ECE ILLINOIS
Electrical and Computer Engineering Alumni News
ECE Alumni Association newsletter
University of Illinois at Urbana-Champaign

Winter 2005-2006
Volume XL

Inside this issue

Jack Kilby, 1923–2005

Cancer claims Nobel laureate, ECE alumnus

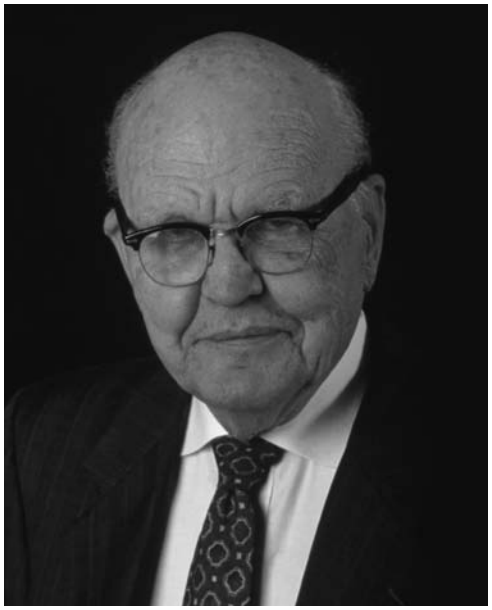
By Laura Schmitt and Jamie Hutchinson

Microchip inventor and Nobel physics laureate Jack Kilby (BSEE '47) died from cancer on June 22, 2005. He was 81.

Kilby received the 2000 Nobel Prize in Physics on December 10, 2001, in an award ceremony in Stockholm, Sweden. Kilby was recognized for his part in the invention and development of the integrated circuit, which he first demonstrated on September 12, 1958, while at Texas Instruments. At the Nobel awards ceremony, Royal Swedish Academy member Tord Claesen called that date "one of the most important birth dates in the history of technology."

A measure of Kilby's importance can be seen in the praise that was lavished on him in death. Lengthy obituaries appeared in engineering and science trade publications as well as in major newspapers worldwide, including the *New York Times*, *Financial Times*, and *The Economist*. On June 24, ABC News honored Kilby by naming him its Person of the Week. Reporter Elizabeth Vargas introduced the segment by noting that Kilby's invention "had a direct effect on billions of people in the world," despite his relative anonymity among the general public.

Among electrical engineers, however, Kilby's name carries legendary status. Electronic *Engineering Times* editor-in-chief Brian Fuller eulogized Kilby as "the soul of innovation." Intel Chairman Emeritus Gordon Moore recalled Kilby as "an engineer's engineer, who remained true to his technical roots and loyal to the principles of science."



Jack Kilby

Kilby grew up in Great Bend, Kansas, where his interest in electricity and electronics blossomed at an early age. His father ran a power company that served a wide area in rural Kansas, and he used amateur radio to keep in contact with customers during emergencies. During an ice storm, the teenage Kilby saw firsthand how electronic technology could positively impact people's lives.

Kilby entered the Illinois EE department in the fall of 1941. He completed his first two years, but his education was interrupted by the war. After serving in the Army, he returned to campus in January 1946. According to Kilby, his formal training was in electrical power, but he had taken some vacuum tube classes and he studied some engineering physics.

He began his career in 1947 with Centralab, a Milwaukee-based electronics manufacturer,

Jack Kilby, 1923-2005, continued on page 39

ECE Alumni News is published by the University of Illinois at Urbana-Champaign Electrical & Computer Engineering Department and the ECE Alumni Association. Your feedback is welcome. Please send comments to Beth Katsinas at katsinas@uiuc.edu.

Department head's message

Richard E. Blahut

I want to use my message this issue to discuss the state of the Department of Electrical and Computer Engineering and the future of the department. From the office of the department head, one can appreciate the full breadth of all that we are doing.

I want to first convey my broad view of how the department is developing and changing. Our department is now much richer and broader than the traditional electrical engineering department of a generation ago. Currently, we have faculty in the ECE Department with degrees in electrical engineering, computer engineering, computer science, physics, mathematics, materials science, chemistry, and linguistics.

Our faculty collaborate with other faculty, not only throughout the College of Engineering, but across many colleges at the University, and with many other people and institutions, both nationally and internationally. Each of our research areas is broad. Our physical electronics research involves not only physics and electronics, but also chemistry, materials, cell biology, and microbiology. Our bioimaging research interacts with medicine and physiology. Our electromagnetics research interacts with civil engineering, plasmas, displays, and aeronautics. Our signal processing research also involves psychology and linguistics. Our research in communications and control involves game theory, networking, information theory, the dynamics of economic systems, and cryptography. Our research in computer engineering involves computer science, circuit theory, robotics, graphics, and complexity theory. Our research in circuit theory ranges from physical electronics and custom VLSI chips to large software design tools. Our power program involves the production and secure transmission of energy, with research in large transmission lines and networks, rotating machinery, batteries, power supplies, and regulation.

Additionally, our graduates now go on to a variety of careers in engineering, finance, law, medicine, management consulting, politics, and so on. Many undergraduate students see engineering as a first degree to be followed by a professional degree in one of these other areas. I encourage this as it is an excellent opportunity for us to prepare ECE students to be leaders in the global society and economy.

As we enter deeper into the new century, our ECE Department must continue to work collaboratively with other disciplines and continue evolving and expanding its breadth. Our student admissions and advising policy must keep pace with this evolution. Our PhD program will continue to welcome the best graduates from a variety of undergraduate curricula: computer engineering, computer science, electrical engineering, mathematics, and physics.

Our mission is to educate our undergraduate and graduate students in the fundamentals of our discipline, to provide practical experience in our extensive suite of laboratory courses, and to foster leadership and the maturity to see competitors and cooperatives as playing two positive roles. Our graduates will enter leadership positions later in their careers and our program must provide both technical knowledge for the early years of the career and the foundations on which later maturity will develop.

Flexible tactile sensors could help robots work better

By James E. Kloeppel, U of I News Bureau

A robot's sensitivity to touch could be vastly improved by an array of polymer-based tactile sensors that has been combined with a robust signal-processing algorithm to classify surface textures. The work, led by ECE faculty members Chang Liu and Doug Jones, is an essential step in the development of robots that can identify and manipulate objects in unstructured environments.

"We are developing artificial tactile sensors that will imitate the functionality and efficiency found in biological structures such as human fingers," said Liu. "We have shown that simple, low-cost sensor arrays can be used to analyze and identify surface textures."

Biological sensors provide a wealth of information concerning the shape, hardness, and texture of an object. Robots, which typically possess a single pressure sensor in their grip, can't determine whether an object is hard or soft, or how hard it is squeezing an object.

"One of the unsolved problems in robotics is the handling of delicate objects such as eggs," said Jones. "The distributed sensing we have in our hands allows us to grab an egg with enough force that it won't slip, but without so much force that it breaks. One of our goals is to develop an array of sensors that provides robotic systems with a similar source of tactile feedback."

Completing the research team are ECE graduate student Sung-Hoon Kim and mechanical engineering graduate student Jonathan Engel. The team described the construction and operation of its tactile sensory array in the May 2005 issue of the *Journal of Micromechanics and Microengineering*, published by the Institute of Physics.

The sensors are fabricated from an inexpensive polymer sheet using photolithographic patterning techniques. In the reported work, the researchers created a 4 x 4 array (16 sensors) and evaluated its performance.

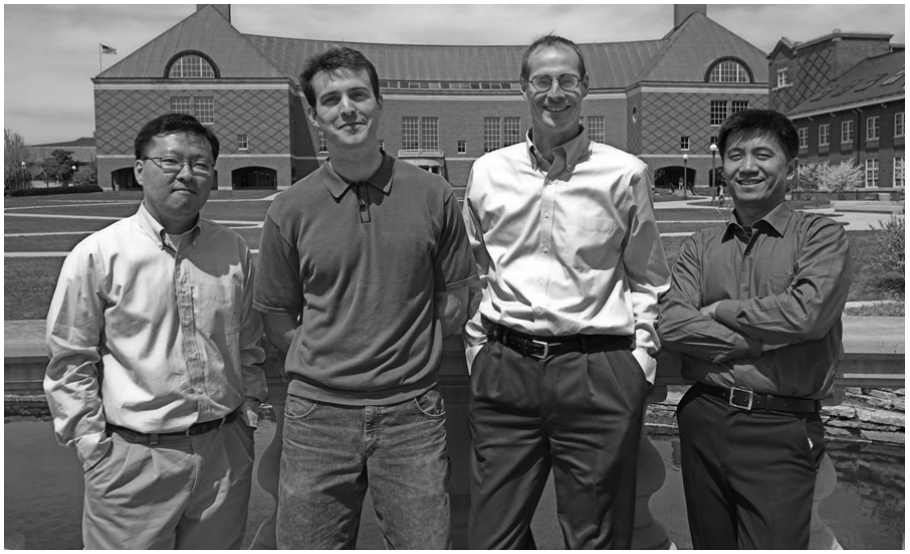


Photo by Kwame Ross.

Developments by Illinois researchers could improve a robot's sensitivity to touch. Researchers include, from left, graduate students Sung-Hoon Kim and Jonathan Engel, and ECE professors Doug Jones and Chang Liu.

"Each sensor resembles a little drum head about 200 microns in diameter with a tiny bump in the center," Engel said. "On the surface of the drum head, we deposit a thin-metal strain gauge that changes resistance when stretched. Pressure on the sensor is converted into digital data that is sent to a computer and analyzed with a signal-processing algorithm."

In any detection problem, implementation is a key issue. "Speed is important, but complex tasks like tactile sensing tend to be very time consuming," Kim said. "We came up with advanced algorithms that make the process more computationally efficient. Our algorithms can quickly determine which sensors are activated in the array, and whether the object is flat, or shaped like a box or the letter X."

In future work, the researchers want to improve efficiency by further simplifying the signal-processing algorithm so it can be performed by circuitry mounted on the same substrate as the sensor. They also want to build larger arrays with distributed sensors, and develop more effective ways to import and utilize sensory data. Such improvements could expand the functionality of robots in assembly-line environments and facilitate the development of autonomous vehicles.

"Our ultimate goal is to allow robots to operate in unstructured environments," Liu said. "To build more trust between humans and robots, we must make reliable sensor systems that can analyze their physical surroundings quickly and accurately. Our work is a step toward making trustworthy sensors that give robotics the power to really help people."

The work was funded by the National Science Foundation, the U.S. Air Force, and the Defense Advanced Research Projects Agency.

Room-temperature transistor laser is a step closer to commercialization

By James E. Kloeppel, U of I News Bureau

ECE faculty members Nick Holonyak Jr. and Milton Feng have demonstrated the room-temperature operation of a heterojunction bipolar transistor laser, moving the device an important step closer to commercialization. The researchers described their work in the September 26 issue of the journal *Applied Physics Letters*.

"We have shown that the transistor laser, even in its early state of development, is capable of room-temperature operation at a speed of three gigahertz," said Holonyak Jr., John Bardeen Chair Professor in ECE and Physics. "We expect the device will operate at much higher speeds when it is more fully developed, as well as play an important role in electronic-photonic integrated circuits."

Room-temperature transistor lasers "could facilitate faster signal processing, large capacity seamless communications, and higher performance electrical and optical integrated circuits," said Feng, the Holonyak Chair Professor in ECE. Feng's research on heterojunction bipolar transistors has produced the world's fastest bipolar transistor, a device that operates at a frequency of 600 gigahertz or more, and is a natural platform on which to develop a transistor laser.

The researchers first reported the demonstration of a light-emitting transistor in the January 5, 2004, issue of *Applied Physics Letters*. They described the first laser operation of the light-emitting transistor in the November 15, 2004, issue of the same journal. At that time, the transistor laser had to be chilled with liquid nitrogen to minus 73 degrees Celsius.

Room-temperature operation is ultimately required for large-scale commercial applications, said Holonyak, who also is a professor in the Illinois Center for Advanced Study, one of the highest forms of campus recognition. "If this device operated only at low temperature, nobody would want it, except as a laboratory curiosity or for very limited applications."

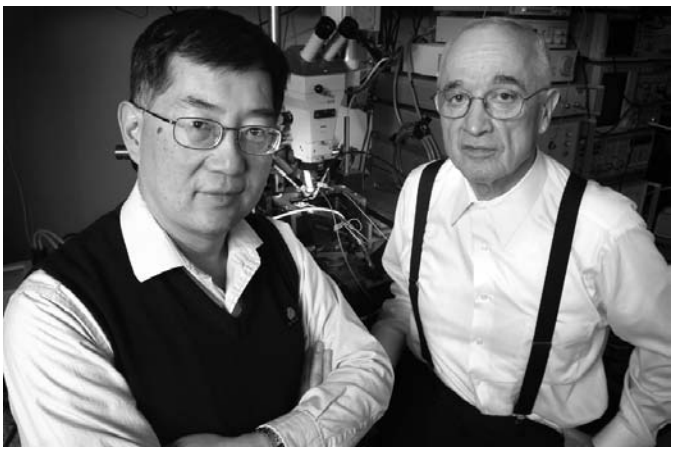


Photo by Kwame Ross.

Illinois researchers Milton Feng, left, and Nick Holonyak Jr. have demonstrated the room-temperature operation of a transistor laser, moving it a step closer to commercialization. Room-temperature transistor lasers "could facilitate faster signal processing, large capacity seamless communications, and higher performance electrical and optical integrated circuits," Feng said.

After the demonstration of the first semiconductor laser (as well as the first practical light-emitting diode) in 1962, "it took the effort of many people eight years to get the diode laser to operate at room temperature," Holonyak said. "Then it took an additional two years to make it reliable. But the big payoff has only now just begun, after more than 40 years of additional work."

In comparison, it has taken the Illinois researchers less than a year to move the transistor laser from cold operation to room-temperature operation. "Who knows where this new transistor laser technology will be in another 40 years," Holonyak said. "The payoff part of scientific and technological advances never occurs rapidly, at least not the 'big payoff.'"

"The transistor laser is still a primitive, laboratory device that will require a lot more work," Holonyak said. "Eventually, optimizing the design and fabrication will result in higher speed laser operation and improved performance, as well as a naturally advantageous way to realize electronic-photonic integrated circuits."

Co-authors of the paper with Feng and Holonyak are postdoctoral research associates Gabriel Walter and Richard Chan. The Defense Advanced Research Projects Agency funded the work.

ECE professor heads up genome project

By Rick Kubetz, Office of Engineering Communications

A team of U of I researchers headed by ECE Professor Greg Timp has been named as a recipient of a federal grant to develop faster, cheaper DNA sequencing. In August, the National Human Genome Research Institute (NHGRI), part of the National Institutes of Health (NIH), awarded grants totaling more than $32 million to advance the development of innovative sequencing technologies intended to reduce the cost of DNA sequencing and expand the use of genomics in biomedical research and health care.

Timp's research team includes ECE Professor Jean-Pierre Leburton, physics faculty Klaus Schulten and Alek Aksimentiev, and biochemistry faculty member Stephen Sligar. Timp and his colleagues will use the three-year, $2.1 million award to explore the feasibility of sequencing a DNA molecule using a type of silicon integrated circuit. The circuit incorporates a nanopore mechanism (see illustration) with a molecular trap that forces the DNA molecule to oscillate back and forth between electrodes, measuring the electrical signal associated with each specific base.

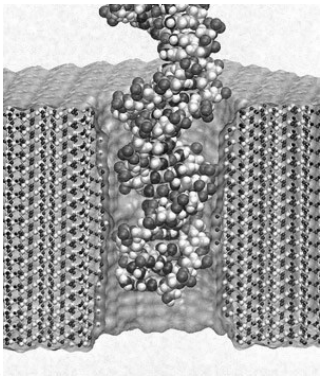
Over the past year, NHGRI has provided grants to a wide range of projects that integrate biochemistry, chemistry, and physics with engineering to enhance the whole effort to develop the next generation of DNA sequencing and analysis technologies.

"It is very important that we encourage and support the variety of sequencing technology projects that hold the most promise for revolutionizing genome sequencing. Each research team brings a unique set of skills and expertise to solving difficult scientific and engineering problems," said Jeffery Schloss, NHGRI's program director for technology development. "The different approaches will likely yield several successful and complementary technologies. It is going to be interesting to see how each technology progresses and which of them can ultimately be used by the average researcher or physician."

"The efforts are aimed at speeding the rate at which the next generation of sequencing technologies become available in the scientific lab and the medical clinic," said NHGRI Director Francis S. Collins. "Not only will these technologies substantially reduce the cost of sequencing a genome, but they will provide a quantum leap in the scope and scale of research aimed at uncovering the genomic contributions to common diseases, such as cancer, heart disease and diabetes."

Over the past decade, DNA sequencing costs have fallen more than 50-fold, fueled in large part by tools, technologies, and process improvements developed as part of the successful effort to sequence the human genome. However, it still costs about $10 million to sequence three billion base pairs—the amount of DNA found in the genomes of humans and other mammals.

NHGRI's near-term goal is to lower the cost of sequencing a mammalian-sized genome to $100,000, which would enable researchers to sequence the genomes of hundreds or even thousands of people as part of studies to identify genes that contribute to common, complex diseases. Ultimately, NHGRI's vision is to cut the cost of whole-genome sequencing to $1,000 or less, which would enable the sequencing of individual genomes as part of routine medical care. The ability to sequence an individual genome cost-effectively could enable health care professionals to tailor diagnosis, treatment, and prevention to each person's unique genetic profile.



Molecular dynamics simulation of the translocation of a single molecule of DNA through a 2.5-nm-diameter pore in an ultrathin membrane.

Teaching computers to talk

By Anna Flanagan

This is the dream: You find an error on your credit card statement and call customer service. But, instead of getting an automated system that leads you through a lengthy and ineffective series of simple responses that lead ultimately to holding for a service representative, your call is answered by an automated system to which you describe your problem in natural language, perhaps even vent some of your frustration, and receive effective assistance.

Some might call this an impossible dream. But professors in ECE are working on a variety of research projects that may turn this dream into reality. Under the loose heading of automatic speech recognition (ASR), they are conducting research related to such topics as robustness, human speech recognition, acoustic modeling, and language acquisition.

Professor Steve Levinson is a principal investigator in the Illinois Speech and Language Engineering (ISLE) research group, housed in the Beckman Institute. The group works toward a full knowledge of human speech, hearing, and language understanding, with an eye toward building computer systems that understand and use human language as well as humans do.

Levinson says that automating human communication has proven to be a much more difficult task than anyone anticipated. Prior to joining the U of I, he spent more than 20 years working on the problem for Bell Labs. Despite the investment of time and money by Bell and other companies, Levinson describes speech recognition as a "primitive technology,"

Jont Allen

Mark Hasegawa-Johnson

Steve Levinson

Richard Sproat

mostly limited to understanding only a small number of words within the context of a specific task. Levinson says ASR won't reach its full potential until scientists fully comprehend how humans acquire, process and understand language.

"In large measure, we understand how speech is produced. We understand how audition occurs. We know a little bit about the structure of language. But we can't put it all together," he said. Existing speech recognition systems are inadequate because they include limited representations of grammar, and no representation of meaning.

"To create a machine that acquires and uses language as humans do, it's going to be necessary to understand a fair amount about how humans construct a mental model of the world," Levinson said. His research team has developed robots that can create, in Levinson's words, "some sort of a mental model of an admittedly simplified world." For example, the team's current robot, Illy, responds to speech, recognizes and picks up certain objects, and mimics sounds she hears.

On the way to an automatic speech recognition system that can engage in natural human communication, another challenge is to increase the performance accuracy of such systems. ECE professor Mark Hasegawa-Johnson, co-principal investigator in ISLE, studies this problem.

He explains that standard speech recognition software has three components: a front end, which processes incoming signals similarly to the human ear; an acoustic model that outputs the probability that at a given time, a given phoneme is being produced; and a language model that matches the probability of phonemes to likely words that a person might say. The second and third stages currently rely on simple, one-dimensional statistical models that are "trainable."

"We can take a body of 2000 hours of data and extract statistics that represent all of the data," he said. "Being able to optimize the model is sufficiently powerful that these very simple models have completely outperformed any more linguistically or psychologically realistic models that are not able to be optimized."

For the last five years, Hasegawa-Johnson has been working to build more realistic models that retain the property of being "trainable." His goal is not only to increase the accuracy of ASR systems,

Continued on page 7

but also to do so regardless of the task assigned to the system.

Among other things, his work has demonstrated that algorithms based on acoustic "landmarks" in speech—perceptually salient, instantaneous events such as the closing and opening of the lips on the word "mama"—result in significant reductions in error rates, as do algorithms that address the interaction between phonemes and prosody, or the stress and rhythm pattern of naturally spoken language. He hopes eventually to create a speech recognition system that performs as well as humans at the speech unit level of phonemes and words.

While Hasegawa-Johnson is working on the second and third stages of automatic speech recognition, Associate Professor Jont Allen's research is critical to the front end. Like Levinson, Allen has a long work history in the field of ASR, also at Bell Labs, although he has focused on understanding the ear and the auditory system. Two of the limitations he sees with ASR are that it's only effective when there's a great deal of control over the environment, and that it relies on a very small vocabulary. He believes the problem that has to be solved before ASR can be commercially viable is the robustness problem.

"If you train a system under ideal conditions with a known talker and a known microphone under a known noise environment, you can probably get it to work pretty well," he said. "But as soon as the talker gets a cold, or uses a different microphone, or there's a radio playing in the background, then it breaks. It's very delicate."

Allen works at reverse-engineering human speech recognition to find out how it works. Over the last five years, he has been applying his physiological knowledge to the technological problems of ASR, in addition to applications such as improved cochlear implants and hearing aids.

Allen conducts experiments to determine how humans discriminate between similar sounds such as "ma" and "na" in high noise environments. He now has a good idea of the noise threshold at which such sounds become confused, and ultimately wants to build a machine that performs the same discriminations with humanlike accuracy. Such discriminations, he has found, can also be affected by characteristics of the speaker, a fact he hopes to take account of in designing the machine.

Professor Richard Sproat, who has joint appointments in the ECE and Linguistics departments, focuses on how computer speech sounds to listeners. Taking children with learning disabilities as an example audience, Sproat said that when using the current technology of speech synthesizers, "You're going to turn them off. They're not going to respond to it." The reason for this lack of response is the lack of emotion—the "flatness"—of synthesized speech. Sproat's work addresses this shortcoming of the current technology.

"Let's say you're reading an age-appropriate story to a child, say a Peter Rabbit story," said Sproat. "You can't make the story sound all happy all the time because bad things happen in the story, and there are scary parts." The only clues as to the appropriate emotion lie in the text itself. "One of the things we're working on is methods that will allow you to predict the appropriate emotion given the properties of the text you're reading," said Sproat. "Ideally, you'd be able to render this particular section as being happy, and this particular section as being sad, and so on and so forth."

Using classic children's texts that are marked up (by humans) with emotional cues for the computer, Sproat applies a variety of machine learning techniques to train the computer to do its own rendering of emotion based on the statistical semantics of the text. Once computers have learned this, their interaction with humans, even those who have difficulty remaining engaged with tasks, will be vastly improved.

It remains to be seen whether the research being conducted by Levinson, Hasegawa-Johnson, Allen, Sproat, and others will lead to an automatic system that can engage in unrestricted dialogue with humans. At the very least, their work is contributing toward the development of general scientific principles that will enrich our understanding of human communication. There is a great deal of skepticism about taking a scientific approach to the automatic speech recognition problem, Levinson says, and it's not clear that it can succeed. But, he says, it certainly has to be tried.

Tom Moone contributed to portions of this article.

An ECE star

Swenson pioneered radio astronomy at Illinois, and a lot more

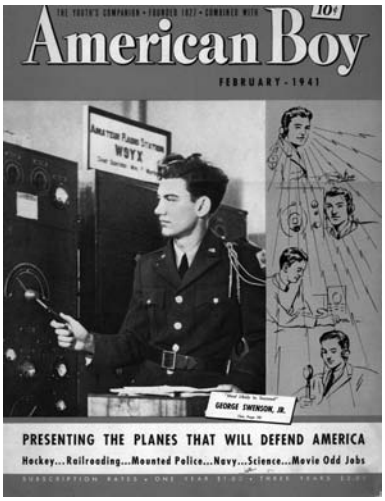
By Jamie Hutchinson

In 1941, the Radio Corporation of America (RCA) awarded ECE professor-to-be George Swenson, then 18, a full scholarship to study electrical engineering and dubbed him the most likely youngster in the nation to lead a successful career in the field of radio science.

Good call, RCA. Swenson would go on to establish the radio astronomy and satellite-ionosphere research programs at Illinois. He served as head of both the ECE and astronomy departments. As ECE head, he established the department's first endowed chair and initiated the acquisition of the Microelectronics Laboratory. He was selected for membership in the National Academy of Engineering in 1978.

Swenson spent his RCA scholarship money in his hometown, attending Michigan College of Mining and Technology (now Michigan Tech) in Houghton, Michigan. He served three years in the U.S. Army Signal Corps during World War II, and then earned his master's at MIT and doctorate at Wisconsin. After graduate school, Swenson served briefly on the faculties at Washington University (St. Louis), the University of Alaska, and Michigan State.

"I was smarting at Michigan State, and open to any offers," recalled Swenson. He longed to apply his electronics expertise to studying the natural world, but found that research was not encouraged there at the time. At a series of monthly professional meetings in Chicago, Swenson befriended the late ECE professors Milt Crothers (MSEE '49) and George Anner, who invited him to visit the Urbana campus. At



American Boy magazine put George Swenson, 18, on its February 1941 cover in honor of his RCA scholarship. He is pictured at amateur radio station W9YX at Michigan College of Mining and Technology in Houghton, where he started hanging around long before college. "I must have been a real pest," joked Swenson.

Swenson (right) displays the furlable antenna, made from a common tape measure, of "Nora Alice"—a satellite payload used for atmospheric research in the early 1960s. Also pictured from left to right: Joseph Hemmer (BSEE '64, holding Nora Alice), Carl Stubenrauch (BSEE '62), William Cochran (BSEE '67), and Joseph Smith (BSEE '64).

Urbana, Swenson met ECE department head Ed Jordan, and he expressed his frustration at trying to generate interest in radio astronomy at Michigan State. Jordan

Though retired, Swenson has continued coming in to work at CSL, where he advises grad students and conducts research in acoustics and animal telemetry for the U.S. Army Corps of Engineers. (He's still strong, but he didn't really bend that signpost.)

invited Swenson to return to Urbana the following month and meet astronomy department head George McVittie.

Within a couple weeks, Jordan and McVittie had put together an offer Swenson couldn't refuse. He joined the Illinois faculty in 1956 with half-time appointments in each department and started building radio astronomy at Illinois. His first "assignment" was a world tour of radio astronomy observatories, which took him to Australia, Holland, France, and England, interrupting his first course as a professor in ECE. "The person who took over my course that semester was Jordan himself," recalled Swenson. "So the students thought I must be pretty important!"

From 1958 to 1981, Swenson oversaw the construction and operation of two major radio telescopes at Illinois' Vermilion River Observatory (VRO). VRO helped in recruiting talented astronomers to Illinois, including the current head of astronomy, Lewis Snyder, and former astronomy head and NCSA chief appli-

Continued on page 9

cation scientist Dick Crutcher. The facility cataloged thousands of radio sources within and beyond the galaxy, helping theorists study the history and structure of our universe. (VRO was featured in the Spring 2005 issue of *Alumni News*.)

In addition, Swenson spent four years during the 1960s as a visiting scientist with the National Radio Astronomy Observatory (NRAO). He chaired the design group for NRAO's Very Large Array in New Mexico, which is to this day one of the premiere radio astronomy research instruments in the world. He served as acting head of the Illinois Astronomy Department from 1969-1971. And he coauthored a textbook, *Interferometry and Synthesis in Radio Astronomy*, now in its second English and Russian editions.

Accomplishments like that would be enough to fill most resumes, but with Swenson it's just the beginning. He enjoys applying radio science to other research areas such as atmospheric research and wildlife tracking, or telemetry. He established the ionosphere research group in ECE at the time the Soviet Union launched the world's first artificial satellite, Sputnik I. His expertise in acoustics dates back to high school, when he built a phonograph for a girlfriend, and he published a textbook, *Principles of Modern Acoustics*, in 1953.

There's more: Swenson is an avid pilot, canoeist, hiker, naturalist, and writer. He once ventured to within 50 kilometers of the North Pole, and he was the first person to make it to the summit of Alaska's Institute Peak (8500 feet). In 1996 he self-published a collection of autobiographical writings entitled "Reminiscence", excerpts of which are available on the Web at: www.ece.uiuc.edu/pubs/reminisc/.

Swenson pictured with his old Cessna 150. He has since replaced the plane with a 1974 Cessna 172, which he flew round-trip from Illinois to Alaska in 2001.

One of Swenson's more unusual professional activities was to serve from 1980 until 1990 on a working group that advised NASA on the search for extraterrestrial intelligence. "The committee was balanced between skeptics and true believers," recalled Swenson. "I was a skeptic. I didn't think we knew enough to devise a rational search strategy. So if a signal came in from an unequivocally intelligent source, I thought it was just as likely to be discovered by an astronomer doing his regular thing as by a group doing a purposeful search." Congress cut the NASA program in 1993, but Swenson continues to follow the work of the privately funded SETI Institute. A skeptic with an open mind, Swenson feels "a small coterie of bright minds working on the problem is worthy of support."

Swenson officially retired in 1988, but has continued to research and advise graduate students. Today, at 83, his towering frame regularly casts its welcome shadow along the corridors of the Coordinated Science Lab. One striking feature sets Swenson's office apart from the others in CSL: a workbench—complete with vise, soldering iron, toolbox—strewn with electronics in varying stages of assembly. That workbench pretty much tells you all you need to know about George Swenson.

Two ECE faculty members receive endowed chairs

By Tom Moone

On September 21, investiture ceremonies were held for ECE Professor Milton Feng, who was invested as the first Nick Holonyak Jr. Chair in Electrical and Computer Engineering, and ECE Professor Weng Cho Chew, who was invested as the first Y. T. Lo Chair in Electrical and Computer Engineering. In his opening remarks, Acting Provost and Vice Chancellor for Academic Affairs Jesse Delia reminded the audience that "investiture" originally meant "to clothe or array a person with clothes or honors." He pointed out that as it is currently used, an investiture represents the highest honor and recognition of excellence that a university can bestow on its faculty. Because both endowed chairs are named for renowned ECE faculty, there were in fact four faculty members honored at the investiture ceremonies.

Nick Holonyak Jr. (BSEE '50, MSEE '51, PhD '54), in whose honor one of these chairs is named, has been a member of the faculty in both ECE and physics since 1963. He was himself named the first John Bardeen Endowed Chair in 1993. He is recognized internationally for major contributions to elemental and compound semiconductors, including semiconductor lasers and incoherent light emitters. He was the first to make electron devices using III-V semiconductor alloys and to demonstrate quantum-well heterostructure lasers, now used in compact disc players and fiber optic cables. He was the first to demonstrate stable native oxides on aluminum-bearing III-V compounds, now the basis for vertical-cavity surface-emitting lasers (VCSELs). Holonyak is one of only 13 Americans to have won both the National Medal of Science (1990) and the National Medal of Technology (2002). In 2004, he won the Lemelson-MIT Prize, the world's largest single cash prize for invention.

Photo by Thompson-McClellan.

On September 21, ECE Professor Milton Feng was invested as the first Nick Holonyak Jr. Chair in Electrical and Computer Engineering, and ECE Professor Weng Cho Chew was invested as the first Y. T. Lo Chair in Electrical and Computer Engineering. Shown here are (from left) Interim Dean Ilesanmi Adesida, Weng Cho Chew, Milton Feng, and ECE Professor Nick Holonyak Jr.

Milton Feng (MS '76, PhD '79) received the chair named for Holonyak. Upon completing his PhD at Illinois under Greg Stillman, Feng went on to a career with Hughes Aircraft Company and Ford Microelectronics, Inc., before joining ECE as a faculty member in 1991. He was a faculty member of the Center for Compound Semiconductor Microelectronics and the Science and Technology Center for Superconductivity, both funded by the National Science Foundation. From 2001 to 2004, Feng was deputy director of the Bio-Optoelectronics System Science (BOSS) Center, which received funding from the Defense Advanced Research Projects Agency (DARPA). Since 2004 he has been the deputy director of the Center of Hyper-Uniform Nanophotonic Technologies (HUNT) for Ultra-Fast Optoelectronic Systems, also funded by DARPA.

Since 2004, Feng has been working with Holonyak, Richard Chan, and Gabriel Walter on the first transistor laser and demonstrated the laser operation of quantum-well-based light-emitting transistors.

In 2005, with Walid Hafez, Feng invented the pseudomorphic heterojunction bipolar transistor (PHBT) and advanced the transistor speed boundary toward the terahertz level. Feng's work has opened important new avenues in low-power, high-speed electronics for a higher level of integration.

Feng is the recipient of numerous awards, including the 1997 IEEE David Sarnoff Award and the 2000 Dr. Pan Wen Yuan Award from Taiwan. He is a Fellow of the IEEE and the Optical Society of America.

Speaking of the person for whom his endowed chair is named, Feng said, "Professor Holonyak is a national treasure." He added, "It is a privilege to be named the first Holonyak professor."

Yuen Tze Lo (MSEE '49, PhD '52), in whose honor the other endowed chair is named, joined the faculty in 1958 after several years working in industry, and he became a major researcher in the

Continued on page 11

the theory of moments during a course he taught in mathematic techniques for electromagnetics. Within a few years, his theory became widely used and highly successful.

Lo invented a popular broadband television receiving antenna, and he developed the cavity model theory for microstrip patch antennas now used in the Global Positioning System. He is also coauthor of a four-volume *Antenna Handbook* series that has been widely used by educators and students around the world.

Lo served as director of the Electromagnetics Lab from 1982 until he retired in 1990. In 1986 he was elected to the National Academy of Engineering for inventions and innovative ideas that significantly advanced the theory and design of antennas and arrays. In 1993, he received ECE's Distinguished Alumni Award. In 1996 he received IEEE's Antenna Propagation Society Distinguished Achievement Award for lifetime contributions.

Professor Lo died in May 2002 at age 82.

Weng Cho Chew, who received the chair named in Lo's honor, joined the ECE faculty in 1985. Prior to that, he had been with Schlumberger-Doll Research, after earning his PhD from MIT. Chew's research interests are in the areas of wave propagation, scattering, inverse scattering, and fast algorithms related to various electromagnetic technologies. He is the originator of several fast algorithms for solving electromagnetic scattering and inverse problems. He is the author of *Waves and Fields in Inhomogeneous Media* and coauthor of *Fast and Efficient Algorithms in Computational Electromagnetics*.

From 1898 to 1993, Chew was the associate director of the Advanced Construction Technology Center. He is the director of the Center for Computational Electromagnetics and the Electromagnetics Laboratory.

Chew is a Fellow of IEEE, the Optical Society of America, and the Institute of Physics. He was named a Presidential Young Investigator in 1986. In 2000 he won the IEEE Graduate Teaching Award. He is currently an associate editor of the *Journal of Electromagnetic Waves* and Applications and of *Microwave Optical Technology Letters*.

Both of these endowed chairs are the result of generous contributions by ECE alumni. A gift from Henry C. Pao (BSEE '59, MSEE '60, PhD '66) was instrumental in establishing the Nick Holonyak Jr. Chair in Electrical and Computer Engineering. Pao cofounded Supertex, Inc., a mixed signal semiconductor manufacturer in Sunnyvale, California. He has served as its president, CEO, and member of the board of directors since its inception. Supertex has introduced many high-voltage driver integrated circuits for light-emitting diodes (LEDs), devices invented by Holonyak. Pao has made many generous donations to ECE in the past, funding fellowships in honor of his parents and establishing an endowed scholarship fund in honor of Professor John Bardeen, Pao's mentor.

Pao received the ECE Distinguished Alumni Award in 1996 and the College of Engineering Alumni Award for Distinguished Service in 2001.

John Bruning (MSEE '67, PhD '69) provided initial funding for the Y.T. Lo Chair in Electrical and Computer Engineering. After completing his PhD, Bruning joined Bell Labs, where he led a group that worked on projects dealing with lithography for microelectronics. He initiated and managed the development of deep-ultraviolet photolithography using excimer lasers. Today, photolithography tools operating at wavelengths of 248 nanometers are produced based on the technology developed by this group.

In 1994, Bruning led a management group that purchased the Tropel Corporation from General Signal and took the company private. Under Bruning's leadership the company grew from 75 employees to 200. In 2001, Tropel became a wholly owned subsidiary of Corning Inc., with Bruning serving as president and chief executive officer. Today, Corning Tropel Corporation is a leader in precision optic subsystems and advanced form metrology instrumentation.

Bruning was elected to the National Academy of Engineering for his work on deep-ultraviolet photolithography and associated manufacturing methods in 1998. He is a Fellow of IEEE and the Optical Society of America. In 1993 he received the Richardson Medal from the Optical Society of America. He received the ECE Distinguished Alumni Award in 1992.

Adesida leads Illinois researchers as part of nanomedicine team

By Rick Kubetz, Office of Engineering Communications

In the not-too-distant future, doctors will use nanoparticles—tiny spheres that can travel through the bloodstream deep into the body—to locate and highlight tumors undetectable by typical methods. While at the tumor site, the nanoparticles can deliver therapeutic agents to destroy the tumor, while the healthy cells remain unscathed.

Nanotechnology researchers from Illinois are part of a multidisciplinary team addressing fundamental issues pertaining to nanomaterials and nanofabrication toward the development of nanodevices and nanotubes for targeting cancer. Working with ECE's professor Ilesanmni Adesida, the project's principle investigator at Illinois, are Bruce Wheeler, ECE professor and interim head of the Department of Bioengineering; Stephen Boppart, ECE professor and a bioengineering research physician in the College of Medicine; and more faculty from engineering, the sciences, medicine, and veterinary medicine.

"With our colleagues at Washington University School of Medicine, we are pleased to add our capabilities to this important research," stated Adesida, ECE's Willett Professor of Engineering and interim dean of the College of Engineering.

Nano-sized particles developed at Washington University School of Medicine in St. Louis and the Illinois offer hope of replacing numerous medical tests, scans, or surgeries with a simple injection. To advance this promising technology, the National Cancer Institute (NCI) recently awarded $16 million over five years to the School of Medicine to establish the Siteman Center of Cancer Nanotechnology Excellence (SCCNE)—one of seven Centers of Cancer Nanotechnology Excellence (CCNEs) around the United States.

Irfan Ahmad and Ilesanmni Adesida.

Each CCNE is a multi-institutional hub. SCCNE is a collaboration between Washington University School of Medicine in St. Louis, the Siteman Cancer Center at the School of Medicine and Barnes-Jewish Hospital, the University of Illinois, and several private-sector companies including Kereos, Inc., and Philips Medical Systems.

Headed by Samuel Wickline, the SCCNE will research and apply nanotechnology for the diagnosis and treatment of cancer. Wickline, professor of medicine, biomedical engineering, physics, and cellular biology and a cardiologist at Barnes-Jewish Hospital, along with Gregory M. Lanza, an associate professor of medicine and a cardiologist at Barnes, developed nanoscale particles that can home in on tumor cells to carry imaging agents and drug therapies directly to tumor sites.

"We've entered an era of precisely targeted and individualized cancer therapy," Wickline said. "Our nanotechnology will strongly affect the practice of medicine. And the grant from the NCI will allow us to build a highly effective collaborative network to bring the technology rapidly to clinical use in the treatment of cancer."

"Among the key components of the University of Illinois' role in the project is the funding of three to four joint seed projects each year to conduct translational research; the training of Washington University's faculty and students in nanofabrication at the Micro and Nanotechnology Laboratory; and the development of online training course modules, including teaching of a joint course in nanomedicine," explained Irfan Ahmad, associate director of the Center for Nanoscale Science and Technology, who serves as project coordinator for the activities at Illinois.

Nanotechnology offers several advantages over traditional techniques. Because it is capable of supporting a wide variety of homing, imaging, and therapeutic agents, nanotechnology can provide more accurate visualization and characterization of tumors, revealing even tiny tumors in medical scans. It also has the ability to focus chemotherapeutic drugs exclusively at tumor sites to alleviate unpleasant or risky side effects. And it offers more precise adaptation of treatment to the biochemical and molecular features of the individual patient.

The NCI began supporting the application of nanotechnology to cancer more than seven years ago and within the past year has created the NCI Alliance for Nanotechnology in Cancer as a comprehensive initiative to translate nanotechnology research into clinical practice in cancer medicine. The establishment of the seven CCNEs is part of this initiative.

"With the advent of the Centers of

Continued on page 13

Professor William R. Perkins retires

By Tom Moone

ECE Professor William R. Perkins retired at the end of the 2004–2005 school year, having been on faculty at Illinois for 44 years. For the past nine years, Perkins had served as the graduate adviser in the ECE Counseling Office.

Perkins was born in Council Bluffs, Iowa, on September 1, 1934. He received his bachelor's degree cum laude from Harvard University in 1956. He then went on to Stanford University, receiving his master's and PhD degrees in 1957 and 1961, respectively. He joined the faculty of the University of Illinois in 1961.

"During his 44 years at Illinois," said ECE Professor Tamer Başar, "Bill has been one of the core select faculty who have been responsible for the tremendous sustained growth that both the ECE department and the Coordinated Science Laboratory have experienced over the years, and the utmost level of distinction and worldwide recognition they have attained."

Perkins has published extensively in the field of system and control theory, and is an expert in sensitivity theory, robust control, and large scale dynamic systems. He is a coauthor of the book *Engineering of Dynamic Systems*. He has held key positions in professional societies, including general chair of IEEE Conference on Decision and Control (1981), president of the IEEE Control Systems Society (1985), editor-in-chief of IEEE Press (1992-1994), and president of the American Automatic Control Council (1996-1997).

Among his many distinctions, Perkins is a Life Fellow of IEEE (elected as Fellow in 1972) and a recipient of the IEEE Centennial Medal (1984). Other awards he has received include Associate Member of the Center for Advanced Study at UIUC (1971-1972); the IEEE Control Systems Society's Distinguished Member Award (1986) and Distinguished Lecturer (1986-1987); Haliburton Education Leadership Award of the UIUC College of Engineering (1987); and the Education Award of the American Automatic Control Council (1997).

Photo by Tom Moone.

ECE Professor Tamer Basar (right) presented ECE Professor Emeritus Bill Perkins with gifts from the ECE department at the 2005 ECE Faculty Banquet. Perkins was honored for his 44 years of service to the department and the university.

"I had the good fortune to join the University of Illinois during the early days of the Everitt-Jordan-Van Valkenburg era," said Perkins. "These three men had a vision of academic excellence that has inspired me to this day. I also am grateful to colleagues past and present—faculty, staff and students—for creating such a special working environment for more than four decades."

Although his expertise in his field will be missed, many will also miss the warmth Perkins exuded in his day-to-day interactions with others. Sherry Beck, who worked closely with Perkins in the Counseling Office, said, "I thoroughly enjoyed working for Professor Perkins for nine years in the counseling office. He is a special and caring person who was always gracious. He will truly be missed in our office because of his warm and friendly personality."

Başar summed up Perkins' legacy, saying, "He is leaving behind a legacy of excellence in all domains: as a teacher in high demand, as a mentor for students with a lasting inspiration, as a researcher with a solid reputation, as an adviser with a gentle touch, and as a friend with sound advice."

Adesida leads U of I researchers

continued from page 6

Cancer Nanotechnology Excellence, we are particularly looking forward to new nanotech-based therapeutic delivery systems that could enhance the efficacy and tolerability of cancer treatments—an advance that would greatly benefit cancer patients," says NCI Deputy Director Anna Barker.

The other six CCNEs are at the University of North Carolina; the University of California, San Diego; Emory University and Georgia Institute of Technology (joint center); Harvard University and Massachusetts General Hospital (joint center); Northwestern University; and the California Institute of Technology.

ECE welcomes six new faculty members

By Tom Moone

This fall, ECE welcomes six new faculty members: Nikita Borisov, Deming Chen, Yih-Chun Hu, Fei-Fei Li, Ada Poon, and Mark Spong.

Nikita Borisov comes to Illinois having received his PhD from the University of California, Berkeley, in 2005. His research focuses on computer security and privacy. His dissertation explored anonymity, technology to protect patterns of communication so as to hide from third parties the identities of parties involved in online communication.

"My intention," said Borisov, "is for this to be useful for people's day-to-day Internet use, like Web browsing or e-mail or instant messaging." This work could also benefit businesses, which may not want to make it public that they are negotiating with a potential business partner.

He is also pursuing research in other areas of privacy, such as privacy protection of data aggregation, where a researcher might want to collect aggregate information while preserving people's individual contributions.

During the fall 2005 semester Borisov taught CS 498CAG (Computer Security) with Carl Gunter from the Department of Computer Science. "This course is part of the new security curriculum roadmap that we're developing," explained Borisov. In addition to this and other courses related to computer security, Borisov will teach courses on distributed systems.

"The combination of potential colleagues [at Illinois] is very hard to find anywhere else," he said.

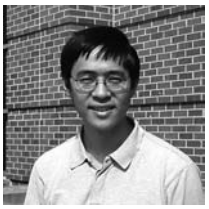
"This is an excellent school," said **Deming Chen** about what attracted him to Illinois. "I am very fortunate that I came to this department." Chen comes to Illinois from the University of California, Los Angeles.

Chen will be examining a hybrid synthesis of field programmable gate arrays (FPGAs) and structured application-specific integrated circuits (ASIC) to provide great power and performance. He will also explore high-level synthesis with architecture design and physical planning, and will examine design space for system-on-a-chip and embedded systems.

Chen's background is very diverse. His undergraduate degree from China was in chemistry. He then worked for a coal chemistry institute in China, a job that involved writing computer software. His interest in computer science grew out of this job. After coming to the United States in 1992, he earned another bachelor's degree in computer science from the University of Pittsburgh. After four years as a system analyst, he went on to UCLA for his master's and PhD.

It was during his graduate career that Chen recognized his desire to enter academia. "I love to be around young people," he said. "I want to pass on what I learned to the younger generation."

In the spring, Chen will be teaching ECE 425 (Introduction to VLSI System Design). For the next academic year, Chen plans to design a new class on either logic systems or embedded systems.



Yih-Chun Hu said of his attraction to Illinois, "I think it's got a great program. I think that the faculty colleagues are just world class in their research."

Hu's own research will focus on computer security, particularly network security. One project he will work on involves developing ways for Internet users to share computational and other resources with each other, and receive some compensation that they can then use. "For example, I might do some computation for you today," said Hu, "and you might do some for me tomorrow." Another project will expand on the notion of hybrid networks, combining cellular and wireless technology to improve connectivity. Again, this project will involve developing some form of compensation to reward cellular users for forwarding other people's messages.

Hu is currently teaching lectures in ECE 428 (Distributed Systems).

Hu recently acquired his private pilot's certificate and likes to spend some of his spare time flying.

Fei-Fei Li joins ECE from the California Institute of Technology in Pasadena, where she recently completed her PhD. Though she had never been to the Midwest prior to taking this position, Illinois' name loomed large. "If you're in an [electrical engineering] department," she said, "you know what are the good EE departments in the nation. Of course, Illinois has a big name."

Li's research addresses computer and human vision, focusing on what Li calls "high-level vision." High-level vision means taking vision input concerning such aspects as color and shapes, and then interpreting it in a meaningful way. Rather than seeing something as "blue" and "square," high-level meaning would interpret it as a chair or a desk. "My research in human vision is to look at how the brain processes higher-level, categorical-level information," said Li.

For computer vision, Li focuses on ways to enable computers—which Li describes as "just boxes of transistors"—to make similar types of interpretation. "We need to design smart software, artificial intelligence to enable them to see the world in a meaningful way," she said.

Illinois should provide a fertile location for Li's research. "It's very exciting that there are people here working in similar fields," she said, noting that she will surely be able to engage in collaborative projects with other researchers.

During the fall 2005 semester Li taught ECE 598FL, Computer Vision and Learning. This graduate-level course examines the state of the art in the field of computer vision, focusing particularly on how different machine learning techniques have been applied to specific areas of computer vision.

In explaining her decision to join the ECE faculty, **Ada Poon** described three major paths that PhD students can go after graduation: major corporations, startup companies, or academia. Though each has advantages and disadvantages, it was the freedom to pursue her own research interests that drew her to an academic career. "I like to do research," she said simply.

The research that she will be pursuing is, in her own estimation, pretty broad and cross-disciplinary. She wants to bring theoretical aspects of wireless communication into efficient implementation. To do this she is setting up a test bed to evaluate wireless protocols from the medium access control layer to the physical layer. She would also like to do research on devising more power efficient analog components.

While working on her dissertation, Poon worked at Intel as a senior research scientist and then later at a startup founded by her adviser. In both of these positions, she worked on implementation problems similar to those she will be examining in her research here. Poon believes this will help her in working with students and advising them on the needs of industry. As opposed to times in the past, she said, "I now think that research and development are much closer to each other. So we need to know what industry is looking for, and we need to try to do the research to bring our theory into application."

In the spring, Poon will teach ECE 461 (Communications II). For the fall 2006 semester, she plans to develop a course that will expand on some of the work in ECE 461, giving the students an indication of the process for moving from theory into implementation.

Poon is a native of Hong Kong, where she received her bachelor's degree, and she then did her graduate studies in the Bay Area. Comparing Champaign-Urbana to these two, she said, "It's very different."

Mark Spong joins ECE from the Department of General Engineering, where he has worked since 1984. He has been involved in the Control Group in the Coordinated Science Lab since that time, and, as he explained, "my research has always been more closely related to the ECE faculty than any other department." With the recent decision to merge the Departments of General Engineering and Industrial Engineering into a new Department of Industrial and Enterprise Systems Engineering, Spong decided it was time to join ECE formally.

Spong's research focuses on nonlinear control systems and applications to robots. One project he is working on involves teleoperation, controlling the movements of multiple robots over a network. An experiment involving Urbana and Albuquerque, New Mexico, is already underway. "We're controlling robots in Albuquerque from our lab here in CSL," explained Spong. Another experiment deals with study biped locomotion in robots to make them walk more like humans.

In the spring 2006, Spong will teach ECE 528 (Analysis of Nonlinear Systems). Other courses he will be teaching for ECE include ECE 470 (Introduction to Robotics) and ECE 589 (Robot Control Theory).

Spong is heavily involved in IEEE and this year is president of the IEEE Control Systems Society. In addition to his research in control systems, he is also active in control systems education, in particular with the Control Systems Laboratory. He helped set up the lab initially, as well as some of the experiments used in the lab.

Oscar Gaddy, Illinois Alumnus and professor, dies

ECE Professor Emeritus and alumnus Oscar L. Gaddy (PhD '62) died May 2, 2005. He was 72.

Gaddy first came to the University of Illinois after earning a BS and MS in electrical engineering from the University of Kansas. He earned his PhD in 1962, beginning his career in the ECE faculty that same year when he was hired as an assistant professor of electrical engineering. He served as an associate professor from 1965 to 1969, becoming a professor in 1969 and associate department head for the graduate and research programs from 1971 to 1984. He also served as faculty coordinator for the ECE Alumni Association and as the department's graduate coordinator until his retirement in 1993.

Gaddy taught courses in physical electronics, including undergraduate metallurgy and semiconductor electronics courses, graduate courses in quantum electronics, and a course in nonlinear optics that he developed. His research interests included special photomultiplier vacuum tubes and thin film infrared detectors.

"Colleagues remember him as a superb teacher, researcher, and a quiet leader," said ECE Professor Jim Coleman. "His photomultiplier tube was a critical component of satellite links in the 1960s. He was instrumental in the reputation for excellence enjoyed by the ECE department in the '70s and '80s that continues today."

In addition to his accomplishments as a teacher, Gaddy worked as a consultant with industry, including McDonnell-Douglas in St. Louis, Missouri, and Varian Associates in Palo Alto, California. Along with the late Marvin Krasnow, former assistant dean of the College of Engineering and director of Industrial Research Relations, Gaddy helped to initiate an industrial affiliates program in physical electronics on campus, which attracted several million dollars in support.

Oscar L. Gaddy (PhD '62)

His memberships included the Institute of Electrical and Electronics Engineers, (elected a Fellow in 1974), Sigma Tau, Sigma Xi, Eta Kappa Nu, and Tau Beta Pi. For his many achievements he was cited in Community Leaders and Noteworthy Americans, Dictionary of International Biography of American Men and Women of Science, Who's Who in Engineering, Who's Who in the Midwest, and Who's Who in America. He won an ECE Distinguished Alumni Award in 2003, which honors ECE graduates who have made professional and technical contributions that bring distinction to the ECE Department and University.

"He recruited the very best graduate students for the research programs at Illinois, and the industrial affiliates program that he conceived and created provided the tools for faculty and students to advance the state-of-the-art in photonics and microelectronics research," Coleman said.

"His distinguished alumnus award, recognizing his lifelong dedication to the University of Illinois and overwhelmingly supported by faculty and alumni, included the citation 'For three decades of technical contributions and outstanding service to graduate education in the Department of Electrical and Computer Engineering.'"

During his retirement, Gaddy enjoyed researching and experimenting with the old classical metal finishing processes used on double guns—especially Parker guns. He became a well-regarded expert in this area, writing and publishing articles regarding the process of restoration of the Damascus shotgun barrel.

Alumni remember him as a remarkable teacher and a great friend. "He was a very special person," said Samuel White (PhD '78), who now teaches at Indiana University-Purdue University Indianapolis in the School of Engineering and Technology. White's doctoral research in electro-optics was guided by Professor Gaddy. "He was a big brother, a father, and a great adviser—one of the most intelligent people I've ever known," he added. "He's probably the reason I've gotten where I am."

Faculty news

Jennifer Bernhard has been selected to participate in the 2006–2007 Defense Science Study Group Program organized by the Institute for Defense Analyses.

Stephen A. Boppart was awarded the 2005 IEEE Engineering in Medicine and Biology Society (EMBS) Early Career Achievement Award at the International IEEE EMBS meeting in Shanghai, China, in September.

Yoram Bresler has been selected as an NCSA/UIUC Faculty Fellow for the 2005–2006 academic year.

Andreas Cangellaris, Jianming Jin, and **Jose Schutt-Aine** recently completed an agreement with Cadence Design Systems, Inc., for the Development and Integration of Computational Engines for CAD Tools. The project will run for four years and will receive $1 million in funding from Cadence.

Patrick Chapman and **Yi Ma** have been awarded the Office of Naval Research Young Investigator Award.

Weng Chew was selected to serve as a Distinguished Lecturer for IEEE Antennas and Propagation Society.

Kent Choquette has accepted the position of acting director of the Micro and Nanotechnology Laboratory while Ilesanmi Adesida is serving as interim dean.

J. Gary Eden has been awarded the 2005 LEOS Aron Kressel Award "for sustained contributions to the development of ultraviolet coherent and incoherent sources, and to excimer lasers and microplasma devices."

Steve Kang, former ECE department head and now dean of the Baskin College of Engineering at University of California, Santa Cruz, has been awarded the 2005 Mac Van Valkenburg Award from the IEEE Circuits and Systems Society (CAS).

P. R. Kumar has been awarded the 2006 IEEE Control Systems Technical Field Award "for contributions to adaptive control, manufacturing systems and wireless communications."

Jean-Pierre Leburton has been selected as a Fellow of The Electrochemical Society "in recognition of his scientific achievement and his service to the society."

Zhi-Pei Liang was elected vice president for Conferences of the IEEE Engineering in Medicine and Biology Society (EMBS). He will serve a two-year term starting January 2006.

Chang Liu's new textbook, "Foundations of MEMS," has been published by Prentice Hall. It is the world's first standard textbook in the MEMS area.

David Nicol and Dartmouth PhD student **Guanhua Yan** (resident in CSL) received the best paper award at the 2005 Conference on Principles of Advanced and Distributed Simulation (PADS), for their paper "Simulation of Network Traffic at Coarse Time Scales." David Nicol was elected to the PADS Steering Committee for a 3-year term.

Umberto Ravaioli has accepted the position of assistant dean in the Academic Programs Office of the College of Engineering.

William Sanders has been selected as a Donald Biggar Willett Professor of Engineering. He has also been elected to serve a two-year term on the ACM Sigmetrics (Special Interest Group on Metrics) board of directors.

Andrew Singer has been named director of the Technology Entrepreneur Center (TEC). The TEC's mission is to promote technology entrepreneurship through formal courses, informal lectures, business plan activities, networking, and other experiences.

ECE 110: Introducing freshmen to the profession

By Tom Moone

Every week of the spring and fall semesters, some 300 freshmen are involved in something that most of their peers at other institutions can only dream of: they are attending an engineering lecture and working on projects in an engineering lab.

For more than a decade, ECE 110 (Introduction to Electrical and Computer Engineering) has been introducing freshmen to the engineering profession in a manner that is rare among engineering schools. Most of Illinois's peer institutions do not provide freshmen with a lab course so early in their curriculum.

Like many other ECE courses, ECE 110 comprises a lecture component and a lab component. The lecture portion of the course has three goals: to teach how a number of electrical devices work, to teach how to construct simple mathematical behavioral models for these devices, and to teach how to design and perform simple analyses of circuits and systems containing these devices. Since this is a freshman-level course, the mathematics required is limited to algebraic and geometric techniques.

In the labs, the students use what was presented in the lectures to perform experiments that lead to the development of an autonomous car. "Many students have little or no experience at all in any aspect of circuit design," said ECE Lecturer Patricia Franke, who oversees the lab portion of the course. "They begin by learning to use the equipment in the lab and very quickly learn to design, build, and debug complicated digital and analog circuitry." At the end of the semester, a design contest is held in which teams of students present a car that uses infrared sensors to follow a strip of white tape through a variety of difficult turns and a split in the path. No joysticks or any type of wireless remote control are used.

Photo by Tom Moone.

ECE Lecturer Marie-Christine Brunet gives a lecture on sequential circuits to students in the ECE 110 (Introduction to Electrical and Computer Engineering). The course provides freshmen with a unique introduction to the field.

ECE Lecturer Marie-Christine Brunet says that the combination of lecture and lab work makes this a "good, well-rounded class." Students get an opportunity early in their academic career to take the theory they learn in the lecture and apply it in the lab. Though lectures can deal with ideal components—such as batteries that never wear out—in the lab students learn to deal with the occasional pitfalls of real-world components.

ECE Professor Emeritus Tim Trick recalls that the course had its origin in the early 1990s. At the time, repeated calls were heard from industry and government agencies of a pressing need for more engineers. At the same time, concerns were raised by ECE faculty and students that some students were dropping out of the engineering program before they had even had their first engineering course. The first two years of the program are typically taken up with fulfilling needed prerequisites in mathematics and physics, as well as fulfilling other general education requirements in social science and humanities. Many students, it seemed, were losing interest in pursuing engineering before they had even had their first course in the field. In response, said Trick, "I put together a task force that would look at

our entire curriculum, in particular the first two years."

The efforts of that task force led to the development of what current students now know as ECE 110. During the first few years as a pilot course, recalled Trick, the course had about twenty students enrolled. Now, two lecture sections of 150 students each are taught in the fall and spring semesters. Brunet teaches one lecture section and Trick the other. There are also 12 lab sections of 28 students each semester.

Brunet said that one of the main purposes of ECE 110 is to provide some guidance to students entering ECE. Students often enroll in ECE because they like computers. "So they come in the field because engineering sounds good, but they don't really know the amount of work that lies behind," she said. "It's not unusual that after this class, they realize that, OK, this is not really what I want to do for the rest of my life. . . . It's the type of class that helps them to get a small feel of what electrical and computer engineering is really all about, and helps them make early decisions on what they want to do."

What they want to do may not include a career as an, engineer. But that is OK, since students can then go on to study a field where they can be successful. Approximately 70% of the students remain within the College of Engineering.

Though he retired last year, Trick still teaches one of the lecture sections of the course. "I think it's a lot of fun," said Trick. "I like teaching the spectrum of topics that we cover, which includes devices, circuits, and systems." What Trick particularly enjoys is the challenge he has in trying to take complicated topics and present them, without using advanced math, in a way that a freshman would be able to grasp.

Over the course of its existence, ECE 110 has remained essentially the same. Students have been making their autonomous cars since the course's inception. However, some changes have occurred. During the last few weeks of the semester, students have learned all they need to complete their lab projects. Brunet says that at this time invited speakers come into the class to discuss other aspects of electrical and computer engineering. Students are exposed to such topics as digital signal processing and analog-to-digital conversion.

Brunet is fascinated by the variety of people who are attracted to the course. The class is required by ECE and the Department of General Engineering, but as space is available, students from other parts of the University can take the course. Usually these are students from other engineering departments, but not always. "One semester we had a student who was a theater major," said Brunet. "He was very interested in lighting for the stage, and he just took the class for fun to learn about electrical components."

Laura Schmitt

After 10 years as editor of the ECE Alumni News, and 15 years with the Department of Electrical and Computer Engineering, Laura Schmitt has left her job at the University to devote more time to raising her children. During her years of service to the department, Laura has been a driving force in publicizing and celebrating the accomplishments of this exemplary department. Though all with whom she has interacted over the years will miss her keen judgment and professionalism on a daily basis, Laura will continue to provide the occasional article or profile for this publication.

ECE seeks input for accreditation process

Alumni and other constituent feedback needed for ABET assessment

By Narayana Rao, ECE Associate Head

During its 2001 review by the Accreditation Board for Engineering and Technology (ABET), ECE did more than just meet the requirements of ABET's new accreditation process, called "Engineering Criteria 2000," or EC2K. Our department established a model for accreditation that other departments around the country have emulated as they came under scrutiny from ABET.

EC2K requires departments to set Program Educational Objectives consistent with the missions of their institutions as well as with ABET criteria; to implement processes, based on the needs of various constituencies, in which the Objectives are determined and periodically evaluated; and to show evidence that these evaluation results are applied back into a continuing process of program development and improvement.

Accordingly, several years ago our department defined its objectives and established processes for their evaluation, which include regular input from constituencies such as students, employers, faculty, and alumni. In 1999, we shared the objectives with alumni in the pages of *Alumni News*, and the following year we surveyed alumni to learn how they evaluated ECE's success at achieving the objectives. Now, ECE calls on alumni to participates in the department's ABET review process for 2007.

There are four Program Educational Objectives that apply to the electrical and computer engineering curricula:

1. Depth. To provide students with understanding of the fundamental knowledge prerequisite for the practice of, or for advanced study in, electrical and computer engineering, including its scientific principles, rigorous analysis, and creative design.

2. Breadth. To provide students with the broad education, including knowledge of important current issues in engineering with emphasis on electrical and computer engineering, necessary for productive careers in the public or private sectors, or for the pursuit of graduate education.

3. Professionalism. To develop skills for clear communication and responsible teamwork, and to inculcate professional attitudes and ethics, so that students are prepared for the complex modern work environment and for lifelong learning.

4. Learning Environment. To provide an environment that enables students to pursue their goals in an innovative program that is rigorous, challenging, open, and supportive.

While articulation of these objectives was prompted by EC2K, the objectives represent the traditional, uncompromising core values and strengths of one of the nation's top-ranked ECE departments. The objectives are linked to a set of Program Outcomes—14 statements that describe more specifically what students are expected to know and be able to do by the time of graduation (see www.ece.uiuc.edu/abet/peo&po.html).

Within the next year, ECE will contact alumni who have graduated in the last 10 years and ask them to complete a survey evaluating the department's success at achieving these objectives and outcomes. It is vital that as many alumni as possible respond thoughtfully to the survey.

Stay tuned to the pages of *Alumni News* for reports about ECE's progress in preparing for the 2007 ABET assessment. If you receive a survey, please respond to it. And in the meantime, you can check www.ece.uiuc.edu/abet for further background about EC2K and reports from our successful 2001 review. Please direct any comments to rao@ece.uiuc.edu.

Know an exceptional fellow alum? Nominate him or her for an ECE award

The ECE Distinguished Alumni Award honors graduates who have made professional and technical contributions that bring distinction to the department and the university. This award is presented each year to four or five exceptional alumni at the fall banquet on campus. There are more than 19,000 ECE alumni worldwide.

The ECE Young Alumni Achievement Award recognizes alumni younger than 40 years old who have made outstanding professional contributions to their field. This award is also presented at the annual fall banquet on campus.

See www.ece.uiuc.edu/alumni/index.html for more information on the nomination process and the awards.

Katsinas, Hill join ECE staff

By Tom Moone

Jonathan Hill

Beth Katsinas

Beth Katsinas joined ECE as the new director of External Relations this past June. She will oversee a variety of public relations efforts, including interaction with the media, corporations, and alumni.

One of her major tasks will be publicity for faculty and their research. "My primary objectives are to make sure that the things that faculty are working on are well known and that we do things that enhance the reputation of our faculty and department," said Katsinas.

Prior to joining ECE, Katsinas spent five years as the director for the University of Illinois Office of Training for Business Professionals. This office provides workshops, business training, and certificate programs for professionals within the University and from the outside community. This office's most prominent event is the Biennial Conference for Women, one of the longest-running conferences for women in the country.

One accomplishment of which Katsinas is particularly proud is receiving the Athena award from the Champaign County Chamber of Commerce in 2004. This award honors individuals who assist other women in reaching their full leadership potential; demonstrate excellence, creativity, and initiative in their businesses or professions; and provide valuable service by devoting time and energy to improve the quality of life for others in the community.

Because the position Katsinas has is a new one in ECE, she sees this as an opportunity to mold the position and help determine the future for her role in ECE. "I'm really open and I want to hear from alumni, faculty, staff, and students anything they think that external relations can do for ECE," she said.

ECE has also added Jonathan Hill as director of Development. In describing his vision, Hill says that he wants "ECE Illinois to be recognized not only as a campus and worldwide leader in education, research, and innovation, but also as a leader in private support for our programs."

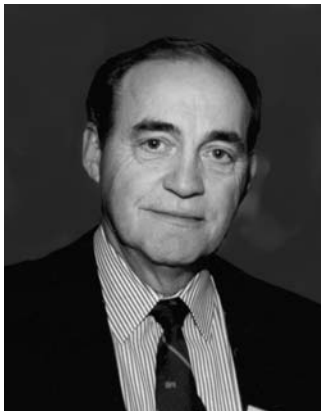
Hill spent four and a half years at Michigan State University working in the development office of the College of Engineering there. Prior to that, he worked in development for the Leukemia and Lymphoma Society.

"Some people have described development as a contact sport," said Hill. "You can't do this job unless you meet people. You have to develop relationships." Hill will therefore spend about 50 percent of his time on the road. "I need to meet with people and update them on the department, our strategic direction, and the areas of need that we have," he said, "and then listen to what they're passionate about." Hill will work to match the passions and interests of potential donors with the needs of the department.

Since starting his job during the summer, Hill has found that he really enjoys the atmosphere at ECE. "The caliber of our faculty and alumni is impressive," he said. Though that caliber of people can make his job easier in some ways, Hill does not want to simply keep things as they are—he wants to move higher. "We have a good endowment, but we need to make it a great endowment." Hill explained, "I think endowments are a key to our long-term growth as a department and for remaining preeminent in research and innovation," said Hill. Avenues for endowment support are numerous, encompassing faculty chairs and professorships, as well as fellowships and scholarships.

Any suggestions, comments, or questions for Hill and Katsinas are welcome. Hill can be reached at jonahill@uiuc.edu and Katsinas at katsinas@uiuc.edu.

Alumni Association Board president's message



Sherel Horsley

The university has completed the fall term and we have another exemplary group of students who have indicated they will pursue degrees in Electrical and Computer Engineering.

One of the projects undertaken by your ECE alumni board is the freshman-calling program. One of our board members, Jennifer Sterling (BS '89, MS '90), has spearheaded this program for a number of years and has done an outstanding job in helping mature the program.

I personally made a dozen or so calls this year and found it to be a rich and rewarding experience. When I heard the enthusiasm of both the incoming students and, in some cases, their parents regarding the reasons for choosing Illinois, I felt proud to be an alumnus. We followed up on these calls by hosting a luncheon in Champaign on September 22 for our new freshmen.

Clearly our standing as one of the top five electrical and computer engineering schools (as ranked by "US News and World Report") is a principal factor for choosing the University of Illinois. Your alumni board has set a goal of further improving our ranking. As an alumnus, each of you can help by telling young people about the strength of our ECE department and by your financial support of the University.

ECE Alumni Board new member: Dirk Meyer

By Tom Moone

Dirk Meyer (BSEE '83), president and chief operating officer of the Microprocessor Solutions Sector of Advanced Micro Devices (AMD), said that "the education that I got at the University of Illinois, and the quality and the reputation of the institution" really contributed to his landing his first job after completing his bachelor's degree. While Illinois' reputation reflected well on the young Meyer, it is now Meyer's reputation that reflects well on his alma mater.

That first job was with Intel Corporation in Chandler, Arizona, where Meyer designed the 80C51 and 80C196 microcontrollers. In 1986, he joined Digital Equipment Corporation, where he was involved in CPU design and system architecture development. He was one of the first members of the design team that developed the Alpha microprocessors, which are widely recognized for their record-setting performance and for setting new standards for performance.

In 1996, Meyer joined AMD as the director of engineering for what eventually became known as the Athlon microprocessor, a processor that had a major impact on the computing world.

In 1999 Meyer became vice president of engineering for AMD's microprocessor area. In 2001 he became the general manager of AMD's microprocessor business at AMD, overseeing all aspects of that segment of AMD's operations.

Meyer expresses some regret that he no longer works directly on the design of microprocessors. "It was certainly fun," he recalled. "In a lot of ways it was somewhat simpler in that the factors contributing to success were more in my control than they are now. But I would say that's always the case as you move up the management chain."

For his early career success, Meyer credits the emphasis placed on lab work during his time at Illinois. "My first experiences at Intel were actually lab oriented," he said. "I think laboratory learning brings an approach and a depth of knowledge that you can't get from a book." One key course for Meyer was Theory and Fabrication of Integrated Circuit Devices (ECE 444). "That was a pretty amazing class at the time, and still is," said Meyer. In this course, Meyer built discrete semiconductor components, but at the time,

Continued on page 23

Dirk Meyer continued from page 22

the technology available in the lab was somewhat more primitive than now.

Meyer said, "When I took the class some 20-odd years ago, the devices were so big that we made our masks with a magic marker. You could actually see with your naked eye the transistors and diodes that we were building."

In 2000, Meyer received the Maurice Wilkes Award for his significant architectural contributions to Alpha and X86 processor designs. The Wilkes Award is given annually by the Association of Computing Machinery for outstanding contributions to computer architecture. Meyer also has over thirty patents to his name.

In terms of what he hopes to bring to the table as a member of the alumni board, Meyer said, "I think I can represent one of the department's stakeholders—namely the industrial sector," adding that he wants to help the department "balance the demands of the various stakeholders and help them more clearly define what excellence is and how to get there."

ECE Alumni Board new member: Denise Turic

By Tom Moone

Photo by Chuck Mercer.

For **Denise Turic** (BSEE '88), one benefit of joining the ECE Alumni Board is that she will have an excuse to return to the campus for the first time in twelve years. "Everybody keeps telling me stories [about the changes], and I can't wait," she said. "North of Green is just completely different."

The Grainger Engineering Library is one major change since she was last on campus. "The old library was on the second floor of Engineering Hall," she recalled, "and they were having supports on the first floor because of all the books and stuff—it was caving in."

Now a principal marketing engineer for Microchip Technology, Inc., Turic had her first job after completing her bachelor's degree with STMicroelectronics in Carrollton, Texas. There, she focused on product engineering. In 1991, she started work with a new startup, Benchmarq Microelectronics, which was working on nonvolatile static RAMs, real-time clocks, and battery management. In 1995, she joined Cirrus Logic, a company that made graphics controllers. In 1999 she moved to PowerSmart as the fourth person in its Dallas office. Microchip Technology acquired PowerSmart in 2002.

Turic still focuses on the PowerSmart line at Microchip. Looking back over her career, Turic said, "This is probably my favorite position," adding, "I think I've finally found the niche where I really add the most value." In her job she has been able to bring together her previous positions in product engineering, quality, and design together with her background in memory to bring benefits to Microchip's customers. Turic writes all the technical documentation for the PowerSmart products, including data sheets and applications notes, and she also gives a number of presentations each year to customers or at conferences.

Remembering her undergraduate years, Turic said that one class she took at Illinois that really stands out in her memory is ECE 444, Theory and Fabrication of Integrated Circuit Devices. The course gave her a head start on the type of information that she needed early in her career. "I was way ahead of a lot of other people in just really knowing about process engineering and knowing about how semiconductors are made," she said. "That was very important early on."

She credits the course with giving her a clearer view of how engineering worked in industry. "So much of the other stuff is theory and books and equations, which are important," she said, "but, boy, getting to see how complicated and difficult it is to actually build a product is huge."

The University of Illinois name also gave her an edge in the early part of her career. "I remember when I was at Illinois," said Turic, "professors would say, when people heard you were from Illinois it would open doors. I was thinking, oh that's crazy. That's not going to happen." But, as Turic found out, this was exactly what happened. After being grilled by experienced colleagues who then asked where she had gotten her degree, Turic's response of Illinois quickly changed their attitudes. As Turic recalled, "Suddenly, it was like, 'Oh, well, maybe you will understand. Maybe you can contribute'."

Sheryle Carpenter

Photo by Tom Moone.

Sheryle Carpenter retired at the end of September after 19 years with ECE. Many ECE students remember Carpenter as the one who would let them know they had received an award or scholarship. "That was the good part of my job," said Carpenter. "I did happy things." In her retirement, Carpenter is looking forward to spending more time with her grandchildren and to volunteering at her church. Photo by Tom Moone.

ECE Alumni Board new member: Christopher George

By Laura Schmitt

Christopher George (BSCE '97, MSEE '99) decided to become a patent lawyer because it provided a unique opportunity to combine technical skills, legal analysis, and extensive interpersonal interaction. "You must juggle many different clients and many different technologies in any given day, must keep your technical skills sharp, and must be good at expressing your thoughts and arguments verbally and in writing," George said. "I like the variety and the pressure to constantly shift gears and think quickly on my feet."

George attended the University of Illinois Law School, earning his juris doctorate in 2002. He practices intellectual property law with McAndrews, Held & Malloy in Chicago. He works on patent applications across a wide range of technologies including imaging systems, medical devices, telecommunication systems, wireless networking, financial systems, online auctions, and gaming systems. He helps clients—from individual inventors to large corporations and universities—build coordinated patent portfolios. And he has worked on lawsuits related to gaming systems, lighting controls, and multimedia communications.

The most challenging aspect of his work has been client counseling. "It's one thing to write a patent application or draft a motion, but it's quite another to create a portfolio of patents to serve a client's business and/or research interests and to answer a client's strategic questions as he seeks to start up a business and protect his key technology with patents, trademarks, and other intellectual property protection," George explained.

To help him meet that challenge, George has enrolled in the U of I's online program for strategic technology management.

As an ECE student, George was very involved in extracurricular activities, including the ECE student advisory committee, so he gladly accepted the invitation to join the ECE Alumni Board. "I loved being involved in the department, the college, and the campus, and I have continued to come back to campus to visit, to be a guest lecturer at seminars or student society meetings, and to attend basketball and football games," George said. "Being on the Alumni Board allows me to remain involved and to hopefully give back to the department which enabled me to have such a promising future."

George said he will work to maintain the interactions between alumni and students, and perhaps find new ways for the two groups to network. Currently, alumni and students interact via the ECE Web Board, the ECE Freshman Calling program, annual mock interviews, and occasional career-oriented seminars.

Although his work schedule is demanding, George does find time to be with his wife and son Christopher, who was born in October 2005. He also enjoys following Illini sports and attended nearly every home basketball game in last year's historic season. He and fellow ECE and law school alumnus Richard Stockton (BSEE '97) are starting an intellectual property alumni group and mentoring program.

ECE Alumni Board new member: Kevin Warren

By Laura Schmitt

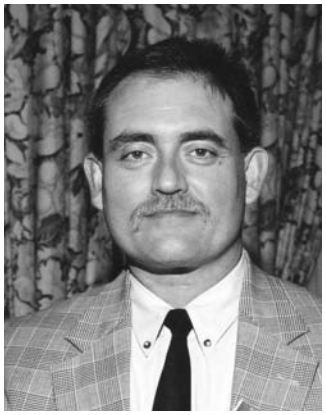


Photo by Chuck Mercer.

Kevin Warren (BSEE '83, MSEE '84, PhD '90), director of Design and Technology Integration for IBM's Systems and Technology Group, has enjoyed a 13-year career with Big Blue that has taken him from research scientist to the executive suites. He started his IBM career in 1992 at the T.J. Watson Research Center, working with the Flat Panel Display Systems Group. He was part of a team that built a full-color high-resolution (5 million pixels at 150 pixels per inch) liquid crystal display—one of the world's first such LCDs.

According to Warren, the display work was among the most rewarding research he conducted. "You get immediate feedback on the quality of your efforts when you work with displays," he said. "You can see artifacts of problems directly on the display itself. When you turn on a display and see a an image, for example, of a *National Geographic* cover, that looks like the cover itself, and you know the huge amounts of data flowing into that display, it's very gratifying to see your work pay off."

In 1995, he became manager of the group—a position he held for four years. After a short stint as a technical assistant to a vice president for research, Warren became senior manager of the research team that trailblazes design methodology for IBM's microprocessors. As senior manager of the VLSI Design Group, he led the research team that participates in all of IBM's processor development efforts, including the recent Cell development.

Throughout his career, Warren has remained loyal to his alma mater. He joined the ECE Alumni Board in July 2005 because, he said, he owes his career to his Illinois ECE education. "When I started at IBM, a manager told me that I had 'learned how to learn' at Illinois, which meant he could put me on any project and I'd know how to get started and could get the job done," Warren said. "Illinois trains students to have a very solid, very methodical, engineering thought process. When they graduate, they can do almost anything because they've had such a broad engineering experience and superb training. Few schools produce students like this."

As a board member, he wants to help ECE and the College of Engineering remain among the top schools in the country. "I'm a consumer of the Illinois engineering product so I plan to give the department input on what industry is looking for in students," he said. "I also want to help the department be all it can be. The board is looking at ways it can help get the word out about Illinois and ECE's excellence."

In his spare time, Warren is helping his church prepare for its 250th anniversary by transcribing old documents and putting them on the Web. He recently came across the charter from King George II granting permission to start the church. He has also enjoyed watching his two sons, both born in Urbana during graduate school, grow up—one of whom is now at the University of Delaware studying biology; the other is a sophomore in high school.

Bobbie Payne

ECE secretary Bobbie Payne retired in June after 27 years of service to ECE. Most recently she had served as secretary to ECE professors Nick Holonyak Jr. and Milton Feng. "It was an interesting job," said Payne of her years spent in the old EERL building before moving to the state-of-of-the-art facilities at the Micro and Nanotechnology Laboratory. Since retiring, Payne has bought a new house, and has taken two cruises on the Mississippi.

Mary Wood Celebrates 80th birthday with ECE

By Laura Schmitt

ECE alumnus Taylor McCormick (BSEE '80) (center), who lives in Half Moon Bay, CA, visited Wood (right) and ECE Alumni Coordinator Emma Marshall (left) in March 2005 shortly after Wood's husband died. "He wanted to spend quality time with me," said Wood, about the former student who calls her "mom."

Although she doesn't look a day over 60, retired ECE staff member Mary Wood celebrated her 80th birthday with members of her ECE family on May 3, 2005, at the Champaign Country Club. Dozens of ECE alumni, faculty, and staff turned out to honor their friend and former colleague.

During her 20-plus years in the department, Wood is best known for her work with student organizations and the ECE Alumni Association. Wood started in the Electrical Engineering Department in August 1967 as a secretary in the Radio Astronomy Lab. A year later she moved into the associate head's office, working as secretary to Wendell Miller, who with secretary Marcia Peterman was establishing the department's Alumni Association. During the next two decades, Wood also worked for Associate Heads Ed Ernst and Oscar Gaddy.

Wood took over supervision of the department's clerical staff in 1984 and oversaw the staff's transition from typewriters to word processors.

"I didn't know how to operate them," said Wood, recalling the new word processing machines. "But I do remember Ed Ernst telling me: 'Mary you don't have to know how to do the job of everybody you supervise.' That has been a good lesson to learn through life whether it be at work or as a volunteer doing committee work. Let others do their job."

Wood retired in 1987, but continued to work part-time for four years, helping Emma Marshall, ECE's alumni coordinator, take over the alumni and student affairs office.

Wood said her greatest accomplishment was establishing so many wonderful friendships with students, faculty, staff, and alumni.

"My office was always open to any of the students that needed help from the associate heads, and I established many endearing friendships," said Wood.

One of those friendships was with Shirley Drazba (BSEE '79), a former officer in the IEEE student chapter on campus. Drazba recalled how she and two other IEEE officers—Taylor McCormick (BSEE '80) and Andrea Mravca Hamel (BSEE '80, MSEE '81)—nicknamed Wood "mom" because she was so helpful and encouraging.

"When we needed help getting a program organized we would turn to Mary initially as a sounding board," said Drazba, an international program manager with Fluid Management Inc. "She was always there for us."

Drazba credits Wood for encouraging her to get involved in undergraduate research, which resulted in an undergraduate scholarship. "I never would have reached my full potential if 'mom' wasn't in the wings cheering me on," Drazba said.

In 1993, Wood was recognized for her dedicated service to the Alumni Board when she received the ECE Alumni Association Marcia Peterman Award, which is named for the longtime departmental staff member and first board secretary. The Peterman Award is presented annually to a former board member for outstanding service.

Since her retirement, Wood was fortunate to travel with her husband Gene "Woody" Wood, to Hawaii, Australia, Switzerland, Alaska, and several other states. In March 2005, her husband passed away. Since then, she has stayed busy by volunteering as an usher for children's shows at the Krannert Center for the Performing Arts, volunteering at her church, visiting her daughter Nancy in Seattle, and seeing friends. She enjoys going to local ECE events, and recently caught up with friends and colleagues at the fall 2005 ECE distinguished alumni banquet in September.

"I still keep in touch as much as I can, valuing all the friendships," she said. "I appreciate how well the department treated me. It's a fantastic department."

Undergraduate research benefits from an alumni-supported fund

By Tom Moone

Last year, though a junior in ECE at the time, Kalou Cheong was encouraged by her adviser, ECE Professor Joe Lyding, to undertake a senior thesis project. The year-long independent study project that she and Lyding agreed upon was a scanning tunneling microscope (STM) study of single-walled carbon nanotubes (SWNT) on pristine Au(111) substrates. The project would gain a better understanding of the SWNT interactions with the gold substrate and investigate optimal parameters for the carbon nanotubes.

Normally, an undergraduate would have difficulty funding the purchase of gold and nanotubes required for such an ambitious project. Fortunately for Cheong, ECE has a newly established ECE Alumni Independent Study Fund. Through this fund, students can receive up to $500 to offset expenses incurred through research. Cheong's was one of five undergraduate projects approved for funding last year.

"I could purchase nanotubes of different dimensions, and I could purchase a little bit of gold," said Cheong. "The funding really helped me to get the opportunity to try a lot of stuff, like different combinations of the nanotubes and the gold."

The funds the students receive may be used for materials and supplies, equipment, computer software, etc. The courses for which students may use this funding are ECE 396 (Honors Project), ECE 397 (Electrical and Computer Engineering Problems), ECE 497 (Senior Researc h Project), and ECE 499 (Senior Thesis, a continuation of ECE 497).

To receive funding, students fill out an Undergraduate Independent Study Funding Request Form, which includes a brief project description and detailed itemization of the items and their costs needed for the project. They also need an instructor's signature. An associate department head then makes final approval of the funding request.

Financial support for this fund comes from the annual giving that alumni provide to the department. But alumni can specify that their contributions go to this fund.

Dominic Tolli (BSEE '87, MSEE '90) was the first alumnus to contribute directly to this fund. "I've always been interested in funding individual engineering projects being done by students," said Tolli, a regular contributor to the ECE Annual Fund. When he found out about this new fund, he was very interested in contributing.

Photo by Tom Moone.

ECE senior Kalou Cheong used money she received through the ECE Alumni Independent Study Fund to purchase materials she used in experiments analyzing the interactions of single-walled carbon nanotubes on gold substrates.

Tolli likes that this fund encourages inquiry among students who have curiosity and talent. "It's allowing students with some very natural and early talent to really utilize that talent," he said. Tolli believes that this fund can encourage students to utilize and develop the creativity they will need once they finish their undergraduate degrees and go on to graduate school, industry, or other endeavors.

Cheong agrees that this fund can help encourage students to really try an independent study. "I think the independent funding is a very good incentive for undergraduates," she said. Having a source for independent funding could make students less hesitant about asking professors to take them on as undergraduate researchers, and could encourage others to undertake a senior thesis earlier in their academic career. Cheong said, "This funding is a way to assist in making [research opportunities] happen."

Alumni who would like their donations to the University of Illinois to go towards supporting the ECE Alumni Independent Study Fund can note the name of the fund or specify the fund's account number (335024) on the contribution form to the University. You can contribute to the University and department online by visiting www.ece.uiuc.edu/alumni and clicking "Make a Gift."

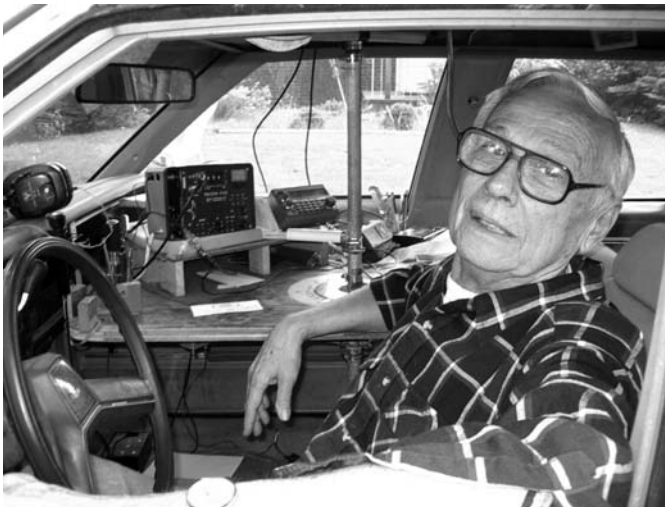
Alumnus finds big clue in bird navigation riddle

By Jamie Hutchinson

In the competitive world of science, researchers do well to abide by the adage "The early bird gets the worm." But there are always exceptions. ECE alumnus Bill Cochran (BSEE '67) only recently got around to publishing an idea that first occurred to him over 30 years ago. He still got his worm.

In 1972 Cochran, then working for the Illinois Natural History Survey (INHS), was studying the migration of peregrine falcons between Greenland and South America. He suspected the birds used Earth's magnetic field to find their way, but he knew there was no constant magnetic field heading that birds could use to fly from Greenland to South America. "Then it popped into my head," he recalled. "What if they frequently calibrated the magnetic field?"

A few years later, Cochran tested his idea using thrushes that pass through Illinois in the spring. These nocturnal, migratory songbirds take off each night after sunset in their flight from South America to Canada. Cochran suspected the thrushes used the setting sun to calibrate a magnetic compass. So he captured birds at the Illinois forestry plantation on South Race Street, fitted them with transmitters, and put them in outdoor cages at the ECE Monticello Road field site southwest of Champaign. There, Cochran subjected the birds during sunset to an artificial magnetic field pointing east, not north. At dark, he released the birds and tracked them electronically in a car equipped with a radio direction-finding antenna.



ECE alumnus Bill Cochran takes the wheel of his 1982 Chevy Caprice station wagon equipped with electronics for animal tracking. The vertical shaft connects to an overhead direction finding antenna, which tends to attract the attention of police as Cochran drives country roads in pursuit of birds.

Cochran, working for ECE Professor George Swenson around 1960, mounts a platform built on the Everitt Lab roof and used to test the antenna for a satellite transmitter. Below Cochran are (left to right) Swenson, Joseph Smith (BSEE '64), Joseph Hemmer (BSEE '64), and Carl Stubenrauch (BSEE '62, MSEE '64).

Sure enough, the tricked birds flew west, not north. According to Cochran, that meant the birds had set their headings during sunset by sensing the angle between the sun and the artificial, eastward pointing field. Upon release into the Earth's field, which pointed 80 degrees counterclockwise from Cochran's artificial field, the birds clung to their established headings by swerving to the west—80 degrees counterclockwise from their natural, northerly headings. Next night, with no artificial field treatment, the birds recalibrated their compasses with the natural field and took off to the north—just as untreated, control birds had done the first night.

Cochran wrote up the results and sent a paper to Science magazine. Science accepted the paper, but never published it due to lack of space. Finally in May 2004, Science published a new paper with the same thesis, written by Cochran and colleagues Martin Wikelski and Henrik Mouritsen. The paper draws on Cochran's old data, as well as new data collected in 2003 by the three coauthors. Mouritsen, based in Germany, provided Helmholz coils for the new study and Wikelski is a former Illinois biology professor now based at Princeton.

The paper has caused a stir among ornithologists, who have long known that migrating birds can use the magnetic field, sun, weather, geographic landmarks, and perhaps even stars as navigational aids, but who have lacked good field studies demonstrating just how birds integrate the various aids. Cochran has provided valuable insight into the problem, but he stresses that his study is not the last word. "Nothing is forever. And this won't be forever—somebody's going to find out more."

Featured alumni careers

Ubell: A patent success

By Erin Lukehart

When Franklin Ubell (BSEE '71) looks back on his first semester at the University of Illinois, he recalls being "the typical wide-eyed freshman"—eager to dive in but not quite sure what to expect. By the time he completed his degree, he had served as chairman of the Dean's Advisory Committee and of the Engineering Student–Faculty Liaison Committee, won Eta Kappa Nu's Outstanding Senior Award and was named a Knight of St. Pat, graduated first in his class, and was one of two college seniors selected nationally by NASA to participate in a summer fellowship program in design at Houston's manned spacecraft center.

"That's really where I got my background in computers and terminology," said Ubell, now an intellectual property litigator. At the NASA program he worked with IBM representatives contracted to design computer systems for the space shuttle.

It was also during his senior year that Ubell interviewed with General Electric, and the company informed him of a program in Washington, DC, to train engineers to become patent lawyers. He had already taken the LSAT, but now felt more certain about pursuing law school. He

Franklin Ubell

applied and was accepted to George Washington University, which has a specialty in patent law.

While attending law school, Ubell worked for Burroughs Corporation (now Unisys) and became a U.S. Patent Agent. He vividly remembers the daily grind: "I'd work an eight-hour day, get off at 5 p.m., drive down to law school for classes from 6 to 9 p.m., do a few hours of studying, and then start all over again."

The hard work paid off—Burroughs offered Ubell a job in California upon completion of his juris doctorate.

When Ubell eventually decided to transition from the corporate world into private law practice, he joined Jackson and Jones, a firm that was in the process of defending a small data modem manufacturer against AT&T. The case grew into a multi-jurisdictional lawsuit that spanned five years, he said, including one grueling year where he was on the road for 180 days.

After Jackson and Jones, Ubell successfully set up his own law firm in Newport Beach for about 15 years. Once he saw that smaller "boutique" firms were beginning to fade out in favor of bigger firms, Ubell decided to move to a large firm environment. He currently works for Greenberg Traurig, a firm staffed with 1,400 lawyers nationwide. Ubell, a supporter of the University's athletics scholarship fund and season ticket holder to Illini football games, remains fond of his days in ECE and the connections he forged with faculty. Murray Babcock was one memorable professor. "I can remember having some difficulties with my circuit class, and I got to know Professor Babcock pretty well by spending a few hours in his office. The individual instruction really helped me out. Tim Trick, my adviser, was also very influential."

Trick was one of the professors Ubell originally sought out to discuss his budding interest in law.

Patent law is particularly well suited to engineers, Ubell explained. He once represented Conexant Systems in a lawsuit against Qualcomm, where each side accused the other of infringing patents in the field of RF semiconductor chip and CDMA cellular technology.

"Some of the technologies were power control, as well as power savings features that are built into cell phones," he said. "In patent litigation, the witnesses are usually engineers with PhD's who are designing equipment, and you have to be able to depose them as well as understand technical documents."

Working in this field often means long hours and late nights, Ubell said, but the rewards are numerous. "One of the reasons why I decided to go into patent law was the opportunity to use writing and speaking skills, while still enjoying the technology and being on the cutting edge of technical developments," he said. "It's never boring."

Stay in touch

Your fellow alums would like to know what you are doing. Visit www.ece.uiuc.edu/alumni/alumnews.html to send us news about your job, your family, awards you've won, or any interesting activities you are involved in.

Engineering twins

By Laura Schmitt

When they were children, identical twin brothers Siavush (BSEE '69) and Daryoush (BSEE '69) Batmanghelidj used to bet their friends and relatives that they couldn't tell the boys apart. The boys won all the time. In high school, the twins had to write an essay on the topic of their choice as part of a literature exam. Without any discussion between them, they both wrote a story about an old man who predicted a flood along a riverbed. As young professionals in the early 1970s, they lived and worked together, and they left engineering for a few years to help impoverished people in their community.

Now almost 60, the Batman twins (everyone calls them that) still resemble each other but they are discernible—Sia's hair is more gray than his brother's. Despite the change in their appearance, the brothers' personal bond is as strong as ever, just like their desire to help others through community service.

"The physical distance between us is just imaginary," said Daryoush about the miles that separate him in Northern Virginia from his twin in Southern California. "I can conjure his great smile, or serious thoughtful look in a split second. Of course he lives in my mind continuously. I know...the color of shirt and tie that he might be wearing on a particular day without even talking to him that day."

Daryoush Batman from the 1969 Illio yearbook

Sia Batman from the 1969 Illio yearbook.

Originally from Iran, the Batman twins came to the United States in 1963 to study engineering at Southern Illinois University in Carbondale. In the fall of 1965, they transferred to Illinois, bringing with them their younger brother Sooroush, whom they enrolled at University High School. Their older brother Anoosh soon transferred from California, and the four Batman brothers lived in a house at the corner of University and Wright near the engineering campus.

"After the second world war, America was viewed positively as a can-do culture, and people wanted to emulate that," said Sia, recalling why he and Daryoush decided to attend college in the United States. "After a year and a half at SIU, we knew that Urbana-Champaign was where we really should be to study engineering."

When they graduated in 1969, the twins took jobs with RCA's Solid State Division in Findlay, Ohio, working with bipolar digital intergrated circuits. Not completely satisfied with the technical work, they soon became active in their community.

In 1970, touched by a television documentary about a teenage runaway, the brothers enlisted the help of three other RCA engineers and started Concern Line, a telephone hot line for people with personal problems. The engineers had special phone lines installed in their homes so they could field calls from troubled people in their own community around the clock. They organized various social service, welfare, health, legal, and religious support professionals, to whom callers would be referred for further assistance.

"This was before hot-line concepts, so it was pioneering stuff at the time" said Daryoush. "We kept it going for about two years and then we both realized that professional help was really needed for some of these people that were calling in and it wasn't sufficient to hear them out."

During this time, the brothers earned master's degrees in economics from Bowling Green University. In 1972, they left RCA and became economists with the Community Action Commission in Findlay, where they organized and secured funds for Findlay's first Family Planning Clinic, which served hundreds of poor women. They started Mobile Meals on Wheels, which provided nutritious meals for elderly residents in four Ohio counties. And they oversaw a new mobile clinic, which provided health services for poor residents

and migrant workers.

"Just imagine someone who definitely looked foreign, like me, talking to these crusty farmers, who weren't used to the idea of government helping people," Sia recalled. "I don't know how I did it, but I would stand up in front of groups of 500 or more, and I would go on television, and it didn't phase me at all. But I knew it was the right thing to do."

In the fall of 1974, the brothers left Ohio for New York City, where they started a doctoral program in public policy at New York University. Their studies were cut short when they received word that their father, a deputy minister in the Iranian Foreign Ministry, had died in Iran. They returned for the funeral and also to help their mother and sister. They ended up staying, putting their engineering skills to work again.

The brothers joined a family development/construction company. Sia worked on the Tochal Tele-cabin project, a 7.5 km gondola just north of Tehran. Daryoush managed a railroad project in the southern port city of Bandar Shahpour and he eventually became CEO of Batman Group Enterprises (BGE).

The twins married within three days of each other—around the time of the 1979 revolution that overthrew the shah and installed Ayatollah Khomeini to power. Had the revolution not occurred, Sia would have stayed in Iran. "Yes, I would have stayed... but constantly visited America," said Sia. "I love America, for what it gave me, and for what it stands for: liberty and freedom. I had hundreds of friends who I could not stay away from for too long."

Coming from a prominent family that owned many businesses drew the attention of the new theocratic government. Many members of the Batmanghelidj family held prominent positions in the shah's government; five were arrested by the Revolutionary Guard and held in the infamous Evin prison where political prisoners were held, including Daryoush and his wife Fati in May 1980.

After the revolution, BGE became a prime takeover target by the Revolutionary Guard, explained Daryoush. In the process of trying to stem back the takeover, Fati, a BGE employee, was taken to prison for questioning. Daryoush was across town at the time, but when he learned of her situation, he rushed to the prison.

Siavush (right) and Daryoush Batmanghelidj pose for a photo on the Bardeen Quad in September 2004--their first visit to campus since graduating in 1969.

"I got to the almost 20-foot-high iron gates of Evin [prison], and it took me another three hours to literally force my entry in," Daryoush said. "I struck a deal with the questioning assistant prosecutor of the Revolutionary Court that they could keep me... provided they would release Fati and my office manager who was also taken in for questioning."

The guards did release the office manager, but they retained Fati for another two weeks, despite the promise Daryoush had secured from guards to release her. Daryoush was released more than a week later provided he give the Revolutionary Courts a year's salary and posted a significant property bond.

Discouraged by the repressive atmosphere in Iran in the early 1980s, the brothers and their families decided to leave Iran, but doing so required patience and secrecy—and a bit of good luck. Sia traveled to the U.S. consulate in Ankara, Turkey, to apply for a visa to bring his family out of Iran. He had planned to plead with the officials there about the hardships he and his family endured after the revolution.

"I was going to go in there begging, saying my dad was a diplomat, my wife's father had been killed

Continued on page 32

Engineering twins

continued from page 31

in the revolution, and my uncle was an ambassador," said Sia. "But the night before my father came to me in a dream and he said: 'Stand on your own feet.' Instead, I told him all we'd done in America."

The official he met with was impressed and granted him the papers he needed to enter the United States. Sia returned to Iran and told his wife that they and the children would be leaving. "I had to be quiet about it," he said. "I went back and didn't even tell my brother or mother until the very last week before my flight out of Tehran."

On March 21, 1985, Sia and his family went to the Tehran airport. Before they could board their flight they were searched and questioned separately by guards. Sia had accidentally left the consulate official's card in his wallet. He watched in horror as a guard flipped through his wallet. "I knew if he saw that, I would probably be accused of something and taken to prison for a long time," Sia said. "They were really skeptical of everybody, even their own shadows. They thought America was going to come back into the country."

Perhaps by luck or by fate, Sia said, the guard touched the card but didn't look at it carefully for it had been flipped backward. He and his family were allowed to board their flight. "It was just a miracle, all of us being able to come out," said Sia.

Daryoush's journey out of Iran wasn't quite as dramatic but it was every bit as stressful. After his release from Evin, he was forced to relinquish some control of BGE to the government. He spent years under immense pressure sorting out the company's layers of debts (all of which were legal prior to 1979 in the normal course of company expansion) and resolving the proper ownership of family assets.

"Sorting this mess literally took me down to the lowest, darkest corner of self pity a sane man can bring upon himself," Daryoush said. "I was up against a totally ruthless, unsympathetic revolutionary court system. I thank God for leaving at my side a genuinely warm, understanding, and caring wife who helped me through the endless nights."

The birth of Daryoush's daughter Sarvenaz in 1983 also helped him through this time. Not long after, he and his wife decided they should leave Iran. "It was sort of a double standard life you had to lead at that time," he said. "For the first 10 or 15 years after the revolution, things were very dogmatic in Iran, very indoctrinated and hardline thinking. School systems were completely topsy-turvy. I didn't want to lead one life outside of the house and a totally different life inside the house so we decided to leave." After a lengthy court process, Daryoush and his family left Iran in 1987.

Sia and his family settled in Orange County, CA, where he and his wife raised their two children. For the past six years, Sia has worked as an OEM account manager with Gigaram, a leading manufacturer of memory modules. Prior to that, he was test and manufacturing manager at Western Digital, overseeing 1,200 employees making PC mother boards.

Daryoush and his family settled in Northern Virginia, where he rejoined the reconstituted family development company. Now called Batman Corp., the firm is heavily involved in land acquisition and commercial development of office and real estate property. He is currently executive vice president, working on a number of mixed-use projects, including a large age-restricted community housing development.

They have continued their public service work. Sia is coordinating, on behalf of Gigaram, a project to equip donated computers and enhanced memory modules used in the local school district's science labs. He's also helping a school build a walkway and garden with an outdoor amphitheater—a project whose design was inspired by the Bardeen Gardens behind Engineering Hall, which Sia saw on his first trip back to the Illinois campus in September 2004. He is also launching an internship program at Gigaram for graduate students at California State at Fullerton.

Daryoush served on the board of the Iranian Community School in Vienna, VA, which teaches 200 K-12 students Farsi, the native language of Iran. He organized a grass-roots movement to elect Mark Warner governor of Virginia in 2000, and he maintains ties with the governor's office. Recently, he began developing projects to help the Gulf Coast region recently impacted by hurricanes Katrina and Rita.

As for the future? Daryoush would like to work in some capacity to relieve international poverty. Sia plans to write books and run for elected office in California. "That would be the ultimate 'community' project. It would also be a good way to find engaging and enchanting friends, wouldn't it?"

Read My Lips: ECE Alum Boosts Computers' Ability to Hear

By Doug Peterson

Her name is Sally and she can both listen and talk. This may not sound so incredible until you discover that Sally is a car—an experimental automobile developed at IBM Laboratories.

Sally can greet you when you get into the car, give you driving directions to specific destinations, keep you apprised of highway traffic, send e-mails on command, and suggest restaurants based on your preferences. If the camera mounted on the dashboard notices that you're getting drowsy, Sally can even play games such as "Name That Tune" to keep you alert.

Futuristic features, such as being able to tell a car to turn on the air conditioning or radio, are already beginning to show up in today's automobiles, such as the Honda Acura, said Stephen Chu, an ECE alumnus (MS '98, PhD '03). However, Chu added, much remains to be done in perfecting the ability of computers to recognize speech, especially in noisy environments like a car.

Today, most speech recognition systems rely solely on audio signals. But Chu, a research scientist with IBM's Watson Research Center in Yorktown Heights, New York, is combining visual signals with audio signals to boost accuracy. Such systems give new meaning to the phrase, "Read my lips."

"The camera can look at lip movements of the speaker, potentially boosting speech recognition significantly," Chu said. The IBM system's effectiveness depends on many factors, such as background noise levels, but he said that adding the visual element has increased speech recognition from 30 percent to 80 percent in some cases.

Stephen Chu

Absent lip movements, certain sounds are difficult to distinguish; people often have to resort to tactics such as saying, "That's P as in 'Paul,'" to get others to fully comprehend a word over the phone.

To demonstrate the power of visual clues, Chu demonstrated "the McGurk Effect" for television and film star Alan Alda on a segment of the PBS show Scientific American Frontiers. In the demonstration, Alda was convinced that Chu was saying "Da-da" on a video clip. But in reality, Chu was mouthing the words "Ga-ga" while the audio was saying "Ba-ba" The combination of the two together made it come out as "Da-da."

Our ears can be easily deceived, but when accurate visual clues are added to the mix, deception is much less likely.

Taking speech recognition even further, Chu has spearheaded IBM's involvement in a large European project that aims to give intelligence to rooms themselves. The project, known as Computers in the Human Interaction Loop (CHIL), features "CHIL Rooms," which are equipped with cameras and microphones. These rooms act as invisible electronic secretaries, keeping track of what is happening, said Chu.

For instance, he said, a smart conference room could listen in on meetings and send a transcript to your computer. If you pop in late for the meeting, the room could send your laptop a bulleted summary of what has been discussed so far. The room could even identify unfamiliar people in the meeting using face recognition software.

"We're trying to design a set of services that are invisible to the user," he added. "The computer would always be doing things in the background, providing information and services. It gives you more tools at your disposal."

Yet another use for IBM's speech recognition system is on the stock trading floor, which is about as noisy an environment as you can find. For these environments, Chu and his colleagues are working on a headset with a camera mounted on a boom. The camera reads your lips and then the system combines the visual with the audio to boost communication accuracy.

Chu's research is an extension of his graduate work on speech recognition at Illinois, done under the guidance of ECE professor Tom Huang. At IBM, Chu's role has been to find better strategies for combining audio and visual signals. Traditionally, the signals are processed in one of two ways. Audio and visual signals are sometimes combined before they're sent to a speech recognizer; and other times, they are sent to the speech recognizer separately and combined later. Chu has developed new algorithms that take advantage of both of these approaches at the same time, further improving speech recognition.

As the visual component becomes a greater part of speech recognition, Chu said the systems have to deal with challenges such as constantly changing shadows that move across the face of the person speaking, making it harder for the computer to track a person's mouth. But Chu believes the systems are up to the task. As he put it: "More and more, computers are able to hear, see, and think."

And read lips.

Danner: Handyman's career takes a turn for the better

By Jamie Hutchinson

ECE alumnus Greg Danner (BSEE'71, MSEE '74) calls it "moving sideways"—a career track whereby he jumped from small business to small business for 25 years, working mostly as a fix-it guy, only to see each enterprise swept away by the tides of the market. But five years ago, Danner's trajectory changed from "moving sideways" to "up the ladder." He joined Scitec, Inc., a global leader in telephone hardware and IP telephony, as an electronics engineer and has since been promoted to director of technology.

Danner, an Urbana native and son of civil engineering professor, the late Ellis Danner, enrolled at Illinois with an eye toward combining his love of music with his in-bred knack for engineering. It wasn't long before he discovered ECE professor (now emeritus) James Beauchamp (PhD '65), an expert in musical acoustics, analysis and synthesis of musical sound, and computer music. For his master's degree, Danner stayed at Illinois and worked with Beauchamp in the campus Experimental Music Studios (EMS).

The two upgraded the EMS, installing a new console designed by Beauchamp, while Danner did most of the wiring, testing, and debugging. For his thesis, Danner designed and built

Greg Danner

a synthesizer. "Literally, we modeled a trombone sound," recalled Danner. "Then we built a bank of filters to emulate the 'comb' frequency response of the instrument. It's called a comb response because it passes several narrow frequency bands, like the teeth of a comb. Then we built a nonlinear function generator, fed it through the comb filter, and we ended up with the trombone sound."

Through EMS, Danner met Illinois composer Salvatore Martirano, who was developing his "SalMar Construction," an analog, electronic, interactive composing machine now considered to be a milestone in the history of electronic music. "That's why my thesis took an extra year to finish," reflected Danner fondly. "I would go into the lab to work, but I'd always end up down the hall in Sal's office!" Martirano continued performing internationally with the SalMar through the 1980s, and Danner would become his right-hand man, keeping the machine in working order.

After grad school, Danner joined Grafyx, a small company based in Champaign's Campustown, which built high-end stereo speakers. Grafyx hired Danner as chief engineer, overseeing the design and production of very good speakers, some of which are still in use. But by 1983, the high-end audio market had contracted to the point where Grafyx could no longer survive, and the company went bankrupt.

Danner then worked for a couple of retail high-end outlets in Champaign-Urbana until the "big box" stores came along and put them out of business. In the meantime, he had been doing repair work on the side, and in the 1990s he ran his own neighborhood electronics repair shop in Urbana. For a few years, VCR repair filled the void left by plunging demand for stereo, TV, and radio repair. But as prices fell, so did the incentive to get VCRs fixed. Danner closed the shop and went to work for Scitec.

"All those jobs gave me good background for managing technology for a company that actually makes the stuff," said Danner. His biggest responsibility is overseeing the company's staple product—analog telephone hardware that you'll find in the majority of hotels and motels in the U.S., as well as in many offices. Danner works with clients to design their phone systems, communicates the specifications to Scitec's factory in southeastern China, and oversees quality control.

"Scitec succeeds because we have a team on both sides of the Pacific," Danner added. "We [in the U.S.] identify customer needs and write the specs. They [in China] make it. Some Asian companies will try to sell something over here that is just wrong for the market. We know what will sell." It also helps that the company's CEO, Dr. Bing N. Sun, a former Beckman Institute research scientist, knows how to do business in China.

In 2004, Danner revisited his electronic music days by restoring the SalMar Construction for a special concert featuring Martirano's old student, composer David Rosenboom. "I was skeptical it would work," he said. "It hadn't even been plugged in for 14 years!" But it did work, and Danner received a big ovation for his efforts.

Google: A High Impact Career

By Erin Lukehart

"In every position I've taken, I've always worked on something that I've believed in and felt excited about," says Jeff Huber (BSCE '89). "I've always felt that if you follow your passions, the rest will follow."

Huber has much to be excited about. Since he joined Google in 2003, the company has tripled in growth, both in terms of number of employees as well as revenues. As vice president of engineering for the search engine giant, he is responsible for the company's advertising and commerce-related products like AdWords, AdSense, and Froogle.

Huber has always been interested in the intersection of technology and business. He began his own start-up for software development and computer equipment sales, Venture Computing, while still in high school. He continued the business from Devonshire Drive in Champaign as a college student, enlisting the help of a few friends.

A native of East Dubuque, Illinois, Huber was attracted to the University of Illinois both as an Illini fan and because he was interested in engineering. "I knew by reputation that it was a fantastic program," he

Jeff Huber

explains. He completed his core EE courses and then focused on software engineering, developing a pre-Mosaic graphical browser of Internet content, based on the usenet news system, for his senior project.

After graduating, Huber went into technology consulting with McKinsey & Company, a group of management consultants who were starting up a technology practice that Huber helped to get off the ground.

After successfully delivering several large systems projects, Huber decided to further develop his business sense by pursuing an MBA at Harvard Business School, which he completed in 1994. "It felt like an opportunity to broaden perspective. I was interested in the business side of things and it's a great place to build a network," he explains. "And when I came out of Harvard, the consumer Internet was really starting to take off."

In 1996, Huber was hired by @Home Network (which later joined with Excite to become Excite@Home), and was one of the first 100 people at the broadband Internet service.

Over time his responsibilities expanded to be senior vice president of engineering and product development for the company. "It was a good match because I really cared about the products, and wanted all of my friends and family to have broadband Internet access," he says.

Prior to joining Google in 2003, Huber also worked for a couple of years at eBay as the vice president for architecture and systems development.

Huber's advice for students looking to break into his field? "Google is technically very strong and intensive," he explains. "Put emphasis behind the most challenging computer science classes you can find, but also learn about business and what your customers really want."

From running his own startup company to working for a major player like Google, Huber is content with the path his career has followed. "It's exciting to be at a company that is successful and growing, but also has the kind of impact that Google has on millions of people every day in making information universally accessible. What's drawn me here is the commitment to making big things happen."

Giving made easier

The generosity of ECE's alumni and friends makes a significant difference as the department works to keep its facilities and programs among the best in the world.

ECE has made it easier for you to contribute by establishing an online giving site. Simply go to my.ece.uiuc.edu/ and select "Make a Gift" under "Quick Links." You can make your contribution with any of the four major credit cards. If your employer has a matching gift program, you can indicate this at the site, doubling or even tripling your gift.

Your gift will help the department in a variety of productive ways—from funding student scholarships to supporting faculty and student recruitment, to supporting alumni and other special events.

Alumni class notes

1961

IEEE has named Jagdishkumar Aggarwal (MS '61, PhD '64) to receive the 2005 IEEE Leon K. Kirchmayer Graduate Teaching Award. The award honors Aggarwal for inspiring graduate students to achieve excellence through mentoring, teaching and guidance of research in computer vision and signal processing.

1973

Don Wills (BSCE '73) was inducted into the Hall of Achievement for the Monmouth Elementary School on May 6, 2005. He has been the co-owner of Subject, Wills & Company, Produce Pro Inc., and DB/C Software Co. for almost 30 years. Mr. Wills currently resides in Western Springs, IL.

1974

On March 8, 2005, Intel Corporation named William Holt (BSEE '74) as the new co-general manager of the Technology and Manufacturing Group. Mr. Holt previously served as the vice president and director of Logic Technology Development.

1978

Hughes Supply, Inc. announced February 9, 2005, that Neal Keating (BSEE '78) had been appointed chief operating officer. Mr. Keating had most recently served as an executive director of GKN, Plc and CEO for GKN Aerospace.

1980

Congratulations to Richard Williams (BSEE '80), ECE Alumni Board member and President, CEO, and CTO of AnalogicTech. A developer of power management semiconductors for mobile consumer electronic devices, AnalogicTech announced their initial public offering in August of 2005.

1983

MIPS Technologies, Inc., a leading provider of industry-standard processor architectures and cores for digital consumer and business applications, announced in January 2005 that Rob Herb (BSEE '83) had been appointed to its board of directors. Mr. Herb had previously served as AMD's executive VP and chief sales and marketing officer.

Dr. Sanjeev Renjen (PhD '83) has been named senior vice president of engineering and operations for TeleCIS Wireless, Inc., a leading developer of multi-protocol broadband wireless access (BWA) chips. In his new role, Dr. Renjen will oversee the company's product development and production of its ASICs.

1998

Alumni Andrew Trick (BS CE '98; MSEE '01) and Teresa Soledad Trick (BSEE '98) are the proud parents of their first child, a baby boy named Timothy Soledad Trick, born March 28, 2005. The proud grandparents are ECE professor Tim and Dorothe Trick.

2004

Carrie Fabbrini (BSEE '04) married Brian DeYoung January 1, 2005, in Evanston, IL. The couple currently resides in Champaign, IL.

2005

The Big Ten Medal of Honor was awarded to Jack Ingram (BSEE '05) for his demonstrated proficiency in scholarship and athletics.

Obituaries

Vernon Clifford Westberg (BSEE '33) died January 22, 2005. In 1957, Mr. Westberg started his own manufacturing business, Auto Meter Products, Inc., and served as president and then chairman of the board. He was a member of the Society of Automotive Engineers for 40 years.

Richard Edward Johnston (BSEE '47) died on November 18, 2004. In 1947 he received his private pilot license with the first class at the University of Illinois. He was employed with IBM for 36 years before his retirement in 1985.

Edward McCartney (BSEE '47) passed away March 24, 2005. He was a retired electrical engineer for Commonwealth Edison.

Donald Steeper (BSEE '48) died at the age of 77 on January 14, 2005. Mr. Steeper worked for 39 years as an electrical engineer at General Electric in Schenectady, NY, and was a senior IEEE member.

Bruce W. Everitt (BSEE '50), died September 27, 2005, in Green Valley , AZ, at age 77. Since 1964, Bruce was a Boston-based financial analyst and technology investor in the high-tech and medical areas for corporate communications, investor relations, corporate finance, and venture investments. Bruce was the son of William L. Everitt, former ECE department head and dean of the College of Engineering at Illinois.

Retired U.S. Army Col. Thomas Clinton Musgrave (MSEE '50) passed away Wednesday, May 11, 2005.

Bill Jacaway (BSEE '50) died March 14, 2004. Bill served in the Air Force during World War II and spent his entire career with the Boeing Company in Seattle, WA.

Joseph McCluhan (BSEE '50) died on January 22, 2005. Mr. McCluhan was an engineer for Central Illinois Light for 35 years and a member of the Illini Club.

Norman Poole (BSEE '51), died at the age of 75 on April 12, 2005. He worked on the technical staff of AT&T Bell Laboratories.

Edgar Stelter (BSEE '51) passed away January 22, 2005. He retired from General Electric in 1990 after 35 years as an engineer. His expertise was in the field of Heavy Military.

Elwood Schmidt (BSEE '52) passed away March 27, 2005 at the age of 75. He was employed by Sperry Gyroscope Company and Raytheon during his career.

John Frederick Williams (MSEE '53) died on April 3, 2005. His interest in engineering subjects, particularly aircraft control systems, was a lifelong pursuit. Mr.Williams retired from Honeywell.

Charles William Wells (BSEE '56) died March 25, 2005. He enjoyed a 40-year career with Illinois Power Company and retired as executive vice president in 1996.

John Charles Olson (BSEE '57) died May 15, 2005. He was 74.

Mr. Olson worked for Western Electric Co. and for the Defense Department for almost 40 years.

Raymond Weiherman (BSEE '58), died March 21, 2005, at the age of 75. He was an IEEE member and was employed as a senior engineer at Barber-Colman from 1958 until retiring in 1989.

Robert Charles Kramp (BSEE '60) died April 10, 2005 at the age of 67. Mr. Kramp worked over 39 years for Inland Steel, Bechtel, Westinghouse, Oakland Army Base, and the US Coast Guard.

John Holmquest Sr. (BSEE '60) died on February 25, 2005 at the age of 71. He served as a lieutenant in the Navy and was a member of the IEEE.

Kenneth W. Heizer (PhDEE '62) passed away April 30, 2005. Professor Heizer retired from SMU in 1992 after 41 years of teaching, receiving the honor of Professor Emeritus of Engineering.

Lester O. Jones (BSEE '70) died January 10, 2005. He was the founder and owner of J.J. Jones & Company, Ltd, an electrical contracting company in Carol Stream, IL.

Robert Smith (BSEE '77) died on April 4, 2005 at the age of 54. Mr. Smith owned and operated Modern Control Company and was an electrical engineer.

ECE celebrates alumni achievement at banquet

By Tom Moone

On September 23, a banquet sponsored by ECE recognized four recipients of the Distinguished Alumnus Award: Raymond Chin, W. Kent Fuchs, Roger L. Johnson, and Howard P. Zinschlag. Also recognized at the banquet were Stephen A. Boppart as this year's recipient of the ECE Young Alumni Achievement Award, Daryl Farley Varney as the recipient of the Marcia Peterman Award, and Professor Bill Perkins as a retiring faculty member (see article p.13).

Photo by Chuck Mercer.

On September 23, the 2005 ECE Distinguished Alumni Awards were presented to four individuals. Seated: W. Kent Fuchs and Roger L. Johnson. Back: ECE Alumni Association President Sherel D. Horsley, Raymond Chin, and Howard P. Zinschlag.

Raymond Chin (BSEE '76, MSEE '77, PhD '80) is chairman of Mtone Wireless Corporation in Santa Clara, California. He has served as its chairman since the company's inception in 1994 and as its CEO from 1996 to 2003. Mtone established the first mobile information services in China by offering mobile Internet information and mobile stock trading services in 1998 with China Telecom. Its innovative wireless network and mobile devices integrated a data broadcast stream and two-way data channel.

As chairman of Proxim Inc., Chin led the company to pioneer the first commercial Wireless LANs in 1992, which launched the WLAN industry. The company had its initial public offering in 1993. He served on its board until 2002.

Chin served as a general partner for two venture firms and on the boards of multiple companies and professional organizations and has spoken numerous times at Illinois on entrepreneurship.

"I consider myself to be fortunate to be associated with the University of Illinois," said Chin when he received his award, noting that Illinois provided "the people that really influenced the things I do today."

W. Kent Fuchs (MSEE '82, PhD '85) is the Joseph Silbert Dean of the College of Engineering at Cornell University, where he has been since 2002. He was a member of the ECE faculty from 1985 to 1996. He was the head of the School of Electrical and Computer Engineering and the Michael J. and Catherine R. Birck Distinguished Professor at Purdue University from 1996 to 2002.

Fuchs's research interests include dependable computing and failure diagnosis. His teaching includes logic design, computer organization, fault-tolerant computing, and testing. He has received several awards for excellence, including appointment as University Scholar while at the University of Illinois.

Fuchs states that throughout his career he has been blessed with exceptional colleagues, mentors, and students. He is a Fellow of the IEEE and a Fellow of the ACM.

Of his award, Fuchs said, "This is more heartfelt than national awards because it comes from your family."

Roger L. Johnson (BSEE '65, MSEE '66, PhD '70) said of his years at Illinois, "I worked with many

Continued on page 38

ECE celebrates alumni...

continued from page 37

people who were top notch." Now chairman and CEO of Information Technology, Ltd., in La Jolla, California, Johnson participated during his Illinois years in the early development of the PLATO network and the invention and development of the plasma display panel (PDP). In 1970, he joined the ECE faculty, teaching courses in integrated circuit and display technology.

He joined Science Applications International Corporation (SAIC) in 1977, retiring from there in 1997, at which time he was senior vice president of technology.

Following his retirement from SAIC, Johnson joined Information Technology, Ltd. (ITL), as chairman and CEO. ITL is a technology consulting firm providing flat panel display and mobile computer system design services to a variety of corporate and government clients.

Dr. Johnson served on the board of directors for the National Center for Advanced Information Components Manufacturing (NCAICM) at Sandia National Laboratories. He is a Member of the IEEE and was granted the position of Fellow in the Society for Information Display in 1986.

Howard P. Zinschlag (BSEE '59) retired in 1998 from MEMC Electronic Material, Inc., after 40 years working in the fields of instrumentation, systems, and automation. He was nationally recognized in 1991 as a computer control pioneer for his contributions at the Monsanto Company in developing a unique foundation for the computerization of the process world. This work, originally done in 1968, involved creating a successful computer system designed specifically for process control, coupled with a very first cathode ray tube display, providing a breakthrough needed for the world of digital process control for process and power plants to be born.

Early in his career he designed and developed state-of-the-art memory systems for the computer industry. He later designed and developed digital control systems for the controlled growth of silicon ingots, the base material for silicon wafers, for the semiconductor industry. In 1986 he was elected a Fellow of the Instrumentation, Systems, and Automation (ISA) International Professional Society and served as its president from 1993 to 1994. He served on the ECE Alumni Board and was recipient of the Illinois Loyalty Award in 1996. Zinschlag remains active in ISA and currently works as a consultant.

Photo by Chuck Mercer.

ECE Associate Professor Stephen A. Boppart (right) received the 2005 Young Alumni Achievement Award. He is shown here with his wife, Marni.

On receiving his award, Zinschlag said, "I'm honored and really humbled because I'm being counted as part of this prestigious group."

The recipient of the 2005 ECE Young Alumni Achievement Award, **Stephen A. Boppart** (BSEE '90, MSEE '91) is an associate professor in ECE at Illinois. He heads the Biophotonics Imaging Laboratory at the Beckman Institute. Using advanced imaging techniques such as optical coherence tomography (OCT), nonlinear interferometric vibrational imaging (NIVI), and multiphoton microscopy, high-resolution, real-time, noninvasive images of biological tissue at the cellular and molecular level can be generated in order to diagnose a variety of diseases, such as cancer.

Boppart also is a physician with an MD and combines his imaging research with clinical patient care. He was named one of the top 100 innovators in the world by Technology Review Magazine in 2002. He received the College of Engineering Everitt Award for Teaching Excellence in 2003 and 2005, and the National Science Foundation CAREER Award in 2004. He also received the 2005 IEEE Engineering in Medicine and Biology Society Early Career Achievement Award.

Speaking of the satisfaction that he and other faculty members feel when working at ECE, Boppart said, "We have found something that we really love to do."

The Marcia Peterman Award is presented annually at this banquet to a former ECE Alumni Board Member for dedicated service as a member of the board. This year's recipient was **Daryl Farley Varney** (BSEE '83, MSEE '85), who was a member of the ECE Alumni Board from 1989 to 2004, serving as president from 1998 to 2001. While serving on the board, she helped establish the first alumni–student mentoring program, Alumni–Student Connections. She received the Orange and Blue Appreciation Award in 2004.

College service award goes to ECE alum

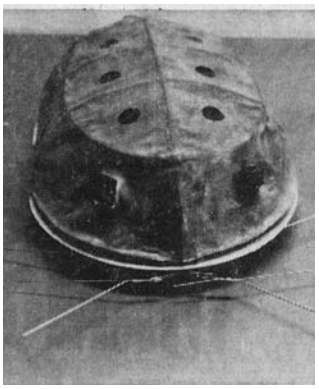
"Illirunt" inventor went on to bigger things

By Jamie Hutchinson

An ECE alumnus has won the 2005 College of Engineering Alumni Award for Distinguished Service. Dr. Henry S. "Hank" Magnuski (BSEE '65) received the honor last spring, in recognition of his contributions to the development of Internet-based telecommunications products. He won the ECE Distinguished Alumni Award in 1998

Magnuski designed the first PC/fax board and software package, which he brought to market in 1985 through his company GammaLink. In 1994, the company merged with Dialogic Corp., a manufacturer of voice cards for PC. The combined companies became part of Intel in 1999.

In 1995, Magnuski founded Internet Video Services, Inc., in California. IVS specialized in storage and distribution of high-quality video over the web. While serving as CEO and president, Magnuski created MediaMart, one of the first electronic commerce sites. Now with NCast Corp., which he cofounded in 1998, Magnuski develops and markets Internet-based video and teleconferencing systems. In years past, he has also been active with facsimile standards development for the Telecommunications Industry Association.



Henry S. "Hank" Magnuski and the Illirunt as it appeared in the Champaign-Urbana News-Gazette in June 1965. "Whiskers" helped the robot avoid walls. Dark circular areas are photocells to help the machine find light. Reproduced by permission of The News-Gazette, Inc. Permission does not imply endorsement by the newspaper.

Magnuski's contributions don't stop with technology and entrepreneurship. He and his wife Cynthia provided the gift to establish the Magnuski Professorship in ECE, now occupied by department head Richard Blahut. Earlier, the Magnuskis had created a fund to support the work of outstanding young ECE faculty. In his philanthropic efforts, Magnuski invokes the memory of his father, a longtime Motorola employee who designed the circuits that were used in the first portable FM two-way radios, or "walkie-talkies." The elder Magnuski fled his native Poland in 1939, shortly before the Nazi invasion. He accumulated 25 patents in VHF and microwave communications during his career.

Magnuski has come a long way from the "Illirunt." That was the name he gave to his senior design project, a robot built under the direction of ECE professor Murray Babcock. Actually a very impressive creation for a college student at the time, the Illirunt could negotiate walls and other obstacles, and seek out light. The machine's control system was probabilistic, not deterministic, making its behavior more unpredictable and lifelike.

From Illinois, Magnuski went on to MIT for graduate school. Before getting involved in telecommunications work, he managed computer systems used in "human factors" and psychological research conducted at Bell Laboratories.

Jack Kilby, 1923-2005

continued from page 1

where he was responsible for the design and product engineering work on hearing aid amplifiers. In 1958, he joined Texas Instruments (TI) in Dallas. During the summer of that year, working with borrowed and improvised equipment, he conceived and built the first electronic circuit in which all of the components, both active and passive, were fabricated in a single piece of semiconductor material half the size of a paper clip.

Kilby went on to pioneer military and commercial applications of microchip technology. He also co-invented the hand-held calculator and the thermal printer that was used in portable data terminals.

In 1970, he took a leave of absence from TI to work as an independent inventor. From 1978 to 1984, he held the position of Distinguished Professor of Electrical Engineering at Texas A&M University. In later years, he maintained a schedule of work and travel on industry and government consulting assignments throughout the world. He also served as a director of several corporations.

"I'd like to be remembered as a good engineer," said Kilby, "to think that my work has had some contribution to society and made this at least a more comfortable place to live."

Huang wins Okawa Prize

By Steve McGaughey, Beckman Institute Writer

As an original Beckman Institute faculty member, ECE Professor Thomas Huang has earned many awards and honors over the years, including two of the most prestigious in electrical engineering. In November, Huang will have a third citation to put at the top of his awards list, an honor given to only one or two scientists in the world per year.

Huang has been named the Okawa Prize winner for 2005 by the Okawa Foundation of Japan. Each year, one foreign scientist is honored, along with one Japanese winner from business or academia, for their contributions to the information and telecommunications fields. The Japanese winner may be a scientist or businessman.

Huang said he counts two honors above the rest when it comes to the many awards he has earned as a leading researcher in image analysis, signal processing, and human–computer interfaces. Huang, co-chair of Beckman's Human-Computer Intelligent Interaction Research Initiative, won the Jack S. Kilby Medal in 2000 and the King-Sun Fu prize in 2002, the top awards, respectively, in the fields of signal processing and pattern recognition.

Thomas Huang

Huang puts the Okawa Prize in the same category. His citation is "for pioneering and sustaining contributions to the theory of image sequence analysis and its applications to video compression, pattern recognition, and animation." The prize includes a certificate, gold medal, and cash award of 10 million yen, or about $90,000. He was honored at a ceremony in Tokyo on November 24.

Huang said he thought he was being considered for the prize, but didn't expect it until receiving an announcement by e-mail. "Like most awards, you get some sort of indirect indication somebody is considering you, but you don't really know whether it is true or not," he said. "I was very surprised and honored."

Huang, leader of the Image Formation and Processing group at Beckman, joins former UIUC Chancellor Thomas Everhart as a winner of the award.

Huang said the Okawa Prize isn't for any one project. "It's more like a lifetime achievement award," he said. Huang received his Sc.D. degree in Electrical Engineering from the Massachusetts Institute of Technology in 1963. He is the William L. Everitt Distinguished Professor in ECE. His wide-ranging work involving images—including areas such as human–computer interfaces, multimedia databases, and 3-D modeling, analysis, and animation of the human face, hands and body—has been groundbreaking.

The selection committee for the Okawa Prize includes university and scientific institute presidents from Japan. The Okawa Foundation for Information and Telecommunications is a nonprofit organization providing funding for studies in those fields. The Okawa Prize was established in 1992 to honor Japanese contributors, and in 1996 was expanded to include foreign scientists.

University of Illinois
ECE Alumni News
Electrical & Computer Engineering Department
155 Everitt Laboratory
1406 W. Green Street
Urbana, IL 61801
(217) 333-5817

Non-profit org.
U.S. postage
PAID
Permit no. 75
Champaign, IL 61820