In addition to juggling his business and EE classes, Verellen has given guest lectures in Otis' analog circuits classes that included, of course, live amplifier demos. "Ben's story is highly inspirational," says Otis. "It's exciting for the students to see real applications of their coursework. Moreover, it is inspiring to see Ben use education to follow his passion with extremely successful results."

In Gratitude to the Late Professor Howard Myron Swarm
by N. Narayana Rao

As a faculty member from 1951 to 1981, the late Professor Myron Swarm is still fondly remembered today. Swarm received both his BSEE ('40) and MSEE ('50) degrees from the UW. He was hired as an instructor in 1941 and became an assistant professor in 1951. As a successful electromagnetics researcher, Swarm, along with Professors Don Reynolds and Irene Peden and three graduate students, traveled to Antarctica to lay a 21-mile antenna for propagation and measurements in the Antarctic regions.

Below is a tribute from N. Narayana Rao, one of his former graduate students. If you would like to share a fond memory of Myron Swarm, or any other former or current EE faculty member, please send it to:

alumni_relations@ee.washington.edu

Fifty years ago in 1958, I arrived in Seattle from India to become a graduate student of Myron Swarm. With him as my advisor, I received my MS and PhD degrees in 1960 and 1965, respectively. I then went to the University of Illinois at Urbana-Champaign, and served on the faculty of the Department of Electrical and Computer Engineering for 42 years, before retiring in 2007 as the Edward C. Jordan Professor Emeritus of Electrical and Computer Engineering. During these 42 years, I was involved in research, teaching, writing textbooks, administration, and international activities, thanks to the solid academic foundation received from the University of Washington.

Professor Swarm was a great academic advisor, always willing and ready to help his students. He was also a very kind person. In this article, I would like to share with you a personal story involving his kindness. We co-authored a 1959 paper from my MS thesis work, "Lunar Tidal Variations in the Ionospheric Layers," that was accepted for presentation at the URSI (International Scientific Radio Union) meeting in San Diego, Calif. Professor Swarm wanted me to attend the meeting to present the paper, even though he would also be attending the meeting.

He approached the department for travel support for me, but the department's policy did not allow it for graduate students. Instead of going alone and presenting the paper without me, he asked if I could afford to pay for the trip myself. When I replied in the negative, he immediately pulled out a $100 bill from his wallet and gave it to me, with which I made the trip to San Diego to present the paper. I can still visualize him doing this very kind act on the spur of the moment.

Pictured (L to R): Myron Swarm, unknown, Milton Scovill from Pacific Bell, Donald K. Reynolds.

I strongly believe in a saying by a late spiritual guru: "Gratitude and appreciation are the key virtues for a better life. They are the spell that is cast to dissolve hatred, hurt and sadness, the medicine which heals the subjective states of mind, restoring self-respect, confidence and security." I am grateful to Professor Swarm for his kindness and contributions to my successful professional career.

Alumnus Tom Rolander - Avid Innovator and Athlete

More than 30 years after earning his master's degree in EE and the successful launch of five software start-up companies, Tom Rolander's passion for innovation remains as fresh today as when he was a student at UW. Rolander's most recent entrepreneurial venture, CrossLoop, Inc., closed a second round of venture capital financing in mid-August, and has already logged more than 2.5 million downloads.

Rolander's inspiration for CrossLoop stemmed from his father's Alzheimer's diagnosis in 2005. After receiving the devastating news, Rolander struggled to find a way to use his engineering background to help shoulder some of his mother's new caretaking responsibilities. Over several months, Rolander made many trips from his home in Pacific Grove, Calif., to his parent's Seattle apartment, working on their computer and writing code that solved his dilemma. His efforts created a foundation for the secure desktop sharing software that is now available in 21 languages and used by individuals and businesses in more than 190 countries for technical support, training, and collaboration.

By developing software that allowed access to his parents' computer, Rolander was able to engage his father via webcams, slideshows, and voiceovers from nearly 1,000 miles away. With the webcam routed through the television, he could "watch" his father for 45-minute stretches, allowing his mother to run errands or take a break from caregiving. His mother was grateful for some time to herself, and Rolander cherished the opportunity to connect with his dad and revisit special memories they'd shared.

Rolander was born in Kiomboi, Tanzania, where his parents were Lutheran Missionaries. They returned to the US when he was a young child, and he grew up in Auburn, WA, East Orange, NJ and Seattle. After graduating from Ballard High School, he headed for the UW.

Paying his own way and working full-time for ten years, Rolander earned a BS in civil engineering and an MSE in electrical engineering. During graduate school, Rolander held a paid internship at Fluke, and carpooled there with fellow student and current EE faculty member Jim Peckol. At Fluke they gained practical experience, access to labs and equipment, and tuition support. Upon graduation in 1976, Rolander spent two years with Intel in Santa Clara, Calif., and then moved to Pacific Grove to join forces with another UW Engineering alumnus, Gary Kildall, at Digital Research. There, Rolander wrote two operating systems, MP/M and CP/NET, rose to become vice president of engineering and later of research and development. Entrepreneurship beckoned, and Rolander left Digital Research with Kildall and eventually started three successful software companies. Although
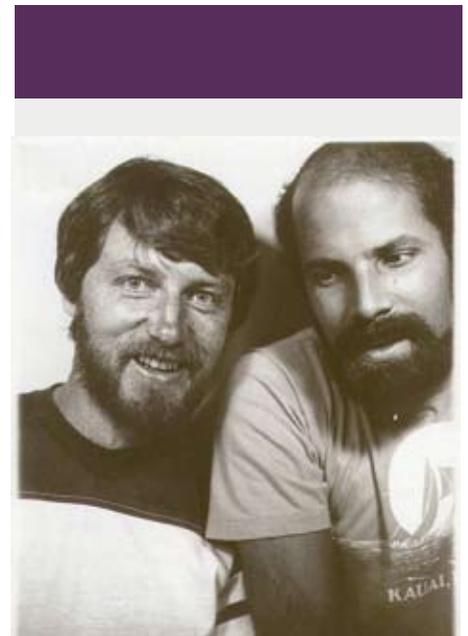
A photo from Sir Harold Evans' book They Made America *of Kildall and Rolander in a Monterey photo booth.*

The EE department not only provides a foundation for lifelong innovation, but for lifelong friendships. Rolander remembers fondly the time he spent in the EE department, particularly the late evening he met fellow student Gary Kildall in a computer science lab. Kildall was the famed microcomputer entrepreneur who created the CP/M operating system and founded Digital Research, Inc. Rolander and Kildall became close friends, later started three software companies together, and served as best man in each other's wedding.

he stepped out of the software arena for a couple years to volunteer full-time and became CTO for Benetech Technology Serving Humanity, he couldn't stay away for long. "Starting software companies is in my blood," he says.

One of the secrets of Rolander's serial successes lies in linking up with a partner whose skills complement his. "If you are technical, find someone who knows the business side. Outstanding technology is not sufficient; you win because of your position in the world market," says Rolander. In his experience, once a company grows beyond five or six people, it is no longer possible for one person to manage both the technical and business aspects. Rolander credits Kildall with providing the business acumen at Digital Research and KnowledgeSet, and after two years at the helm of CrossLoop, he has hired a CEO with a Harvard MBA.

Rolander tempers the intensity of his work life with equally ambitious athletic pursuits. He is an avid sailor, pilot, cyclist, and runner, and recently competed in the Pikes Peak Marathon (elevation 14,110 feet), his fourth marathon since turning 60 earlier this year, and his 98th marathon to date.

We look forward to welcoming Tom Rolander back to campus this winter, as one of our speakers for the 2009 EE Leadership Seminar Series.

Alumni on the Radar
EE Class Notes

We would like to hear from you! Check out our Alumni Connections web page to read a complete list of updates from your former classmates, or to provide an update of your own:

www.ee.washington.edu/people/alumni/index.html

Chin-Hui Lee, *PhD '81*
Atlanta, GA – Lee is a Professor of ECE at Georgia Institute of Technology, Atlanta. Before joining the faculty at Georgia Tech in 2002, he worked for two start-up companies, followed by 15 years of research at Bell Labs, Murray Hill, and one year as a visiting professor for the School of Computing at the National University of Singapore.

Jerry Russell, *BSEE '96*
Seattle, WA – For three years, Russell worked for Lattice Semiconductor in the San Francisco Bay Area. He left there to start his own software company, and has bounced around as a lead architect for various software companies. Russell is now a lead architect at Oracle.

Mark Hirota, *BSEE '01*
Kent, WA – After graduation, Hirota began working with the Enterprise Platform Group at the Dupont, Wash. site. He's been working there ever since, doing validation on Intel's Xeon processors and server class chipsets. During this time, he has met scores of fellow employees who are UW grads—go Huskies! Hirota is happily married with three beautiful daughters and resides in his hometown of Kent.

Will Biederman, *BSEE '08*
Fox Island, WA – Heading to Berkeley for grad school!

Clement Sun, *MSEE '08*
Bellevue, WA – Sun will spend the next seven years in Texas earning dual MD/PhD degrees from the University of Texas Medical Branch at Galveston and the University of Texas at Austin's Bioengineering Department. He'll be back in Seattle in 2015...or, that's the plan.

The Professional Masters Program
Earn an MSEE in the Evening

With a stellar curriculum equivalent to the UW's daytime Electrical Engineering masters program, the PMP offers a wide range of courses, from wireless communications and electromagnetics to microelectro-mechanical systems. Courses are taught by UW faculty members. The PMP leads to the same degree (MSEE) offered through the daytime program. To learn more about the program:

- **Attend an Information Session:**
  Tuesday, November 4th, 5:30pm-6:30pm
  RSVP to DJ Miller at: mrmiller@u.washington.edu

- **Join the PMP Mailing List:**
  www.ee.washington.edu/academic/pmp/pmp_info.html

- **Visit the PMP Website:**
  www.ee.washington.edu/academic/pmp/index.html

"I think this program has a lot to offer—it allows me to simultaneously advance my education and career—and the atmosphere is fun and enjoyable."

– Jessica Yan,
PMP Graduate Student

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Website: www.ee.washington.edu / Tel: 206.221.5270 / Fax: 206.543.3842

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Leung Tsang
Professor & Chair

Sumit Roy
Associate Chair for Research & Development

James A. Ritcey
Associate Chair for Education

Laura J. Haas
Publications Manager

Contributors
Kelly Oswald
Sandy Marvinney
Thomas Jones

Send address corrections to:
alumni_relations@ee.washington.edu

University Of Washington
Department of Electrical Engineering
Paul G. Allen Center - Room AE 100R
Box 352500
Seattle, Washington 98195-2500