

RES NANCE

NEWS FOR ECE ILLINOIS ALUMNI AND FRIENDS
WINTER 2009–2010

Creating a better sensor for DNA analysis

Also in this issue:

Goddard receives Presidential
Early Career Award

Scientists break light modulation
speed record—twice

ECE grad students develop portable
AIDS diagnostic platform

ECE alumnus Cho inducted into
National Inventors Hall of Fame

 ILLINOIS

Department of Electrical
and Computer Engineering



Support excellence

To alumni and friends of ECE ILLINOIS,

Speaking at a special session on scientific philanthropy, held at the World Conference of Science Journalists in London last July, Mike Lazaridis, co-founder of Research in Motion, Ltd., the company behind the BlackBerry® and major sponsor of the Institute for Quantum Computing at the University of Waterloo, Canada, said, “Philanthropy can be seen as a kind of venture capital for really long-term investment.”

This comment reminds us of the true value of academic philanthropy as a critical enabler of the free pursuit of the arts, scientific discovery, and engineering innovation.

Philanthropy, which can be defined literally as “a love for mankind,” occurs through the generosity of those with a commitment to the future, people for whom satisfaction derives from the benefits to society at large.

I can think of no other institution more deserving of sponsorship today than the land grant university, perhaps the foremost guardian of the free pursuit of knowledge expansion. In today’s challenging economic times, the uncertainty of state support forces land grant universities to become increasingly dependent on philanthropy to further pursuit of their mission.

The characterization of the philanthropist as a catalyst for the betterment of humanity aligns with the wellspring of the land grant university’s success—a fundamental meritocracy, regarding not only the selection of the student body, but also regarding academic and artistic freedom. Support of free thought and inquiry is integral to the progress of mankind toward a better future. The value of those who generously offer such support is inestimable.

You, our alumni and friends, have firsthand experience with the invigorating power of engineering innovation, since over the years you have been pioneering contributors to all major technological leaps that have transformed our way of life.

I ask you to embrace and support our commitment to excellence in electrical and computer engineering. Every chance you have, talk about ECE ILLINOIS and encourage young, inquiring minds to come to us to build the future together; you know we will serve them well. I respectfully ask you to give back to the department any way you can, because giving back is “a kind of venture capital for really long-term investment.”

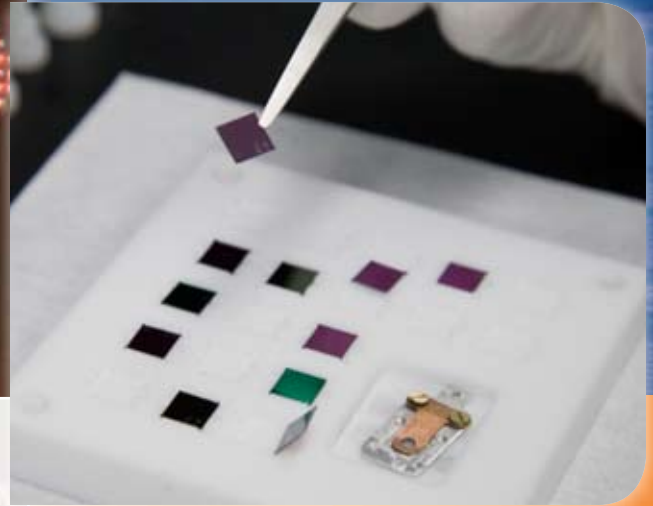
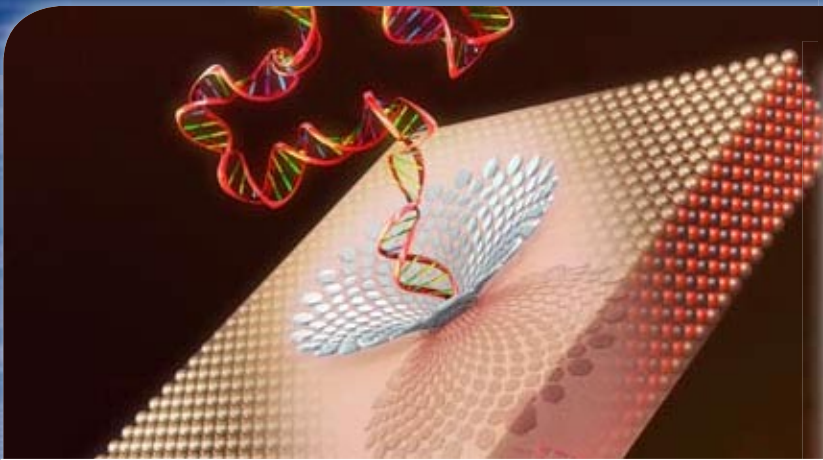
Best Regards,

Andreas C. Cangellaris
Department Head

M. E. Van Valkenburg Professor in Electrical and Computer Engineering

ECE ILLINOIS

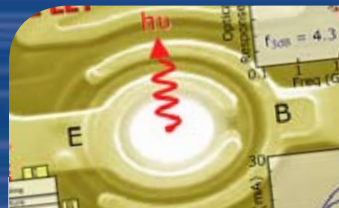
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RESONANCE is published twice a year by the Department of Electrical and Computer Engineering (ECE) at the University of Illinois at Urbana-Champaign. Comments and suggestions are welcome. Contact Tom Moone, editor, at moone@illinois.edu or mail to the address at left.

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Rosenbaum leads workshop on “Making Engineering Fun”

ECE Professor Elyse Rosenbaum is doing her best to ensure that engineering will get more attention in the public schools. On June 30, Rosenbaum led “Making Engineering Fun,” an all-day workshop for 18 Illinois teachers of grades 4 through 8. The workshop covered four units: microelectronics, waves, static electricity, and heat. Lesson plans and material lists were provided to the teachers, along with the hands-on opportunity to participate in the demonstrations and experiments.



ECE ranks higher in U.S. News annual survey

ECE ILLINOIS is again one of the top-ranked engineering departments in the country, according to the 2010 annual survey by *U.S. News & World Report*. ECE is ranked third for undergraduate computer engineering, up from fifth in the 2009 rankings. MIT and University of California, Berkeley are ranked first and second, respectively. For undergraduate electrical engineering, ECE tied for second, up from third in 2009. MIT is ranked first, and Stanford University tied with Illinois for second.

Making music that’s truly electric

Electronic Services Shop Technician Mark Smart performed as the headliner for the 2009 annual conference of the Society for Electro-Acoustic Music in the United States (SEAMUS). Smart played the Continuum Fingerboard, which was created by ECE Lecturer Lippold Haken, and was accompanied by a pair of Tesla coils.



Remote Sensing group builds new Chile compound to study upper atmosphere

ECE Professor Gary Swenson and members of the Remote Sensing and Space Sciences (RSSS) group are building a new 900-square-foot facility at Cerro Pachon in northern Chile. There, they will study the middle atmosphere using an active LIDAR (light detection and ranging) device, which, when projected onto a sodium layer, acts as a tracer to study wind and temperature in the atmosphere. They will also study airglows, which are weak light emissions produced by the recombination of atomic oxygen in the Earth’s atmosphere.



Chapman evaluates highway rest areas for wind power

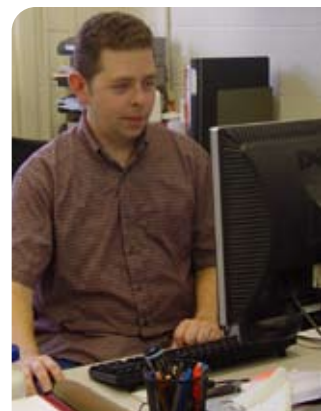
ECE Associate Professor Patrick Chapman and his graduate student Piotr Wiczowski performed an in-depth study for the Illinois Center for Transportation and the Illinois Department of Transportation



to determine the feasibility of using wind to provide electrical power at highway rest areas and weigh stations. They examined the degree to which wind power could offset electricity costs and provide a reasonable return on the investment of installing and maintaining the necessary wind turbines. Based on a number of factors, Chapman and Wiczowski determined that wind power is not currently the most economically feasible method for providing power at highway locations.

Carroll receives 2009 Chancellor’s Distinguished Staff Award

Matt Carroll, who runs the copy room in the ECE Publications Office, was named a recipient of the 2009 Chancellor’s Distinguished Staff Award. This prestigious award annually recognizes staff for their exceptional accomplishments and service to the University. [U](#)



Andreas Cangellaris named head of ECE ILLINOIS

By Tom Moone

On June 30, College of Engineering Dean Ilesanmi Adesida announced the selection of ECE ILLINOIS Professor Andreas Cangellaris as department head for the Department of Electrical and Computer Engineering. Cangellaris, the M. E. Van Valkenburg Professor in Electrical and Computer Engineering, has been serving as interim head of the department since November 2008.

In a memo, Dean Adesida said, “Professor Cangellaris is an outstanding scholar who has a strong vision for the department’s future and is dedicated to sustain the quality of the ECE Department, which has prospered tremendously over the past several years.”

“It is a great honor,” said Cangellaris about being named the head of ECE ILLINOIS. “I consider it a very special privilege to be given the opportunity to serve such a stellar department in such a role. ECE ILLINOIS has distinguished itself over the years as a leader in engineering education and groundbreaking research. I look forward to working closely with the ECE ILLINOIS faculty, our students, and our alumni to build the brightest future for our department.”

Among his goals for the department is “to share our enthusiasm about the importance of education and engineering innovation with everyone,” said Cangellaris. “We have a responsibility to remind people that it is through innovation that we prosper and through education that we put our prosperity to good use.”

Cangellaris came to the U.S. from Greece in 1981 for graduate school. His sister was a grad student at Illinois in chemical engineering, and he considered coming to Illinois as well. But, “I was afraid of the cold,” he said.

He went on to earn his master’s and PhD degrees from the University of California, Berkeley, in 1983 and 1985, respectively. While there, he met his wife, Helen. He joined the Illinois faculty in 1997. His expertise and research interests are in the area of applied and computational electromagnetics with an emphasis on applications to methodologies and algorithms for computer-aided analysis and design of radio frequency/microwave components and systems;

high-speed digital interconnects at the board, package, and chip level; and system-level electromagnetic compatibility.

An author of numerous journal and conference papers, Cangellaris is also co-author of the book *Multigrid Finite Element Methods for Electromagnetic Field Modeling*. His scholarly recognitions include the Humboldt Research Award, the Best Paper Award at the 1999 IEEE (Institute of Electrical and Electronics Engineers) Topical Meeting on Electrical Performance of Electronic Packaging, and the ECE ILLINOIS Faculty Outstanding Teaching Award. A Fellow of the IEEE, he currently serves as editor of the IEEE Press Series on Electromagnetic Wave Theory and as a distinguished lecturer for the IEEE Microwave Theory and Techniques Society.

“We have a responsibility to remind people that it is through innovation that we prosper and through education that we put our prosperity to good use.”



Andreas Cangellaris, Department of Electrical and Computer Engineering

Cangellaris and his wife have three children. Their oldest daughter is a junior in bioengineering at Illinois. He has another daughter who is studying animation at the Rhode Island School of Design and a son who is a senior in high school. And perhaps surprising for someone who first came to the U.S. as a graduate student, Cangellaris is a great fan of American football. He explained, “I need to watch at least half a game a week to be at peace with myself.” 🔌

Architect presents plans for new ECE building

By Tom Moone

After many months of concentrated effort working with SmithGroup, initial drawings for the new building were presented to the University on September 10. These plans follow months of a “program analysis” and “schematic design stage” for the new ECE building.

During this process, the architects took the department’s needs for classroom, laboratory, office, and support space and developed preliminary layouts of those particular spaces.

the Instructional Fabrication Lab and labs for ECE 110: Introduction to Electrical and Computer Engineering will be on the first floor, and they will have windows to allow visitors to observe the activities in these exciting labs.

The design envisions a three-story structure and a five-story structure joined by an atrium. The building will contain a 450-seat auditorium for large classes and presentations. There are plans for a green roof and a large array of photovoltaic cells to help power the building. A chilled beam system provides cooling and heating for the taller structure.

Numerous other innovations will be included to make the building as energy-efficient as possible. The goal is to achieve near-zero net energy consumption.

In terms of the project budget, there were also a couple of items over the past several months that dealt directly with the budget for the building. At the May 21 meeting of the University of Illinois Board of Trustees, the Board approved

an updated total project budget. The approved budget for the building is now set at a maximum of \$95 million. “It’s not so much that the budget has been increased as much as it has been finalized,” said Krein.

And, on May 30, the Illinois legislature passed a state construction bill that included, among other items, \$44.5 million for construction of the new ECE building. Currently, that bill is awaiting the governor’s signature. This adds to the previous release of \$3 million for planning and commits the state to a total of \$47.5 million out of the total \$95 million budget for the project.

A fundraising campaign is under way to raise the balance of the funds needed for this project. To get involved with the ECE building project go to

ece.illinois.edu/buildingcampaign/. 



SmithGroup presented ECE ILLINOIS is developing some preliminary building designs. See additional renderings at www.ece.illinois.edu/buildingcampaign/e-update/oct09-photoalbum.html.

ECE Professor Philip Krein, who is chair of the Ad Hoc Building Committee, explained, “That whole process was essentially us working with architects to see that they captured what we are trying to achieve.” For their part, the architects delivered to the department a large book of configurations for every functional room proposed for the building, addressing all the most desired features within the target of nearly 250,000 gross square foot total. Once the department and University were satisfied that the needs had been fully addressed, this analysis was then approved.

Of the design presented on September 10, lead architect David King noted that not all of the showpieces for the department were able to fit on the first floor. However,

Illinois Gable Home wins second in Solar Decathlon

BY MELISSA MITCHELL, U OF I NEWS BUREAU

A student team from the University of Illinois won second place in the 2009 Solar Decathlon design competition sponsored by the U.S. Department of Energy.

Winners of the international contest were announced October 16 in Washington, D.C., by U.S. Deputy Secretary of Energy Dan Poneman. Team Germany took the top spot in the competition.

The interdisciplinary team from Illinois designed a super-energy-efficient, solar-powered residential dwelling named the Gable Home.

“As I kept saying, we never could guarantee first place, but we could guarantee a first-place effort,” said ECE Associate Professor Patrick Chapman, one of the lead faculty advisers, who oversaw engineering efforts on the project.

“We’re very happy to get second place,” said architecture professor and project manager Mark Taylor.

The Illinois team’s highly insulated, 800-square-foot house used recycled, reclaimed wood and engineered bamboo, and was outfitted with a rooftop array of solar panels. The house was designed to meet standards set by the Passive House Institute US.

According to another team adviser, industrial design professor David Weightman, the home had “more solar panels than would be required for normal operation, due to the particular nature of the competition requirements.”

“It requires very little heating in Illinois during the winter months,” he said. “In fact, it can produce three to four times the output of power that it needs.”

According to the Solar Decathlon Web site, goals of the competition included education of participants on the benefits of energy efficiency, renewable energy, and green building technologies; raising public awareness of these practices; encouraging research, development, and marketability of solar energy technologies; fostering educational cooperation among students and institutions; and promoting an integrated, “whole building design” approach to new construction.

The competition involved 10 areas: architecture, comfort, livability, and market viability to how well the solar homes provide energy for space heating and cooling, hot water, lights, and appliances.



Illinois students celebrate after taking second place overall in the U.S. Department of Energy Solar Decathlon competition on the National Mall in Washington, D.C., October 16. Photo by Stefano Paltera/U.S. Department of Energy Solar Decathlon.



Photos by Stefano Paltera/U.S. Department of Energy Solar Decathlon.

The Illinois team won first place in hot water, appliances, and home entertainment. It also won second place in lighting design, comfort, and net metering.

ECE graduate student Charles Murray liked the camaraderie among all the participating students. “You didn’t start getting competitive until your house was set up,” he said. In fact, the Illinois team loaned spare parts to the Minnesota team and borrowed an item from the California team. “Everybody wanted to see this technology work,” he said.

The house shell was manufactured by Homeway Homes of Deer Creek, Ill. Other sponsors included Texas Instruments, Kohler, Optiwin, Valcucine, Lamboo Inc., and Crate&Barrel.

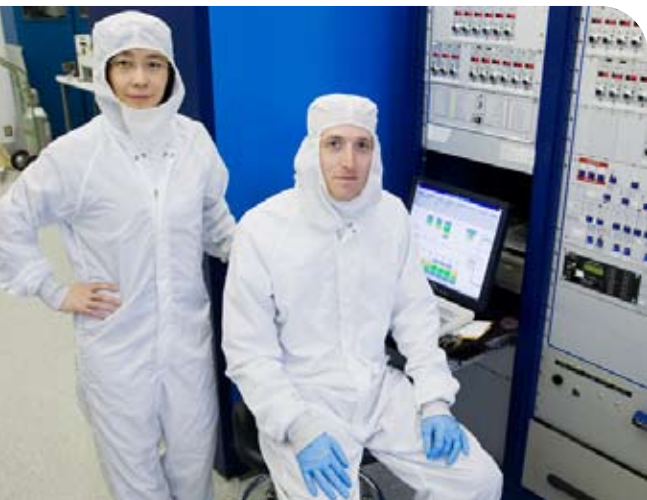
For more information on the Illinois Gable Home, go to solardecathlon.uiuc.edu. To learn about the Department of Energy’s Solar Decathlon and to see more images from the competition, go to solardecathlon.org. [↗](#)

Self-assembled nanowires could make chips smaller and faster

BY JAMES E. KLOEPEL, U OF I NEWS BUREAU

ECE ILLINOIS researchers have found a new way to make transistors smaller and faster. The technique uses self-assembled, self-aligned, and defect-free nanowire channels made of gallium arsenide.

In a paper to appear in the IEEE (Institute of Electrical and Electronics Engineers) journal *Electron Device Letters*, ECE Assistant Professor Xiuling Li and graduate research assistant Seth Fortuna describe the first metal-semiconductor field-effect transistor fabricated with a self-assembled, planar gallium-arsenide nanowire channel.



ECE Assistant Professor Xiuling Li (left) and graduate research assistant Seth Fortuna have found a new way to make transistors smaller and faster. The technique uses self-assembled, self-aligned, and defect-free nanowire channels made of gallium arsenide. Photo by L. Brian Stauffer.

Nanowires are attractive building blocks for both electronics and photonics applications. Compound semiconductor nanowires, such as gallium arsenide, are especially desirable because of their high transport properties and versatile heterojunctions. However, a number of challenges—including integration with existing microelectronics—must first be overcome.

“Our new planar growth process creates self-aligned, defect-free gallium-arsenide

nanowires that can readily be scaled up for manufacturing purposes,” said Li, who also is affiliated with U of I’s Micro and Nanoelectronics Laboratory and Beckman Institute. “It’s a non-lithographic process that can precisely control the nanowire dimension and orientation, yet is compatible with existing circuit design and fabrication technology.”

The gallium-arsenide nanowire channel used in the researchers’ demonstration transistor was grown by metal organic chemical vapor deposition using gold as a catalyst. The rest of the transistor was made with conventional microfabrication techniques.

While the diameter of the transistor’s nanowire channel was approximately 200 nanometers, nanowires with diameters as small as five nanometers can be made with the gold-catalyzed growth technique, the researchers report. The self-aligned orientation of the nanowires is

determined by the crystal structure of the substrate and certain growth parameters.

In earlier work, Li and Fortuna demonstrated they could grow the nanowires and then transfer-print them on other substrates, including silicon, for heterogeneous integration. “Transferring the self-aligned planar nanowires while maintaining both their position and alignment

could enable flexible electronics and photonics at a true nanometer scale,” the researchers wrote in the December 2008 issue of the journal *Nano Letters*.

In work presented in the current paper, the researchers grew the gallium-arsenide nanowire channel in place, instead of transferring it. In contrast to the common types of non-planar gallium-arsenide nanowires, the researchers’ planar nanowire was free from twin defects, which are rotational defects in the crystal structure that decrease the mobility of the charge carriers.

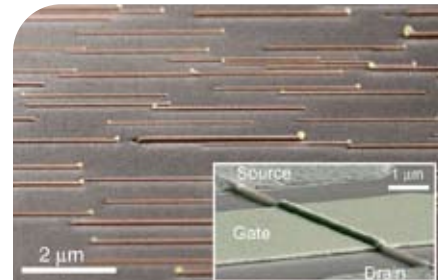
“By replacing the standard channel in a metal-semiconductor field-effect transistor with one of our planar nanowires, we demonstrated that the defect-free nanowire’s electron mobility was indeed as high as the corresponding bulk value,” Fortuna said. “The high electron mobility nanowire channel could lead to smaller, better, and faster devices.”

Considering their planar, self-aligned, and transferable nature, the nanowire channels could help create higher performance transistors for next-generation integrated circuit applications, Li said.

The high-quality planar nanowires can also be used in nano-injection lasers for use in optical communications.

The researchers are also developing new device concepts driven by further engineering of the planar one-dimensional nanostructure.

The work was supported by the National Science Foundation. [u](#)



A scanning electron microscope image of self-assembled, self-aligned planar gallium-arsenide nanowires. The inset shows a field-effect transistor fabricated with one of the nanowires. Photo courtesy of researchers.

Srikant named Nearing Professor of Electrical and Computer Engineering

BY KIM GUDEMAN, COORDINATED SCIENCE LAB

ECE Professor R. Srikant has been honored as the Fredric G. and Elizabeth H. Nearing Professor in Electrical and Computer Engineering. Srikant is internationally known for his work on communication problems related to the Internet and more recently for research on wireless networks.

“This honor recognizes professor Srikant for the excellence of his scholarly work,” said ECE Department Head Andreas Cangellaris. “It is through scholarly accomplishment like his that we realize our vision for leadership in breakthrough research and transformational engineering education.”

Srikant received his B.Tech. degree from the Indian Institute of Technology, Madras, in 1985. The same year, he came to Illinois, where he graduated with a master’s degree and PhD in electrical engineering in 1988 and 1991, respectively.

After graduating from Illinois with his doctorate, Srikant joined Bell Labs where he was a member of the technical staff. At Bell Labs, he focused on communications theory and practical design of communication networks.

He returned to Illinois as a faculty member in 1995, studying information transfer on the Internet. His research contributed to a better understanding of how to design congestion control protocols for the evolving Internet. He is also a researcher in the Coordinated Science Lab.

More recently, professor Srikant has focused on wireless networks. His current projects include designing efficient architectures for communication networks (National Science Foundation); developing distributed algorithms with low-complexity implementation (Air Force Office of Scientific Research); and protecting the wireless infrastructure against a terrorist attack (Defense Threat Reduction Agency).

He has received numerous recognitions, including the Engineering Council Award for Excellence in Advising

(2003), the Shimemura Young Author Prize (2002), and National Science Foundation Career Award (1997). In addition, he was named a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) in 2006.

As the new Nearing Professor, Srikant will hold the same title as his former PhD adviser Tamer Başar, now a Swanlund Endowed Chair.

“It has been rewarding to see how he has made such a seamless transition from



R. Srikant

“This honor recognizes professor Srikant for the excellence of his scholarly work. It is through scholarly accomplishment like his that we realize our vision for leadership in breakthrough research and transformational engineering education.”

—Andreas Cangellaris,
Department Head, ECE ILLINOIS

control to communications, and established himself as an internationally recognized authority in a field different from his PhD research,” said Başar, interim director of the Beckman Institute. “He is truly deserving of the honor that this title brings.”

This professorship was established by Fred Nearing (BSEE '43) and his wife Betty. Retired after a distinguished career in the marketing of technical instruments, Nearing served on the ECE ILLINOIS Alumni Board of Directors from 1979 to 1985 and currently is on its Advisory Board. He received the Marcia Peterman ECE Award in 1997 in recognition of his devoted and loyal service to the University and the Alumni Association. In 1985, he was presented with the Illinois Alumni Association Loyalty Award. His wife Betty passed away in 2006. Nearing resides in Barrington, Ill. [🔗](#)

ECE ILLINOIS faculty receive teaching awards

BY SUSAN KANTOR AND LAUREL BOLLINGER

Education has always been at the forefront of the mission of ECE ILLINOIS, and some recent awards received by ECE faculty have recognized the extraordinary efforts that our faculty exhibit in teaching our students. It is telling that these awards for ECE ILLINOIS come from the department level, the college level, and the University level.



Steven Franke

Steven Franke

ECE Professor Steven Franke was the recipient of the College of Engineering Teaching Excellence Award. This award was established by an anonymous alumnus and his wife in appreciation for the superb teaching that he received during his student days. The intent of this award is to motivate teachers to increase the educational impact that they make on their students and to improve teaching excellence across the College of Engineering.

“It was an honor to receive this award,” said Franke, who also serves the department as the associate head for graduate affairs. Since joining the faculty in 1984, Franke has inspired students not only to master the material he teaches, but to appreciate the intimate link between engineering innovation and the physical world.



Michael Loui

Michael Loui

ECE Professor Michael Loui has received the King Broadrick-Allen Award for Excellence in Honors Teaching for distinguished teaching and service to the

Campus Honors Program. The program gives this annual award to a faculty member who has made exemplary contributions to the program.

Loui, a University Distinguished Teacher-Scholar, has been involved in the Campus Honors Program since the early 1990s, serving on the Honors Advisory Committee, evaluating course proposals, and offering advanced seminars that have appealed to disciplines even outside engineering. He enjoys using ambitious teaching methods in his honors courses. “I do things I couldn’t normally do in a regular course,” he said.



Jonathan Makela

Jonathan Makela

ECE Assistant Professor Jonathan Makela was the 2009 recipient of the ECE ILLINOIS department’s Ronald W. Pratt Teaching Award. Makela was surprised to win the award, but pleased to receive recognition for his hard work. “It feels great to be recognized by the students and faculty for the effort that I put into teaching,” he said.

Makela has been teaching at Illinois for more than four years and has taught ECE 329: Introduction to Electromagnetic Fields; ECE 437: Sensors and Instrumentation; ECE 445: Senior Design; and ECE 450: Lines, Fields, and Waves. In addition, he created ECE 498: Special Topics on Global Navigation Satellite Systems (such as GPS). [u](#)

Adesida honored—twice—for a distinguished career

College of Engineering Dean and ECE Professor Ilesanmi Adesida had the distinction recently of twice being recognized for his outstanding achievements in the field of electrical engineering.

On May 22, more than 50 of his former graduate students gathered in the Micro and Nanotechnology Laboratory atrium for a symposium to recognize his 60th birthday and the impact that he has had on both his students’ careers and the nanotechnology field in general.

“Dean Adesida inspired me to humbly excel with creativity and hard work in both my personal life and career,” said

Ebrahim Andideh (PhD ‘90), who organized the event and was Adesida’s first graduate student. “I wanted to recognize his achievements and generous contribution to his family, his graduate students, the University of Illinois, and the scientific community. Celebrating his 60th birthday was appropriate to recognize what he has done for us all.”

Following this symposium, Adesida flew to California, where he was honored by the Department of Electrical Engineering and Computer Science at his alma mater, the University of California–Berkeley, as the recipient of its 2009 Outstanding Alumnus Award in Electrical Engineering. [u](#)



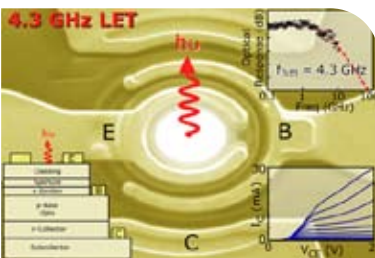
Ilesanmi Adesida

Scientists break light modulation speed record—twice

BY JAMES E. KLOEPEL, U OF I NEWS BUREAU

Researchers have constructed a light-emitting transistor that has set a new record with a signal-processing modulation speed of 4.3 gigahertz, breaking the previous record of 1.7 gigahertz held by a light-emitting diode.

But, the researchers didn't stop there. By internally connecting the base and collector of a light-emitting transistor, they created a new form of light-emitting diode, which modulates at up to 7 gigahertz, breaking the speed record once again.



4.3 GHz optical bandwidth light-emitting transistor, top view, cross section and collector current-voltage characteristics. Image courtesy Feng and Holonyak.

In a pair of papers published in the June 15 issue of *Applied Physics Letters*, ECE Professors Milton Feng and Nick Holonyak Jr., as well as researchers at U of I licensee Quantum Electro Opto Systems in Melaka, Malaysia, reported the fabrication and testing of the new high-speed light-emitting transistor and the new “tilted-charge” light-emitting diode.

“Simple in design and construction, the tilted-charge light-emitting diode offers an attractive alternative for use in high-speed signal processing, optical communication systems, and integrated optoelectronics,” said Nick Holonyak Jr., who holds a John Bardeen Chair in Electrical and Computer Engineering and Physics at Illinois, and is a co-author of both papers.

The modulation speed of either a light-emitting diode or a light-emitting transistor is limited by the rate at which electrons and holes (the minus and plus charges—the carriers of current) recombine. The recombination lifetime is important in determining device speed.

With a usual “slow” recombination process, the speed of a light-emitting diode is limited to approximately 1.7 gigahertz, which corresponds to a carrier lifetime of 100 picoseconds. For more than 40 years, scientists thought breaking the 100-picosecond barrier was impossible.

Recombination speeds of less than 100 picoseconds are not readily achieved in light-emitting diodes because equal number densities of electrons and holes are injected into the active region to preserve charge neutrality, said Holonyak,

who invented the first practical visible light-emitting diode more than 40 years ago.

These charges become stuck, stacked-up waiting to recombine, Holonyak said. To achieve high recombination speeds, an extremely high injection level and a very high charge population are required in light-emitting diodes. These conditions are not necessary in transistors, however.

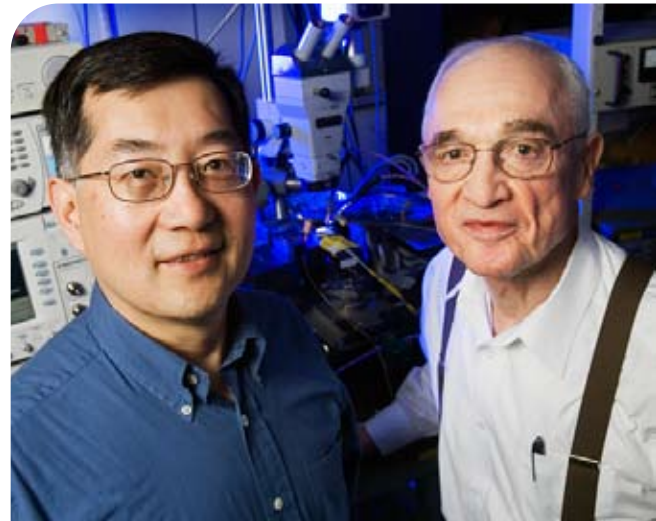
“Unlike a diode, a transistor does not store charge,” said Milton Feng, who holds the Nick Holonyak Jr. Chair in Electrical and Computer Engineering, and is a co-author of the two papers. “Charges are delivered to the transistor’s quantum well active region, where they either recombine almost instantly, or they are kept moving on out of the device. The charges do not become stacked-up, waiting to recombine with their oppositely charged twins.”

To increase the modulation speed of their light-emitting transistor, the researchers reduced the emitter size, increased the so-called collector thickness (the third terminal region), and utilized a special internal common collector design. These changes resulted in a faster signal at a very low current level, and at low heat dissipation.

Having a “fast” recombination process, the modulation speed of the light-emitting transistor was measured at 4.3 gigahertz, which corresponds to a recombination lifetime of 37 picoseconds, well under the 100-picosecond barrier.

“In the light-emitting transistor, the third terminal—the collector—effectively ‘tilts’ the charge and removes carriers with slower recombination lifetimes,” said Holonyak, who also is a professor in the University’s Center for Advanced Study, one of the highest forms of campus recognition.

“As opposed to the charge ‘pile-up’ condition found in a normal diode, the dynamic ‘tilted’ charge flow condition in the transistor base is maintained with the collector



Milton Feng and Nick Holonyak, Jr.

See **SCIENTISTS BREAK RECORD**, continued on page 29.



Narendra Ahuja



Thomas Huang



William Sanders

NARENDRA AHUJA, THOMAS HUANG, AND WILLIAM SANDERS were among an elite group of 59 professors to receive a 2009 HP Labs Innovation Research Award. The program creates opportunities for colleges, universities, and research institutes to conduct breakthrough collaborative research with HP.

NARENDRA AHUJA also received the T. A. Stewart-Dyer and F. Trevithick Prize for his work on the use of computer vision for railroad engineering. The award recognized Ahuja's work on an interdisciplinary project for automated visual inspection of the loading of intermodal freight trains to improve energy efficiency.



Stephen Boppart

STEPHEN BOPPART was named a Fellow of SPIE, the international society for optics and photonics, and the Optical Society of America (OSA). He also received the 2009 Paul F. Forman Engineering Excellence Award from OSA.

YUN CHIU and PhD student Wenbo Liu recently presented a parallel analog-to-digital converter (ADC) array chip at the International Solid-State Circuits Conference (ISSCC) that won them the 46th DAC/ISSCC Student Design Contest Award.



Hyungsoo Choi


HYUNGSOO CHOI was recently issued a U.S. patent titled, "Organometallic compounds and their use as precursors for forming films and powders of metal or metal derivatives." This is Choi's seventh U.S. patent related to chemical vapor deposition research.

A new edition of **SHUN LIEN CHUANG's** book *Physics of Photonic Devices* was recently published as part of the Wiley Series in Pure and Applied Optics. The book introduces the topic for graduate and upper-level undergraduate students in electrical and computer engineering, material science, and physics.

P. R. KUMAR is the 2009 recipient of the Daniel C. Drucker Eminent Faculty Award. This award recognizes faculty in the College of Engineering who have received national or international acclaim for dedication to academic excellence through teaching and research and have made exemplary contributions to their fields.



P.R. Kumar

BEN WAH received the 2009 Tsutomu Kanai Award from the IEEE (Institute of Electrical and Electronics Engineers) Computer Society "for outstanding contributions to the theory and applications of distributed multimedia and nonlinear optimization algorithms." The award is given each year to someone who has made exceptional contributions in the area of distributed computing systems and their applications. 



Ben Wah



G. Roland Pierce

ECE Professor Emeritus **G. ROLAND PIERCE** (BSEE '36, MSEE '37) died May 20, 2009. He was 94. He was a Fellow of the Illuminating Engineering Society of North America and a member of the Eta Kappa Nu Electrical Engineering Honorary Fraternity, Illinois Academy of Science, American Society for Engineering Education, Instrument Society of America, and the Illuminating Engineering Society of Great Britain. He retired from the University in September 1973 after 35 years of dedicated service.

Goddard receives Presidential Early Career Award

BY SUSAN KANTOR

ECE Assistant Professor Lynford Goddard was working at his computer on a typical Tuesday afternoon when an unexpected e-mail popped up in his inbox. That e-mail notified him that he was a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE). This award is the highest honor given to young researchers by the U.S. government.

“It’s one of those awards that really changes your career,” Goddard said. “It’s a very prestigious award and I was just bouncing off the wall. It was just amazing excitement.”

Goddard is one of 100 researchers in the early stages of their independent research careers who received the award.

“These extraordinarily gifted young scientists and engineers represent the best in our country,” President Barack Obama said in a White House press release. “With their talent, creativity, and dedication, I am confident that they will lead their fields in new breakthroughs and discoveries and help us use science and technology to lift up our nation and our world.”

Nine federal departments and agencies nominate their most promising scientists annually for the award. Goddard was nominated by the Department of Energy for the postdoctoral work he did at Lawrence Livermore National Laboratory from 2005 to 2007 and for work on some new collaborative projects since joining Illinois.

While at Lawrence Livermore, Goddard first worked on a project on photonic integrated circuits. For his final year of postdoctoral research, he researched trace gas detection. He developed a new sensor architecture to detect very low levels of hydrogen. This can be applied to the storage of

hydrogen for energy. The release of hydrogen from storage, as well as hydrogen production, transport, and usage, can be monitored for public safety.

“The sensors we’re developing will play a role in the future hydrogen economy,” Goddard said.



Lynford Goddard

“These extraordinarily gifted young scientists and engineers represent the best in our country. With their talent, creativity, and dedication, I am confident that they will lead their fields in new breakthroughs and discoveries and help us use science and technology to lift up our nation and our world.”

—President Barack Obama

Goddard continues to research this area at Illinois, and the award will allow him to expand his collaboration with Lawrence Livermore.

“The award is in recognition for outstanding potential not only in innovative research, but also in education, community service, and potential for leadership,”

Goddard said. “I see the award as giving me extra motivation and extra encouragement to excel in my work.”

Another benefit of winning the award is meeting and collaborating with other young researchers—something Goddard is looking forward to at the White House awards ceremony this fall. And for Goddard, the presidential ceremony will be one of the most exciting parts about receiving the award.

“It’s truly an honor to meet President Obama and receive an award from him,” Goddard said. “That’s one of those once-in-a-lifetime opportunities. I hope it’s not the only time I’m invited to Washington, but it’s one of those things that I’ll have stories to tell my kids and my students. It’ll be amazing.”

Also receiving the Presidential Early Career Award for Scientists and Engineers was ECE alumnus Gregory Huff (BSEE ’00, MSEE ’03, PhD ’06). Huff is an assistant professor in the Department of Electrical and Computer Engineering at Texas A&M University. Among Huff’s research interests are biologically inspired mechanisms and dynamic material systems for electromagnetic, acoustic, and IR agility; the theory, design, and application of reconfigurable antennas and circuits; and multifunctional RF, microwave, and millimeter-wave radiating systems and smart skins. [u](#)

Making hearing aids better

BY LAUREL BOLLINGER

“People do not like to talk about it that much, but hearing aids do not work very well,” said ECE Associate Professor Jont Allen. “It’s not like they’re useless; they just don’t work like real ears.”



Jont Allen

According to Allen, this is the most prevalent issue facing hearing aid companies and hearing-impaired individuals. Having devoted the past 15 years to solving this problem, Allen and his team of students have come closer to a solution during the past year.

Allen began by examining how the ear works. This research slowly led him in a different direction—specifically, the application of the information involved with hearing aid development. Since joining Illinois in 2002, Allen has benefited greatly from having students help him with his theory and research.

For a long time, Allen has wanted to solve the problem of how humans decode speech sound. Until he started, there really was no research or theory behind it. He was moving into uncharted waters. And what he discovered was unexpected.

“We found that there are some spots in speech that are critically important and some spots, actually huge areas, that are completely irrelevant,” said Allen. “The spots that are critically important are always onset transients, or those little bursts of energy in speech. Different sounds are characterized by different patterns of onset transients. It is those various little pieces of onset transients that define what you hear.”

A hearing-impaired listener has difficulty with certain sounds simply because the correlated speech features are inaudible due to the hearing loss. In an extreme case, a cochlear dead region may block the speech feature totally within a frequency range. For example, one research subject had a cochlear dead region around 2,000 hertz in her left ear. As a consequence, she cannot hear /ka/ and /ga/, which are characterized by two features at the same frequency. In contrast, her right ear can hear the two sounds.

Feipeng Li, one of Allen’s graduate students, has been working extensively with this patient, and he says that improved understanding of such dead regions will help shape the future of hearing aids, making them more useful and successful at recovering hearing loss.

“If you want to make a better hearing aid, you need to know what the problem is. Right now people don’t know what’s wrong here,” said Li. “Instead of boosting features of the inaudible sounds, state-of-the-art hearing aids

amplify everything, noise as well as signal, without taking into account whether the listener has difficulty with the inputting sounds or not. The situation gets much worse under noisy conditions.”

Allen and Li suggest a solution is in the works. “The short version of the plan is to change the hearing tests,” said Allen. “Right now for a hearing test, they play tones in your ear and you say, ‘Yes, I can hear it’ or ‘No, I can’t.’ Well, that turns out not to be very effective. It doesn’t tell you where your dead regions are. And it doesn’t tell you if you can hear speech transients.”

Allen says the new type of test will use nonsense speech sounds in order to diagnose the transients and frequency bursts that people cannot hear. Allen and Li administered a massive data collection test that collected around 1,000 hours of data from almost 100 subjects listening to 20 different talkers with noise-masked speech. Allen was pleased to see that the features they were looking for were found. They now have an understanding of the basic science behind the speech perception problem. In cases such as that of their subject with a dead region, they now may have the next step in their sights.

“With all of the testing we’ve done, we’ve discovered that this is the best thing to do,” said Allen. “We plan to test specifically with various speech sounds to better diagnose the ear. It needs to be done on an ear-by-ear basis. So this woman in our test, her one ear is very different than her other ear. All of the people where we’ve tested both ears, there’s significant differences, which is kind of amazing.”

Allen is excited that this new diagnostic will make it easier to attack particular problems, allow for more direct diagnoses, and hopefully provide more concrete solutions to hearing loss problems.

Allen spent 32 years at Bell Laboratories before joining the University of Illinois in 2002. He is the recipient of the IBM Faculty Award and the IEEE Third Millennium Award. He is a Fellow of IEEE and the Acoustical Society of America. In 1994 he and his wife, Pat Jeng, founded Mimosa Acoustics, a company that diagnoses middle ear problems.

Feipeng Li is a PhD student at ECE ILLINOIS. He received his bachelor’s and master’s degrees from Wuhan University, China, in 1996 and 1999, respectively. His interest is in signal processes for hearing aids and cochlear implants. He is the recipient of the 2009 Sundaram Seshu International Student Fellowship from ECE ILLINOIS. [↗](#)

“Right now for a hearing test, they play tones in your ear and you say, ‘Yes, I can hear it’ or ‘No, I can’t.’ Well, that turns out not to be very effective. It doesn’t tell you where your dead regions are. And it doesn’t tell you if you can hear speech transients.”

Wright wins Lemelson-Illinois Prize for facial recognition work

BY LAUREL BOLLINGER

ECE graduate student John Wright received \$30,000 as the winner of the third Lemelson-Illinois Student Prize. The award ceremony was held on March 4 at the National Center for Supercomputing Applications at the University of Illinois. Wright has developed new mathematical tools that drastically improve the accuracy of facial recognition systems.



ECE graduate student John Wright won the Lemelson-Illinois Student Prize for his work with facial recognition software.

“It’s an exciting thing because this is a great award. It validates that the work is valuable from a research perspective, but also that recognizes the fact that we are getting closer to producing a complete solution to robust, reliable, and scalable automatic face recognition,” said Wright.

The Lemelson-Illinois Student Prize is awarded to “an undergraduate or graduate student who has created or improved a product or process, applied a technology in a new way, redesigned a system, or demonstrated remarkable inventiveness in other ways,” according to the Lemelson Prize Web site.

Wright is currently in Beijing at Microsoft Research Asia (MRSA) and is hard at work applying new mathematical processes to take this face recognition project closer to perfection. “It’s a pretty big topic of research here at MRSA. At the same time, we’d seen a lot of coverage in the popular press,” said Wright. “We work on computer vision, but we had never worked on this particular subarea of computer vision before, even though it’s one of the most visible applications of the field.”

There have been attempts in the past to create similar systems, but Wright explained that there have been many high-profile failures resulting from technology being deployed in situations that don’t quite meet its operating conditions. In one example in Tampa, Fla., Wright explained that a similar system was tried for a year, but it did not meet with any success. “There were no correct identifications and tons of false ones, so it was unfortunate for our field of study,” he said.

Fortunately, new results in applied mathematics may hold the key to making facial recognition possible and successful. Literature discussing sparse representation and compressed sensing seemed to fall very easily into the facial recognition problem. “Face recognition under varying illumination with occlusion falls very naturally into this framework of sparse representation,” Wright said. “So it can be cast as a sparse representation problem, and there are new tools to solve that problem.” Wright said that if successful, the area of security is one in which this technology could easily be applied.


“Access control is important,” he said, explaining that face recognition could replace key cards for gaining access to buildings or other critical facilities. The technology could also be used for human-computer interfaces, organizing photos, and Internet image searches. “There are literally endless possibilities,” said Wright.

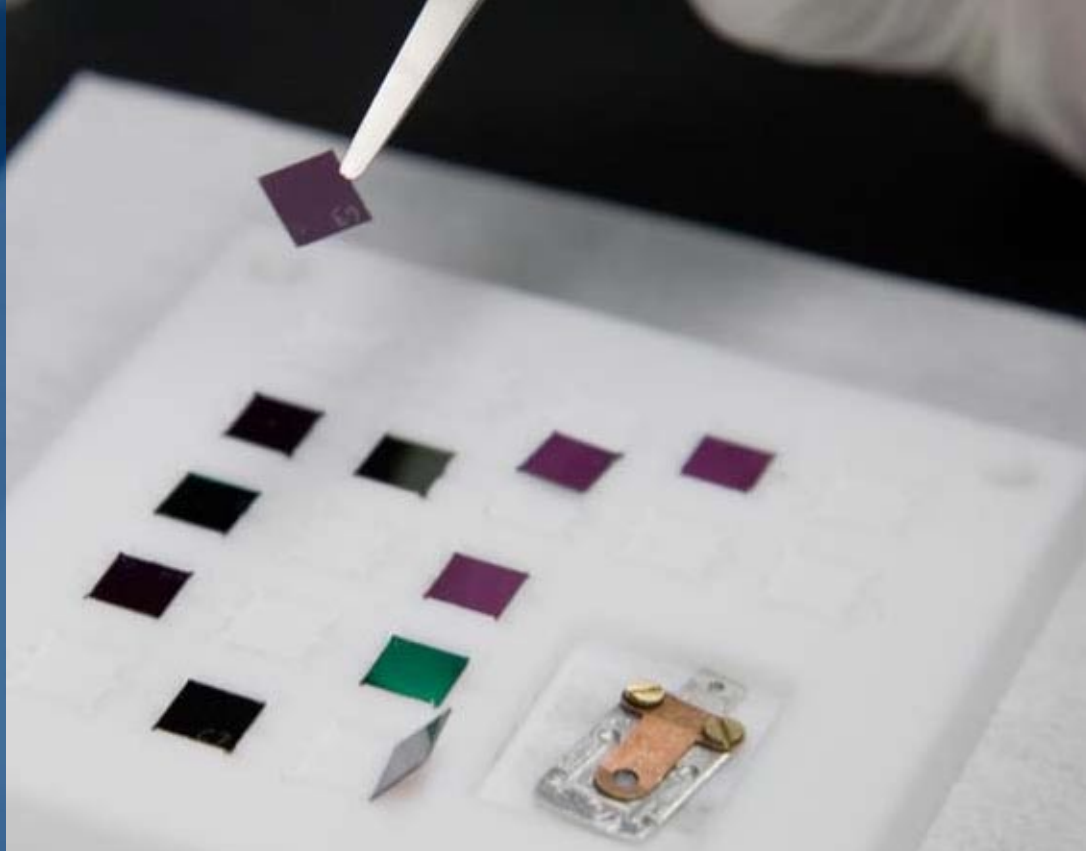
In addition to improving applications with his work, Wright said that it’s simply a very interesting field of study that fits well into his background. “The way these data behave and the methods we apply to them actually tell us methods that go beyond face recognition,” Wright said. “It’s nice both from an intellectual standpoint and from the application standpoint.”

About the Lemelson-Illinois Student Prize

The \$30,000 Lemelson-Illinois Student Prize is awarded to a student at the University of Illinois at Urbana-Champaign who has demonstrated remarkable inventiveness and innovation.

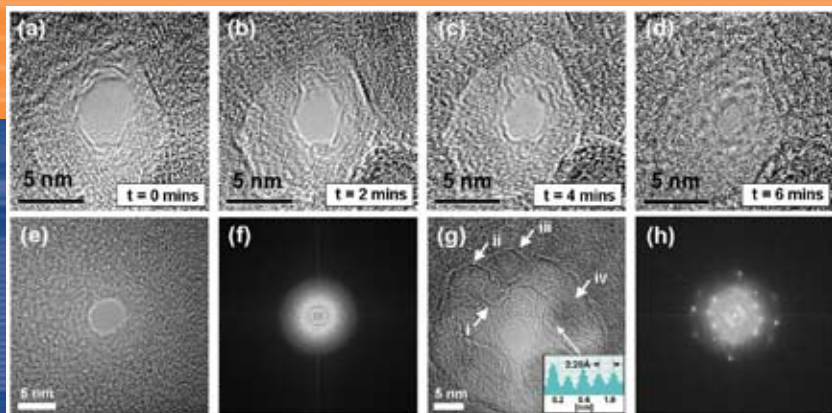
Administered by the Technology Entrepreneur Center, the Lemelson-Illinois Student Prize is funded through a partnership with the Lemelson-MIT Program, which has awarded prize money to outstanding student inventors at MIT since 1995 (see <http://web.mit.edu/invent>).

For more information on the Lemelson-Illinois Student Prize, please visit <http://30kprize.uiuc.edu>. 



Creating a better sensor for DNA analysis

BY JAMES E. KLOEPEL, U OF I NEWS BUREAU



In the top row, electron beam images show that the nanopores can be tuned from 5 nanometers down to 1 nanometer, sizes similar to the diameter of a DNA molecule. In the bottom row, materials analysis at the nanoscale indicates that the material is changing locally from less ordered (amorphous) to more ordered (poly-crystalline), increasing the robustness of the nanopore.

Fast and affordable genome sequencing has moved a step closer with a new solid-state nanopore sensor being developed by researchers at the University of Illinois.

The nanopore sensor, made by drilling a tiny hole through a thin film of aluminum oxide, could ultimately prove capable of performing DNA analysis with only a single molecule, thus offering tremendous possibilities for personalized medicine and advanced diagnostics.

“Solid-state nanopore sensors have shown superior chemical, thermal, and mechanical stability over their biological counterparts, and can be fabricated using conventional semiconductor processes,” said ECE Professor Rashid Bashir.



Rashid Bashir

“The aluminum-oxide nanopore sensors go a step further, exhibiting superior mechanical properties, enhanced noise performance, and increased lifetime over their silicon-oxide and silicon-nitride counterparts,” said Bashir, who is a Bliss Professor of Engineering and the director of U of I’s Micro and Nanotechnology Laboratory.

The researchers describe the fabrication and operation of the aluminum-oxide nanopore sensor in a paper published in

Advanced Materials in July.

To make the sensor, the researchers begin by using a technique called atomic layer deposition to produce a very thin film of aluminum oxide on a silicon substrate. Next, the central portion of the substrate is etched away, leaving the film as a suspended membrane. An electron beam is then used to create a very tiny hole—a nanopore—in the membrane.

The process of making the nanopore resulted in an unexpected bonus, Bashir said. “As the electron beam forms the nanopore, it also heats the surrounding material, forming nanocrystallites around the nanopore. These crystals help improve the mechanical integrity of the nanopore structure and can potentially improve noise performance as well.”

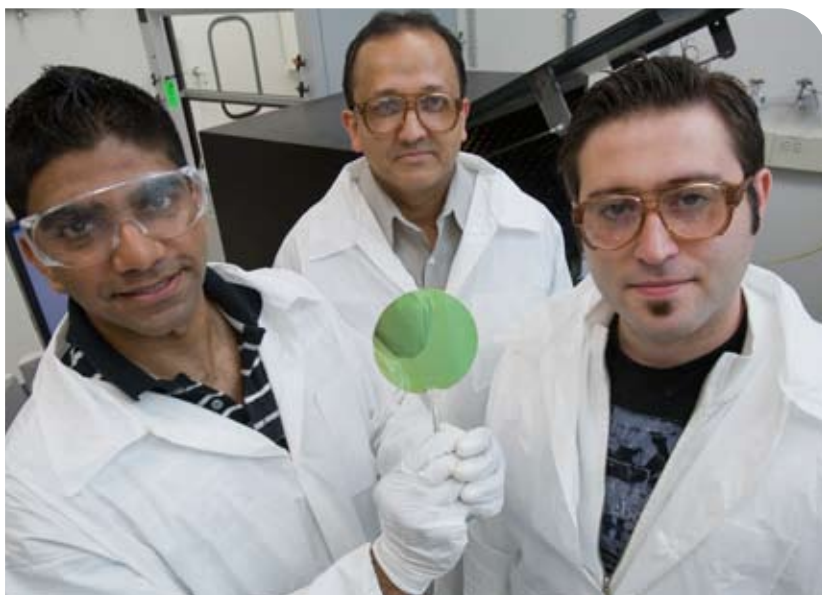
The nanopore sensors described in the paper had pore diameters ranging in size from 4 to 16 nanometers, and a film thickness of approximately 50 nanometers. Thinner membranes are possible with atomic layer deposition, Bashir said, and would offer higher resolution of the detection.

“Thinner membranes can produce less noise as a molecule travels through the nanopore,” said Bashir, who is also affiliated with U of I’s Beckman Institute, Frederick Seitz Materials Research Laboratory, and Institute for Genomic Biology. “Ultimately, we’d like to make our membranes

as thin as biological membranes, which are about five nanometers thick.”

To demonstrate the functionality of the aluminum-oxide nanopores, the researchers performed experiments with pieces of DNA containing approximately 5,000 base pairs. Bashir’s team verified the detection of single molecules, with a signal-to-noise performance comparable to that achieved with other solid-state nanopore technology.

“More work must be done to achieve single-base resolution,



Rashid Bashir (center), a Bliss Professor of Electrical and Computer Engineering as well as bioengineering, led the researchers who developed a new solid-state nanopore sensor. He is flanked by graduate students Murali Venkatesan (left) and Sukru Yemenicioglu. Photo by L. Brian Stauffer.

however,” Bashir said. “Our next step is to detect and measure significantly shorter molecules.”

With Bashir, co-authors of the paper are ECE graduate students Bala Murali Venkatesan (lead author), Sukru Yemenicioglu, and Nicholas Watkins; Biophysics and Computational Biology graduate student Brian Dorvel; and principal research scientist Ivan Petrov.

Funding was provided by the National Institutes of Health. [↻](#)



“Right now, renewable energy is getting a lot of interest, which was a big motivation for the project. However, while a lot of people want to see green technology, from a research standpoint, renewable energy is old news for us.”

Student recycles to study renewable energy

By LAUREL BOLLINGER

At the University of Illinois, students are nothing if not resourceful, finding class projects in discarded material. One example is ECE graduate student Grant Pitel’s group project of installing solar panels on top of Everitt Lab.

He was looking for a challenge for his last semester, as well as a way to utilize his academic studies and experience in controls. When Pitel found out about eight solar panels left over from the 2007 Solar Decathlon, he wanted to put them to use. As a part of the Power Electronics Research Group, he was also sure that he could use them to do solar panel experiments. With a team of students interested in being a part of a renewable energy project, Pitel was ready to go. He was assisted by Mike Driscoll, Hari Krishna, and Taylor Wu, with ECE Professor Philip Krein advising the project.

“Right now, renewable energy is getting a lot of interest, which was a big motivation for the project,” said Pitel. “However, while a lot of people want to see green technology, from a research standpoint, renewable energy is old news for us.”

Being old news didn’t keep Pitel and his group from working on the project. First, they did a lot of planning. Everything was planned and built from scratch. “All we had were the solar panels, and we had to figure out the correct way to install them and what we needed to do it,” said Pitel. Everything they needed was sent from New Mexico, where many of the main solar energy distributors are located.

After the planning and ordering was done, construction began. Most of the frame construction started indoors, with the intention to finish assembly on the roof. After construction, the panels were mounted to the frames on the Everitt Lab roof and connected to a set of breakers in the lab. The breakers allow the group to turn the solar panels off and on from inside the lab. Custom energy processing hardware and software, built by students and programmed by Pitel, let them “control all aspects of injecting power into the grid,” said Pitel. “This is different than buying a commercial inverter because with a commercial one you have limited control.”

However, their custom inverter has its own limitations. While it allows the group to monitor and control phase, frequency, bus voltage, phase current, and control effort, it is more valuable as a research tool and was not designed for continuous operation. The project was funded in part by the Grainger Foundation.

Pitel said that overall he is proud of his group and what it has accomplished. The entire project was done basically for Pitel’s own curiosity and initiative, giving him the opportunity to work on a large-scale controls system.

“I wanted to further my research, which is in controls,” said Pitel. “I wanted something that would be a good application for my learning and would allow me to create a custom hardware, and this was it.” 🔌

ECE grad student leads Student Sustainability Committee

BY LAUREL BOLLINGER

The University of Illinois is home to numerous groups, committees, and organizations. Among these, few have the level of responsibility of the Student Sustainability Committee. This committee is charged with evaluating and recommending projects to receive funds from two student fees: the sustainable campus environment fee and the cleaner energy technologies fee.

ECE graduate student Suhail Barot serves as the committee chair. “There are a lot of campus committees that people can sign up to be a part of,” he said, “and it is great to be on one of these committees because it is a chance to see how the University works and you get to play a role in what we do.” Once recommended by the Student Sustainability Committee, projects are then submitted to the Office of Sustainability and Facilities and Services for final campus approval.

The Student Sustainability Committee provides support to campus organizations interested in improving sustainability on this campus. “We fund energy-efficient projects, green roofs, a bunch of occupancy centers for lighting, those kinds of things,” Barot said. “We’ve given money to the Solar Decathlon project and several others.”

The committee is made up of 10 students and 10 faculty or staff members. This group oversees a large pool of money. “Together, these fees bring in roughly \$550,000 a year,” said Barot. “There’s a lot you can do with it to improve our campus and support U of I.”

Among the projects the committee has previously recommended for funding is the installation of the solar panels on the new Business Instructional Facility. Barot said that the idea of the committee is to use the money to make changes and set an example on campus and as a University.


This year they have already had nearly 30 proposals, an increase over previous years. Barot said that this increase is due to publicity that they’ve gotten and the fact that there is less money for these types of projects from other campus organizations. “Partly our challenges are how to stretch this money as far as possible,” said Barot, “and to do it in a way that the student body will support, because it is their money.”

“We fund energy-efficient projects, green roofs, a bunch of occupancy centers for lighting, those kinds of things. We’ve given money to the Solar Decathlon project and several others.”

As the committee chair, Barot runs the meetings, is the primary contact, and represents the committee at different coalitions and presentations. He also has had to keep an eye on all the different proposals, and he works with groups that are trying to receive funding to help them get organized.

Barot’s commitment to the work of the committee comes easily, as sustainability has always been an interest of his, and he really enjoys putting this interest to use on the Illinois campus.

“It’s just really great to work with the senior administration on campus and to have access to so many people trying to get positive work done,” said Barot. “It’s also been a great learning experience”

To learn more about the Student Sustainability Committee, visit its Web site at <https://netfiles.uiuc.edu/ro/www/StudentSustainabilityCommittee>. 



Suhail Barot, an ECE graduate student and chair of the Student Sustainability Committee, removes a prairie grass seedling from a flat in preparation for planting in the new prairie garden at the Veterinary Medicine Basic Sciences Building last summer. The committee funded the purchase of the seedlings. *Photo by Kerry Helms.*

ECE grad students develop portable AIDS diagnostic platform

By CHARLIE JOHNSON

Born in India, lived in Canada, raised in Australia, studying in the United States, ECE graduate student Murali Venkatesan has seen the world. And he wants to change it.



ECE graduate students Murali Venkatesan (right) and Nicholas Watkins worked together developing a portable AIDS diagnostic platform. For his work on the project, Venkatesan was nominated for the 2009 Lemelson-Illinois Student Prize.

“I’m one of those people who is very upbeat and who thinks they can change the world,” said Venkatesan.

And try to change it he has. He’s worked on nutritional health supplements with students from the College of Business and from Industrial Design and battled nutritional deficiency in developing nations. He’s also studied genome sequencing using solid-state nanopores—the topic of his PhD research—in an effort to better understand the mechanisms driving cancer at the genetic level. Clearly, Venkatesan has dedicated his substantial talents to improving the world around him with technology. Together with Nicholas Watkins, one of

Venkatesan’s recent innovations garnered the attention of the Lemelson-Illinois Student Prize, an award presented annually to an Illinois student who has demonstrated outstanding innovation and creativity in a project they have completed. Their project was selected as one of eight finalists for the award. (See the story on the competition’s winner, John Wright, on page 13.)

Venkatesan and Watkins’ entry was a portable AIDS diagnostic platform that can be used to diagnose AIDS quickly and accurately. The device analyzes the number of CD-4 cells in a patient’s blood sample. A low CD-4 count is evidence of a depleted immune system and an indication that an individual has AIDS. “The idea is to attain a CD-4 cell count in a cost-effective and rapid manner,” said Venkatesan. But even beyond diagnosing the presence of AIDS, Venkatesan and Watkins hope to refine the technology to the point that it not only diagnoses AIDS, but also performs a viral load test, which tells the patient how many copies of the HIV virus they have

per microliter of blood. This would allow doctors to better monitor the progress of the virus in an individual patient before it becomes full-blown AIDS, as well as helping doctors monitor a patient’s response to antiretroviral drug therapy.

What makes the technology being developed by Venkatesan and Watkins special is its ability to bring such an important diagnostic tool to areas of the world where medical technology is sparse. Conventional diagnostic systems can cost around \$100,000. Venkatesan hopes this diagnostic platform will be able to slash the cost of such tests dramatically. “We are looking at developing something at about \$5,000. The cost of administering the test should be one-fifth to one-tenth of the traditional cost of administering this sort of test using conventional methods.”

Besides drastically reducing cost, Watkins and Venkatesan are working to increase the accessibility to HIV/AIDS diagnostic tools by reducing the actual size of the diagnostic platform. While they are still working on developing the diagnostic microchip, they expect that, when packaged and ready for use in the field, the diagnostic platform will weigh no more than 10 pounds and be totally handheld. “You can actually take the device to the people. It’s a lab on a chip, essentially,” said Venkatesan. “You look at places like sub-Saharan Africa that just cannot afford health care and this offers a great first step. In addition, this sort of platform is extensible to the potential detection of other autoimmune disorders and blood-borne diseases such as tuberculosis.”

Venkatesan and Watkins are currently comparing their chip’s output to that of conventional diagnostic devices and are finding that the outputs are comparable. “The chip is really working. We’re having great progress right now,” said Venkatesan. While Venkatesan estimates the commercial implementation of this device is still more than a year away, with more time and resources to dedicate to the project, he thinks the device could be helping people well before that. “If we could get a few more technology people on board, a few people from the school of business or industrial design, we could really prototype something pretty quick,” said Venkatesan. [🔗](#)

ECE ILLINOIS congratulates its PhD recipients

STUDENT	ADVISOR	DISSERTATION
OCTOBER 2008		
Anderson, David	Swenson, G.	Estimation of Intrinsic Gravity Wave Parameters from Multiple, Ground-Based Observations of a Single Mesospheric Airglow Emission
Bhatia, Karan	Rosenbaum, E.	Design and ESD Protection of Wideband, Radio Frequency Integrated Circuits in CMOS Technologies
Chen, Nannan	Liu, C.	Artificial Lateral Line Canal System for Underwater Disturbance Sensing
Fu, Yun	Huang, T.	Unified Discriminative Subspace Learning for Multimodality Image Analysis
Gu, Wenhua	Kim, K.	Modeling and Application of Flow-Limited Field-Injection Electrostatic Spraying (FFESS)
Gupta, Mithun	Schutt-Aine, J.	Patch-Based Models for Image Enhancement
Hahm, Hyung-Seok	Ravaoli, U.	Enhancement of Monte Carlo Simulations on 3D Nanoscale Semiconductor Devices
Han, Xu	Huang, T.	Watching Humans and Detecting Their Abnormalities
Holm, Jonathan	Spong, M.	Gait Regulation for Bipedal Locomotion
Kollia, Varvara	Cangellaris, A.	Electromagnetic Modeling of the Power Distribution Network in Packaged Integrated Circuits Using a Hybrid Extended Segmentation Method
Kourkoulos, Vasileios	Cangellaris, A.	Electrodynamics Green's Functions in Layered Media: Accurate Closed-Form Approximations for Both Electric and Magnetic Sources
Lam, Chunwei Jethro	Singer, A.	A Bayesian Approach to Beamforming for Uncertain Direction of Arrival
Li, Lingxi	Hadjicostis, C.	Estimation, Diagnosis, and Control in Discrete Event Systems in the Presence of Observability Constraints and Faults
Lin, Che	Chew, W.	Multiantenna Communications in the Presence of Feedback
Lindemann, Stephen	Lavalle, S.	Smooth Feedback Planning
Mitofsky, Andrea	Carney, P.	Symmetries of Wave Equations of Statistical Optics
Rahurkar, Mandar	Huang, T.	Mining Intelligence of Crowds for Knowledge Interference
Ruiz, Pablo	Sauer, P.	Reserve Valuation in Electric Power Systems
Sztelle, Matthew	Lyding, J.	Low Temperature Selective Silicon Epitaxy at the Nanometer Scale
Tate, Joseph	Allen, J.	Event Detection and Visualization Based on Phasor Measurement Units for Improved Situational Awareness
Wang, Nicholas	Patel, S.	Cost-Effective Soft Error Mitigation in Microprocessors
Zhang, Chun	Dullerud, G.	Centralized and Decentralized Control with Limited Information
Zhang, Lingxiao	Leburton, J.	Engineering Exchange Interaction in Coupled Spin Qubit Quantum Dots
Zhou, Yue	Huang, T.	Analyzing Activities and Events in Video from Motion Content
DECEMBER 2008		
Bui, Loc	Srikant, R.	Optimization and Algorithms for Protocol Design in Wireless Networks
Chan, Leo	Cunningham, B.	High Throughput Screening Development Using Photonic Crystal Optical Biosensor
El Choubassi, Maha	Moulin, P.	Security of Watermarking Schemes against Sensitivity Analysis Attacks
Fuemmeler, Jason	Veeravalli, V.	Energy-Efficient Tracking in Sensor Networks
Hu, Yuxiao	Huang, T.	3D Face Processing and Its Application in Biometrics
Ivanovic, Aleksandar	Huang, T.	Graphical Models for Video Analysis
Khatami, David	Wheeler, B.	Design, Implementation, and Analysis of Functional Activity and Connectivity in Patterned Neutral Networks
Long, Christopher	Choquette, K.	Laterally Current-Injected Membrane Photonic Crystal Emitters
Musick, Katherine	Wheeler, B.	Three-Dimensional Microelectrode Array for Recording Dissociated Neuronal Cultures
Ning, Huazhong	Huang, T.	Visual Action Search and Recognition
O'Connell, Timothy	Krein, P.	An Investigation of Boundary-Based Field Analysis Methods for Electric Machines: The Schwarz-Christoffel and Boundary Element Methods
Pitel, Grant	Krein, P.	Fast Power Converters and Rapid Digital Design
Tang, Xiangyu	Koetter, R.	Iterative Algebraic Decoding of Codes Defined on Graphs
Thakker, Purvesh	Swenson, G.	Development of a Small University Satellite for Performing a Global Survey of Gravity Waves in the Mesosphere
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Basu, Anirban	Adesida, I.	Advanced Processing Techniques for Algan/Gan High Electron Mobility Transistors
Chen, Chen	Choquette, K.	Couples-Cavity Surface-Emitting Lasers: Modulation Concepts, Performance, and Applications
Dagli, Cagri	Huang, T.	Interactive Pattern Recognition Strategies for Multimedia Document Analysis and Search
Davis, Charles	Overbye, T.	Multiple Element Contingency Screening
Kerby, Kiersten	Bernhard, J.	Ground Plane Slot Structures for Isolation of Cosited Microstrip Antennas
Lee, Shih-Hao	Jin, J.	Efficient Finite Element Electromagnetic Analysis for High-Frequency/High-Speed Circuits and Multiconductor Transmission Lines
Li, Yujia	Jin, J.	Development and Application of the FETI-DPEM Algorithms for Analysis of Three-Dimensional Large-Scale Electromagnetic Problems
Liu, Shanshan	Sauer, P.	Dynamic Data-Driven Real-Time Identification for Electric Power Systems
Lobdell, Bryce	Hasegawa-Johnson, M.	Models of Human Phone Transcription in Noise Based on Intelligibility Predictors
Lu, Meng	Cunningham, B.	Label-Free Biosensor Based upon Replica-Molded Vertically Emitting Distributed Feedback Laser
Moon, Se-Jung	Kamalabadi, F.	Rational Function Interpolation of Electromagnetic Transfer Functions of High-Speed Interconnect Systems from Discrete Time-Domain and Frequency-Domain Data
Qian, Zhiguo	Chew, W.	Augmented Surface Integral Equation Method for Low-Frequency Electromagnetic Analysis
Raczkowski, Brian	Sauer, P.	Identification of Critical Lines for Power System Operational Reliability Assessment
Ramachandran, Anand	Cangellaris, A.	Methodologies for Transient Simulation of Hybrid Electromagnetic/Circuit Systems with Multiple Time Scales
Ramachandran, Aravind	Cangellaris, A.	Optimal Spatial Grids for Efficient Numerical Simulation of Time-Domain Electromagnetic Phenomena by Finite Methods
Singh, Nikhil	Sreenivas, R.	Distributed Algorithms for Resource Allocation in Multi-Hop Random Access Wireless Networks
Sundaram, Shreyas	Hadjicostis, C.	Linear Iterative Strategies for Information Dissemination and Processing in Distributed Systems
Vladimerou, Vladimeros	Dullerud, G.	Specifications for Decidable Hybrid Automata and Games

Alumnus Simaan named interim dean at University of Central Florida

By CHARLIE JOHNSON

Most associate spring with blooming flowers and chirping birds, but any Illinois student or alum knows you're just as likely to spend the spring marching under gloomy skies and freezing rain in Champaign-Urbana. And while there is a lot to love about Illinois, the weather isn't always high on the list. For Marwan Simaan (PhD '72), subzero temperatures and April snow showers are no longer a problem. Simaan was recently named interim dean for the College of Engineering and Computer Science at the University of Central Florida (UCF) in Orlando.



“The education that I received at Illinois is very unique, and there’s nothing like it in this country, or even in the world. ... Going to Illinois for my graduate studies was one of the best decisions I have ever made in my life.”

“When the provost asked me to serve as interim dean of the college as we started our spring semester in January, I saw in this an opportunity to serve the University and do whatever I can to enhance the stature of the College,” said Simaan.

Simaan received his bachelor's degree with distinction from the American University of Beirut and his master's from the University of Pittsburgh before coming to Illinois to pursue his PhD in electrical engineering. After graduating in 1972, Simaan stayed at Illinois for two years as a postdoctoral researcher and visiting assistant professor, teaching courses in signal processing and control systems. After working at Shell Development Company for two years, Simaan returned to the

University of Pittsburgh, eventually serving as the head of its electrical engineering department before leaving for UCF in 2008 as the Florida 21st Century Chair and Distinguished Professor.

“As interim dean, I hope to have some influence on where our college at UCF is heading. The engineering college is a wonderful place with tremendous potential and opportunities for research and has outstanding faculty, students, and state-of-the-art facilities,” said Simaan. “I will do whatever it takes to move our college into further national prominence.” UCF, which was founded in 1963, currently ranks fifth in the nation in enrollment and seventh on the list of “Up and Coming Universities,” according to *U.S. News and World Report*.

Despite taking over the day-to-day operations of the college, Simaan continues to work on several research projects, including one sponsored by the National Science Foundation. He is working to develop a controller for a device called Left Ventricular Assist Device, or LVAD, which is often used on patients awaiting a heart transplant to help their hearts pump blood until a donor heart becomes available. In recognition of his distinguished body of research, Simaan was elected to the National Academy of Engineering in 2000 and was recognized with the 2008 College of Engineering Award for Distinguished Service in Engineering.

“The education that I received at Illinois is very unique, and there’s nothing like it in this country, or even in the world,” said Simaan. “The courses you take, the research you do, and the appreciation for quality teaching and research you learn at Illinois have all contributed to me being where I am today. Without the University of Illinois, who knows where my career would have been today? Going to Illinois for my graduate studies was one of the best decisions I have ever made in my life.”

And while Simaan speaks highly of his time at Illinois, he's quick to point out the benefits of life in Orlando. “I love UCF and Orlando. The campus here is beautiful and many of the buildings are new and modern. There are palm trees and smiling students everywhere on campus,” said Simaan.

And the weather? “It’s great, especially in winter.” If only those in Illinois could be so lucky. [🔗](#)



Fellowships foster ECE ILLINOIS graduate students

BY JONATHAN HILL, DIRECTOR OF DEVELOPMENT

My job certainly involves a great deal of travel. I spend a lot of time on the road meeting with alumni and discussing the benefits of supporting the University of Illinois in general and ECE in particular.

I have visited many towns and cities, and everywhere I go, our alumni tell me about the positive impact our department has had on their lives and careers, regardless of whether they remained in the engineering field or not.

What is it about Illinois that enables us to so effectively teach students these types of thinking skills? I believe it is in part the mission of the department and University as a research institution. And a strong research institution must have a gifted collection of graduate students, students who will go on in the field of electrical and computer engineering and create the innovations of the future.

Currently, our graduate programs in electrical and computer engineering are both ranked fourth in the nation, according to the most recent *U.S. News and World Report* rankings.

The strength of our program, of course, lies in good measure with the strength of our faculty. But the quality of graduate students that we attract to our department is also a vitally important aspect of our mission.

To help attract and retain the highest caliber graduate students, we need to be able to provide assistance to them as they train with our faculty.

We have always benefited from the generosity of our alumni to establish the endowed fellowships needed to assist our graduate students. You can see some of the previously established fellowships at www.ece.illinois.edu/current/grad/fellowships/index.html.

Please consider ways that you could support our graduate students and continue the process of innovation and critical thinking.

Jonathan Hill
Director of Development
University of Illinois at Urbana-Champaign
Department of Electrical and Computer Engineering

ECE ILLINOIS

ECE is grateful for the support it receives from alumni and friends. Your monetary donations help ensure our students have the best learning experience possible. View the funds you can support online at www.ece.illinois.edu/give.asp.

Lalit Bahl: Speech recognition expert recognizes the impact of ECE

By Tom Moore

Lalit Bahl (MSEE '66, PhD '69) recalls coming to the University of Illinois in 1964 as a graduate student from India. He arrived knowing that he would have a teaching assistantship in the department. For Bahl, that was a relief. "I would not have been able to come to the States without some help," he said. "That teaching assistantship made it possible for me to come to Illinois."

While the teaching assistantship benefited Bahl, his career provided a great benefit to the engineering field. Bahl's impact was shown over a 30-year career at IBM, where he started working after completing his PhD.

Bahl, who is a Life Fellow in IEEE (Institute for Electrical and Electronic Engineering), received recognition from the IEEE Information Theory Society in 1998 after one of the papers he co-authored during his time at IBM received one of that group's Golden Jubilee Paper Awards. Bahl's paper was one of only 15 to receive this distinction.

In 1997, Bahl received the Distinguished Alumni Award from ECE ILLINOIS and retired from IBM in 1998. He then joined Renaissance Technologies, a hedge fund management company, where he now performs statistical analysis of the stock market. "It's a completely different field," said Bahl. "However, many of the statistical modeling techniques that were useful in speech recognition can also be applied to modeling stock markets. Based on these models, we predict stock price movements and adjust our investment portfolios accordingly."

Bahl believes that his career success stems from his time at Illinois. "I have always felt that the career I had after Illinois was all due to the education I received there," he said. "Much of what I have been doing throughout my career is based on what I did in either the classroom or in the lab as a student."

To show his appreciation for what Illinois has given him, Bahl and his wife, Kavita Kinra, established two graduate fellowships at Illinois: one in ECE and one in Civil and Environmental Engineering. The Ravindar K. and Kavita Kinra

Fellowship in Civil and Environmental Engineering is named in memory of Kinra's first husband, who received his PhD in civil engineering from Illinois, and who died in 1990. The Joan and Lalit Bahl Fellowship in Electrical and Computer Engineering honors the memory of Bahl's first wife, Joan, who died in 1996.

Both of these fellowships are intended to help students who had the same background that Bahl had: They are primarily designed to help students who are coming from India become graduate students at Illinois. As Bahl said, "I look at this as paying back the University and helping students with similar backgrounds to me." [🔗](#)

At IBM, Bahl was part of a group researching speech recognition. His

"I have always felt that the career I had after Illinois was all due to the education I received there. Much of what I have been doing throughout my career is based on what I did in either the classroom or in the lab as a student."

group pioneered the idea of using statistical modeling in the field.

"Rather than linguistics and folk knowledge, we tried to model everything statistically," said Bahl. At the time, this approach was considered heretical, but over time, the success of their method won out.

"A lot of what is in speech recognition products today came out of that group," said Bahl. The IBM group was able to model whole speech processes using statistical methods. Prior to research done by this team, speech recognition depended upon trying to write sets of rules.



ECE alumnus Lalit Bahl (left) and his wife Kavita Kinra established the Joan and Lalit Bahl Fellowship in Electrical and Computer Engineering, and the Ravindar K. and Kavita Kinra Fellowship in Civil and Environmental Engineering. Photo by John Kelley.



Honoring our alumni

Every fall, I particularly enjoy attending the Distinguished Alumni Awards Banquet, which honors recipients of the year's Distinguished Alumni Award, Young Alumni Achievement Award, and Marcia Peterman Award. It also gives us a chance to meet the recipients of the ECE Alumni Scholarship and the IEEE/ECE Alumni Outstanding Sophomore Award.

Throughout the history of these awards, it has been stipulated that recipients must attend the banquet. For me, this is an important attribute of the banquet. But why, you may be thinking?

Let's go back to the year 2006, the evening before the awards banquet, when awardees were invited to a dinner for board members at the Beckman Institute. My sister was my guest, and we rushed by several people to get to the dinner. My sister suddenly stopped and told me she thought she recognized one of the gentlemen we passed. We lingered to learn the identity of this person, and even rode the elevator to the wrong floor so that my sister could have a few minutes to confirm her hunch. I share our story of the "stalking" of Steve Sullivan with you to illustrate the power of awards to enhance the image of engineers to the public and to potential engineers. My sister, a lover of the arts, recognized the Academy Award winner. This R&D Director at Industrial Light and Magic wasn't just an intellectual who had earned M.S. and PhD degrees from our ECE department—he was a celebrity.

Last year my cousin and his son, a very bright high school senior looking to pursue a career in engineering and political science, were my guests at the banquet. My cousin, a history major who retired from a career in the military, felt like an outsider as his son talked, seemingly in another language, about his education and career plans. I introduced them to another board member who leads defense project teams. Before long, *they* were the ones speaking in a foreign tongue, having discovered that my cousin had flown planes designed by my colleague. That chance meeting helped my cousin gain a new enthusiasm for his son's career choice.

Our alumni undoubtedly have a positive impact on our world. So, when you see a call for nominations, like the one in this edition of *Resonance*, please recognize the power that our awards have to favorably change impressions and dissolve barriers. A better understanding of who we are will help ensure continued technological brilliance. Please nominate a fellow ECE alumnus today.

Sincerely,

Denise Turic (BSEE '88)
ECE Alumni Association
Board of Directors President

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Texas Instruments, Inc.
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Patrick Engineering
John Woythal (BSEE '56)
The Boeing Company (retired)

Where are the girls with guitars?

Here's one who has traded engineering for a Stratocaster

BY DAVE EVENSEN

There are generally two ways to meet Laurie Watters Morvan (BSEE '84) if you're ever in southern California. One is to enroll in her applied mathematics class. Another is to hang out at the nearest blues club, where sooner or later she's bound to show up with her electric guitar and maybe blow the roof off the place.



Laurie Morvan (left) lets loose with her band at the Highdive in Champaign during the summer of 2008. Photo by Brendan Ryan.

“My albums cover the whole spectrum of happy to sad to mad and celebration and heartbreak. The human experience is this unending palette of inspiration.”

Though Morvan leads a double life as college instructor and blues band leader, there's no doubt where her true love lies. Through grit and devotion, she's forged a sound that draws comparisons to musical legends such as Stevie Ray Vaughan and Bonnie Raitt. Morvan and her band

perform on nights, weekends, and all summer—all while maintaining lofty standards at her day job at Cypress College in southern California. She loves her music too much to support it by lowly jobs or half-measures.

“If I'm going to do something that takes me away from music, then it's going to be something that helps people,” she said. “At least I'm going in and helping people achieve their dreams.”

Morvan, 48, knows about chasing dreams. Ever since she picked up a guitar as a young woman, she's considered the instrument the “most wonderful thing that ever existed” and built her life around playing it. After studying electrical engineering at the University of Illinois, Morvan picked up an engineering job in California in order to move closer to the music scene. After a couple of years, the Illinois native quit engineering to start playing in cover bands full time—once performing 32 nights in a row—before earning a master's degree and a teaching job to finance a shot at recording. Since 1997, the Laurie Morvan Band has released three CDs (the first under the name of Backroad Shack).

She's still confronted with the old attitude that electric guitars are a man's plaything, but Morvan overwhelms

doubters with characteristic style. When she played volleyball at the U of I, Morvan, at 5 feet 10 inches, was short for a middle hitter, but she made up for it with athleticism and passion, earning the team's MVP award. Along the way, she earned her pilot's license and graduated in the top quarter of her class.

Coach Don Hardin ('84) recalls how Morvan broke out her guitar and led the team in song during road trips. A blues fan, Hardin now has all of Morvan's CDs, and he recently watched her perform when she visited Champaign.

“She plays the guitar like an athlete,” Hardin said. “It's a very physical performance.”

Morvan has been known to leap on bar counters and let loose fiery solos on her 1956 Fender Stratocaster. “I feel the vibe,” she said. “Fortunately, I have a great band that can follow me wherever I take them. I'll make a left turn in the song, and the band just follows right along with me.”

Morvan writes all of her songs, tapping into her own reflections and vulnerabilities for numbers ranging from the raucous “Kickin' Down Doors” to the disappointed “Where Are the Girls with Guitars?” to the sentimental “Family Line,” which describes regret over never having had a child.

“My albums cover the whole spectrum of happy to sad to mad and celebration and heartbreak,” she said. “The human experience is this unending palette of inspiration.”

Songs from her latest CD, *Cures What Ails Ya*, released in 2007, helped usher the band to the finals of the Blues Foundation 2008 worldwide competition for best self-produced CD. Music reviewers have since spared few adjectives in praising Morvan's talent, and most recently, she was named 2008 Blues Artist on the Rise by the Blues Festival Guide.

Morvan, meanwhile, has kept her rising fame in perspective. She knows the key to her success is the same as always.

“You just go out and make sure you're great every time you go on stage. That takes care of everything,” she said. “You just go out and let your guitar do the talking, and that's how you win people over.” 🎸

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C-SPAN leader got his start with ECE ILLINOIS

By SUSAN KANTOR

It seemed only natural for Rob Kennedy (BSEE '78) to choose electrical engineering at Illinois when he graduated from high school in 1974. Born into a family with orange and blue in its blood, and interested in circuits and electricity, the choice seemed obvious. As an undergraduate, he never thought president and chief operating officer of a national cable channel would be his job title.

"You can prepare for a career, but you'll end up in situations that may take you in an entirely different direction," Kennedy said. "And those can be very good paths."

You could say Kennedy's path began to veer when he took a few business classes toward the end of his undergraduate career. He realized he had an affinity for business, and went on to receive his MBA from the University of Chicago in 1980.

Kennedy went to work for Centel, a telephone company that became involved in cable television and was later purchased by Sprint. Kennedy, who had previously interned with Centel, worked on building and expanding cable access in some Chicago suburbs. It was at Centel that Kennedy was introduced to C-SPAN.

Kennedy's boss, Jack Frazee, served on C-SPAN's board of directors. When C-SPAN needed help creating its business plan, Frazee recruited Kennedy. Kennedy kept in touch with the people he met at C-SPAN, including founder and CEO Brian Lamb. In 1987, he was offered a full-time job.

"C-SPAN needed a full-time business person to come and work for them," Kennedy said. "Brian Lamb called, and I moved to Washington. I've been here ever since."

Kennedy, hired as the vice president of business affairs, was responsible for the channel's finances. In the mid-1990s, he became co-chief operating officer with Susan Swain.

Today, Kennedy and Swain are C-SPAN's co-presidents and chief operating officers. Kennedy oversees the company's finances, engineering, and administration.

Kennedy admits he doesn't typically use the high-level math he was taught as an undergraduate. But that's not to say he doesn't use his electrical engineering background

every day. Take the switch from analog to digital, for example. C-SPAN is in the process of converting its satellite feeds to digital and is investigating how to move to high-definition broadcasts. Although these technologies didn't exist 30 years ago, basic engineering skills still apply.

"A lot of the technology has changed since I was in school," Kennedy said. "I think what was important about the education at

"You can prepare for a career, but you'll end up in situations that may take you in an entirely different direction, and those can be very good paths."

Illinois for me is that the technology may change, but the approach to technology—something that you learn and absorb while you're at Illinois—always stays with you." Kennedy attributes much of his success to his years at Illinois.

"I think I would not have been where I am today if it hadn't been for my time at Illinois," Kennedy said. "I think it made me a solid engineer, a very analytical person. I think being able to analyze these situations as they come along, whether technical or otherwise, is important to have in an organization." 🔗



Rob Kennedy is the co-president and chief operating officer of C-SPAN. Photo by Amy Joseph courtesy of the University of Illinois Alumni Association.

Dobberpuhl receives College of Engineering Alumni Honor Award

By Tom Moone

“Coming to the University was a revelation to me,” said Dan Dobberpuhl (BSEE ’67). “It opened up a whole new world of things.”

Dobberpuhl came to U of I from the small town of Streator, Ill., then used his University experiences to open up a whole new world in semiconductor chip design. In recognition of his achievements, he received the Alumni Honor Award for Distinguished Service in Engineering from the College of Engineering during the Student and Alumni Honor Awards Convocation held May 1.



ECE alumnus Dan Dobberpuhl (right) is presented with the Alumni Honor Award for Distinguished Service in Engineering by College of Engineering Dean Ilesanmi Adesida at the Student and Alumni Honor Awards Convocation held May 1.

“I think the two things that influenced my career the most were the time I was at the University and the opportunities I had at Digital Equipment Corporation.”

Following his graduation from Illinois in 1967, Dobberpuhl spent four years as a civilian engineer with the Department of Defense. In 1973, he joined the GE Integrated Circuits Lab in Syracuse, N.Y., where he developed application-specific integrated circuits for various GE business units.

In 1976, he joined the Semiconductor Engineering Group at Digital Equipment Corporation (DEC) in Hudson, Mass. He was eventually responsible for a number of key microprocessor designs, including MicroVAX-II, the first single-chip VAX, and the first three ALPHA CPUs. He started DEC’s Palo Alto Design Center in 1993, where he led the development of the StrongARM™ microprocessor. “I think the two things that influenced my career the most were the time I was at the University and the opportunities I had at Digital Equipment Corporation,” said

Dobberpuhl. “I went from doing interesting engineering on industrial scale to world-class engineering at DEC on a global scale.”

Building on the advanced engineering he did at DEC, Dobberpuhl co-founded SiByte, Inc., in 1998 as its president and CEO. He led the development of the SB1250 chip, a high-performance, coherent, 64-bit multi-processor CPU with high-speed input/output, integrated multilevel caches, and 128-bit high-performance DDR memory controller. “The timing was very good,” said Dobberpuhl, because SiByte was able to ride high on the fast-moving wave of growth in the Internet industry. SiByte was acquired by Broadcom Corporation in December 2000.

Dobberpuhl co-founded P.A. Semi in 2003. A fabless semiconductor company, P.A. Semi developed the high-performance and low-power PWRficient processor family, which is based on Power Architecture technology. In June 2008, P.A. Semi was acquired by Apple.

Dobberpuhl sees the College of Engineering as continuing to be a leading educator of the future pioneers in engineering. The awards ceremony held May 1 combined alumni and

student awards, and Dobberpuhl said, “I was extremely impressed with the students that were given awards. Their achievements were incredible. It is a great testament to the University that it is continuing to provide superior undergraduate opportunities.”

In addition to this College of Engineering award, Dobberpuhl’s achievements have earned him a number of other distinctions. In 2003, Dobberpuhl received the IEEE Solid-State Circuits Technical Field Award, as well as the Distinguished Alumni Award from the ECE Department. He was elected to membership in the National Academy of Engineering in 2006 for “the innovative design and implementation of high-performance, low-power microprocessors.”

ECE alumnus Cho inducted into National Inventors Hall of Fame

By CHARLIE JOHNSON

Alfred Cho (BSEE '60, MSEE '61, PhD '68) is no stranger to orange and blue. Cho's older brother and sister both graduated from Illinois, and his uncle before them. By the time Cho came to Champaign-Urbana from Hong Kong to pursue his bachelor's degree in electrical engineering, his Illinois roots already ran deep. And they only grew deeper as he went on to receive his bachelor's, master's, PhD, and later an Honorary Degree of Doctor of Engineering, all from the University of Illinois.

When it was announced in February that Cho was to be inducted into the U.S. National Inventors Hall of Fame, it's fair to say that the University of Illinois had something to do with it. "I was very fortunate to go to Illinois," said Cho. "There are great facilities for students to have a hands-on experience at Illinois, but the really unique thing is the first-class teachers it has. You really get a broad education that prepares you to face the ever-changing world we live in."

The National Inventors Hall of Fame class of 2009 was inducted during a ceremony on May 2 in Mountain View, Calif. The inductees for 2009 include 15 other inventors from across the U.S., including five who are being honored posthumously.

In celebration of the 50th anniversary of the invention of the integrated circuit, a device invented by Illinois alumnus Jack Kilby (BSEE '47), the 2009 class of inductees represent those who have greatly advanced integrated circuit technology. "It's a great honor to be inducted, and I feel very humbled to be selected," said Cho. Cho, who holds 85 patents, has also been the recipient of the National Medal of Science and the National Medal of Technology.

Cho, known as "the father of molecular beam epitaxy (MBE)," is being recognized for the development of MBE,

a process by which crystals can be layered on top of one another, atom by atom, to achieve greater precision. The process of MBE begins when crystals are deposited or "spray painted" on a heated substrate. As more and more crystalline beams are deposited, layers begin to form atom by atom, which allows for extraordinary smoothness and control of the thickness and composition of the device's structure. This control becomes a highly valuable tool

when it comes to developing high-quality photonic devices and performing quantum research.

MBE-fabricated devices are used in cell phones and are found in almost all CD and DVD players. And because MBE produces compounds not found in nature, it is useful in a variety of applications in the research of quantum physics.

"The really unique thing [at ECE ILLINOIS] is the first-class teachers it has. You really get a broad education that prepares you to face the ever changing world we live in."



ECE alumnus Alfred Cho (center) was inducted into the Inventors Hall of Fame on May 2, 2009, at a ceremony in Mountain View, Calif. He is pictured with Richard Maulsby (left) of the United States Patent and Trademark Office and James Pooley, president of the National Inventors Hall of Fame board of directors.

Cho developed the MBE process while an engineer at AT&T Bell Laboratories (now Alcatel-Lucent's Bell Laboratories) where he eventually became vice president of semiconductor research. Ironically, when Cho began developing the technology, most didn't see a practical application for it. "When I started developing it 35 years ago, I was told that this technology was totally useless. That the layers were too thin to be commercially viable," said Cho. "But, as time goes on, technology is always changing, and it shows you that if you have a vision and believe in yourself, good things can happen. Science is only limited by your imagination."

Even though Cho has long since left the Urbana-Champaign area, he remains tied to the Fighting Illini. He met his wife, Mona Willoughby, while a student. Cho has also added several branches to his orange and blue family tree. Three of his four children also graduated from Illinois.

It gives new meaning to the phrase "Illinois Loyalty." 

1940s

EDWARD LOVICK JR. (BSEE '47) retired from Lockheed Martin. He has almost finished an autobiography detailing his life experiences, which include his World War II naval service history, time at U of I, and 30 years of employment at Lockheed Burbank.

CLARENCE ARNOW (BSEE '49) is the semi-retired president of Resonance Instruments, Inc. Formed in 1996, it is a manufacturer and distributor of microwave instruments for chemical and biological applications.

1950s

EDWARD KITSCH (BSEE '50) retired at the age of 75. He is an avid amateur astronomer and remembers his college mentor Ed Ernst, considering him a great man.

RICHARD BERRY (MSEE '57) has retired as a lieutenant colonel for the U.S. Air Force. He said he is now enjoying life in fine health at the age of 83.

1960s

JOHN H. PAINTER (BSEE '61, MSEE '62) attended the Apollo-8 Reunion at the LBJ Library in Austin, Texas, on April 28th. He spent 10 years working for NASA before he became a professor at Texas A&M. Painter retired from teaching in 1999.

1970s

PETER FOX-PENNER (BSEE '76) is writing a book on the future of the electric power industry. He is a principal and chairman emeritus for Brattle Group.

RANDALL LEHMANN (BSEE '74, MSEE '76) was voted the students' favorite instructor for the Erik Jonsson School of

Engineering and Computer Science at the University of Texas at Dallas for the 2008–09 school year.

TOM MIERS (MSEE '79) was named the 2008 Follett Award winner at the Ball Aerospace & Technologies Annual Excellence Awards Banquet. The award recognizes Miers' leadership skills and his high standards for teamwork. Miers is a senior manager of Instrument System Design for the Program Execution organization and has worked at Ball Aerospace for 25 years.

RUSSELL POWERS (BSEE '76) is a senior staff engineer at Motorola, Inc.

CHARLES BLEICH (BSEE '78) was recently promoted to the Hardware Development Project Engineering Department as principle engineer for WMS Gaming. He has been with it for 30 years and is excited about the opportunity to manage and coordinate new projects from a technical perspective.

KURT HOLLENBECK (BSEE '78) recently joined Mustang Technology Group, a small radar business in Allen, Texas. He is developing low-cost, phased array radar for unmanned air vehicles.

1980s

VIKRAM SAKSENA (MSEE '80, PhD EE '82) was named the executive vice president and chief technology officer at Tellabs. He has more than 25 years of telecom industry experience and will be responsible for technology strategy and business development.

DAVID L. BLAKENEY (BSEE '83) has been named vice president of research and development at Tollgrade Communications, Inc. He has more than 25 years experience in developing software and hardware products.

CHARLES "CHIP" CARTER (BSEE '87) retired from the U.S. Army after 22 years of service. He served in the Gulf War, Bosnia, and Operation Iraqi Freedom. He is now a program manager for the commercial sector in helicopter/airplane modifications and condition-based maintenance programs.

JOHN DALLESSASSE (BSEE '85, MSEE '87, PhD '91) is now the vice president of MicroLink Devices, Inc.

RAY GHANBARI (BSEE '87) was named executive vice president of strategy and products for Vital Images, a leading provider of enterprise-wide advanced visualization and analysis solutions. He will be responsible for product strategy and marketing, corporate development, and driving strategic business planning.

JEFF HUBER (BSCompE '89) was appointed to the Electronic Arts, Inc., board of directors and serves as senior vice president of engineering at Google.

1990s

DOUG BROWN (BSEE '94) is the new project manager for City Water, Light, and Power in Springfield, Ill.

Do you have a photo of yourself at work or at play that you'd like to share?

If so, please send these photos along to Tom Moone, editor, at moone@illinois.edu. Though we'll only be able to print a few in each issue, you can see these and other submissions from our alumni at www.ece.illinois.edu/news/resonance.

You can also mail your photos to:

Tom Moone
55 Everitt Laboratory
1406 W. Green St.
Urbana, IL 61801



On June 1, about 50 ECE alumni and spouses gathered in Charleston, S.C., at a reception held by the department. The event was held in conjunction with both the IEEE International Symposium on Antennas and Propagation and the USNC/URSI National Radio Science Meeting.

2000s

GREGORY HUFF (BSEE '01, MSEE '03, PhD '06) received the NSF CAREER award for his proposal "Biologically Inspired Concepts for Reconfigurable Antennas and Multifunctional Smart Skins." He teaches at Texas A&M University.

MICHAEL O'SULLIVAN (BSCompE '02) was made the software team leader for the Data Processing Department at the F-22 CTF at Edwards Air Force Base in California.

DAVID NG (BSEE '05) graduated from the University of Chicago with an M.D. this May and will be starting his residency in clinical and anatomic pathology at Dartmouth Hitchcock Medical Center in Lebanon, N.H.

MANJARI NARAYAN (BSEE '07) was one of the recipients of the 2009 Google Anita Borg Scholarship.

KATHLEEN REILLY (BSCompE '07) is currently finishing her M.S. in biomedical engineering at the University of Minnesota and Gillette Children's Specialty Healthcare.

In Memoriam

EDWARD L. HULLA (BSEE '42) died January 30, 2009.

RICHARD E. STEVENS (BSEE '49) died October 8, 2008. He was a retired industrial development engineer for Ameren.

EDWIN L. HUGHUS (MSEE '50) died January 10, 2009. He was 78. He served in Europe during World War II and earned two Bronze Stars. During his time at Illinois he worked on the development of the ORDVAC and ILLIAC first-generation computers. He holds 18 patents in the field of electronics and computers. During his career he worked for General Motors Digital Computer R&D Lab and Xerox. In 1984 Hughus received the Distinguished Alumni Award from ECE ILLINOIS.

STUART MELZER (MSEE '67, PhD '70) died May 2, 2009. He spent most of his life working with the Aerospace Corporation and was regarded as one of the most respected national experts in his field. He set high standards for technical excellence in the areas of system performance prediction and signal processing for national security programs.

ERICA RUTH SCIANCE (BSEE '87) died May 16, 2009. She worked as an engineer and supercomputer policy specialist for the Department of Defense and was the NSA liaison to the Department of State Office of Foreign Missions. From 1998 to 2008 she worked for several Washington-area defense contractors providing project management and systems engineering expertise. [u](#)



More than 300 graduates and their families gathered on May 17 for the annual ECE ILLINOIS Graduate Brunch. ECE ILLINOIS alumnus Mark Laufenberg (BSCompE '92, MSEE '93, PhD '97) provided the keynote address. Graduating students also were able to sign their class banner, which will hang in the first floor hallway of Everitt Lab.

SCIENTISTS BREAK RECORD, continued from page 9.

in competition with the base recombination process," Holonyak said. "If the charge doesn't recombine and generate a photon fast enough, it is swept away by the current in the collector."

By preventing the build-up of "slow" charges in the base, the "fast" picosecond recombination dynamics also provided the basis for the researchers' light-emitting transistor rewired internally as a new type of light-emitting diode.

The tilted-charge light-emitting diode achieved a record-breaking modulation speed of 7 gigahertz, corresponding to a recombination lifetime of 23 picoseconds.

"The tilted-charge light-emitting diode is simple to make, low cost, and easy to package and use," Holonyak said.

Because of the tilted base population in the device, current flow, which is a function of the slope of the charge

distribution, makes possible high current densities without requiring extreme carrier densities.

"That's the trick of the transistor," Holonyak said. "And now we've incorporated it into a diode. The physics has been there all along. It just wasn't recognized."

With Feng and Holonyak, co-authors of the paper are lead author Gabriel Walter (chief executive officer at Quantum Electro Opto Systems), and graduate students Chao-Hsin Wu and Han Wui Then.

Funding was provided by the U.S. Army Research Office and the Brain Gain Malaysia Diaspora Program. Device fabrication and testing was performed at the University's Micro and Nanotechnology Laboratory.

Quantum Electro Opto Systems is a company formed by Walter, Feng, and Holonyak to commercialize the light-emitting transistor and tilted-charge light-emitting diode technology. [u](#)

Illinois alumnus named Cornell provost

BY LAUREL BOLLINGER

On January 1, 2009, W. Kent Fuchs (MSEE '82, PhD '85) became Cornell University's newest provost. Fuchs (pronounced "fox") said it is a distinguished and interesting position and one that not

all colleges have. At Cornell, the provost position includes overseeing all of the different departments within the university.

"The provost here has several duties," said Fuchs. "One is that you are the chief academic

the colleges and departments working together to address issues like energy, the environment, sustainable development, and global climate change.

He said it is important that Cornell, as well as many other universities, try to cut expenditures in some areas in order to invest in high-priority areas.

Fuchs said that this opportunity is very exciting and that U of I was a very large part of what helped him get to this point.

"Illinois was the most important influence in my life because it prepared me for the rest of my career," he said. "Those studies and courses I took, the research, the facilities, were just wonderful for me. It took me from being a not-very-good student or researcher to one who was able to be successful. It was all perfect for me. It was wonderful."

Fuchs was also a faculty member in ECE ILLINOIS from 1985 to 1996. Even today he keeps in touch with students who he taught, some from his time as a TA. "I was a faculty member, and that was an equally amazing experience because it not only gave me the opportunity to succeed, but it also allowed me to interact with the gifted instructors who were around me," he said.

"Illinois was the most important influence in my life because it prepared me for the rest of my career. It took me from being a not-very-good student or researcher to one who was able to be successful. It was all perfect for me. It was wonderful."

officer, so you are responsible for all the academic portions of the university as well as responsible for the budget for the entire college, including all the schools."

The current economic climate provides a challenge. Fuchs said there are some changes that he will have to make, as well as a few goals he would like to implement for the whole college. "Since I am responsible for the budget, I want to understand how we currently manage our expenditures and our budget and make sure that we are well positioned for the future. So that's the first thing: Understand the budget and make appropriate adjustments and reallocations."

His other goal is to decide on a new set of academic priorities and implementing programs that will get all of

Fuchs modeled himself after the great faculty at ECE, and it helped him to refine his teaching and researching skills. "The faculty was outstanding, the students I was working with were superb and the organization of the department and of the Coordinated Science Lab gave me a lot of both freedom and resources to work on things I wanted to in a very collaborative environment," said Fuchs. "It helped me prepare to be a successful teacher as well as an academic leader."

Fuchs earned his bachelor's degree at Duke University in 1977. Between his master's and PhD at Illinois, he earned a master of divinity degree at Trinity Evangelical Divinity School in 1984.

Fuchs became the head of the School of Electrical and Computer Engineering at Purdue in 1996, where he was also a distinguished professor. He joined Cornell University as the dean of its College of Engineering in 2002. 🔗

Farewell to “Woodhenge”

BY JAMIE HUTCHINSON

A landmark of ECE research and of the landscape of rural Champaign County is finally gone. ECE has completed the protracted dismantling of its venerable Wullenweber direction-finding array, which occupied the department’s Bondville Road Field Station southwest of Champaign for several decades.

The Wullenweber array was completed in 1957 under the direction of Edgar Hayden (MSEE ’52, PhD ’58), who was a research associate finishing his PhD when the project began and later became a faculty member of ECE’s Navy-funded radio direction-finding research group. After Hayden’s departure, research using the array continued until 1980, first under the guidance of Albert Bailey and then Edward Ernst. Most of the array was dismantled by the late 1990s; the laboratory building was razed in 2008; and other remains have been hauled away this year.

A form of what engineers call “circularly disposed antenna arrays,” Wullenweber arrays were first developed by the Germans during World War II in order to gain a strategic upper hand in the contest to locate enemy radio transmissions. The U.S., Soviet Union, and other countries adopted the technology and refined it during the Cold War, building Wullenweber arrays all over the world. The Illinois array was commissioned by the U.S. Navy Bureau of Ships with its practical interest in navigation as well as target identification; however, research at the site focused on fundamental problems like deflection of waves by the complex and dynamic structure of the ionosphere.

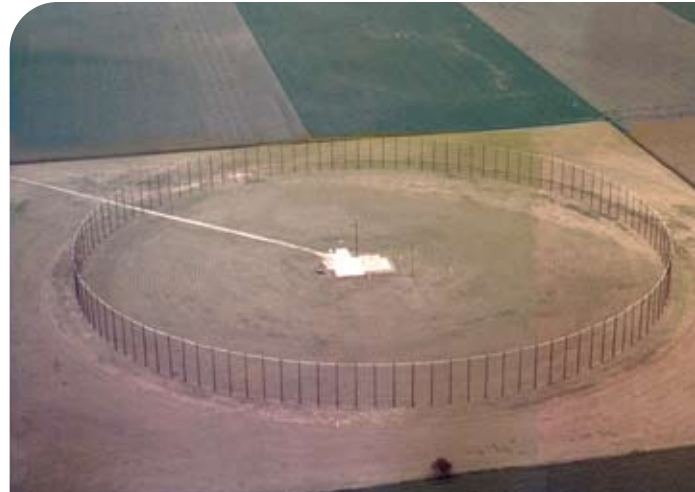
The Illinois Wullenweber consisted of 120 antennas, each 16 feet high, uniformly spaced in a circle 994 feet in diameter and connected by underground cables to terminal gear in a laboratory building in the center of the array. What made the instrument a prominent feature of the local landscape, as well as the subject of local lore, was the 65-foot-high ring of wooden poles located concentrically a few feet within the antenna array. The poles supported a wire reflecting screen that prevented the antennas from picking up signals through the back of the array. Phasing and switching systems served to sweep the array’s reception pattern around the entire horizon up to 900 times per minute.

Shortly after the Wullenweber became operational, ECE Professor George W. Swenson Jr. used the instrument to identify a radio source that interfered with his tracking of the Soviet satellite *Sputnik I*. The Federal

Communications Commission couldn’t locate the source with its direction-finding network and informed Swenson that there was no licensed transmitter on that frequency (20.004 MHz).

Recalled Swenson: “Our Wullenweber was probably the world’s best high-frequency direction finder at that time, though its highest designed frequency was 16 MHz. We thought it was worth a try, and in fact we were able to get a good bearing on the signal. It turned out that it was a British station somewhere in the Caribbean, used for interisland communication. They agreed to shift their frequency enough to get it away from *Sputnik*’s, and we were able to proceed with our research.”

U of I’s WILL-TV interviewed Swenson onsite at the Wullenweber in 1993 for its local interest program *Prairie Fire*. The segment also featured locals discussing neighborhood lore about the structure they referred to as “the elephant cage,” “the birdcage,” and “Woodhenge.” To see the segment online, visit the *Prairie Fire* Web site at will.illinois.edu/prairiefire, scroll down the monthly archives to September 1993, and follow the link “Woodhenge in rural Bondville.” [🔗](#)



With George Swenson piloting, Edgar Hayden took this aerial photo of the Wullenweber radio direction-finding array while it was under construction in 1957.

Thirty-six years later, Swenson discussed the Wullenweber on WILL-TV while much of the structure, though long since decommissioned, was still standing.



After 44 years, Trick still involved with ECE

By SUSAN KANTOR

When ECE Professor Emeritus Timothy Trick began working at the University in 1965, he thought the job would be short-term. After receiving his PhD from Purdue University, he could

have chosen several high-paying offers from industry employers. But he was attracted to Illinois' people and reputation.



“A university is an ideal place to keep learning because, in a sense, that’s your job description. You’re supposed to be a leader and a scholar in your field. That’s what a research university is all about. You have to constantly keep learning.”

“It was a very exciting opportunity,” Trick said. “I was always learning. I was always changing my courses and developing new material. It was a lot of fun, and I enjoyed it. I had a lot of good people to talk to. And I ended up staying here all these years.”

Much has changed in the 44 years Trick has been with Illinois. In 1965, Everitt Lab was considered a new building. A slide rule was his main tool in his office. Research consisted of submitting a deck of cards punched with

computer programs to be processed by a computer that filled an entire room. The next day, you picked up a printed copy of the computer results. If there were errors in your program, you would have to start all over again.

Trick first began teaching and developing courses on circuits, but also became interested in filter design, digital signal processing, and computer-aided design.

“A university is an ideal place to keep learning because, in a sense, that’s your job description,” Trick said. “You’re

supposed to be a leader and a scholar in your field. That’s what a research university is all about. You have to constantly keep learning.”

Trick realized the research he did with graduate students, combined with research from other experts on campus, would shape what he would teach in the future. His courses were always transforming. And he tried to learn as much as he could.

“I took the opportunity to teach a semiconductor device course because I wanted to learn as much as I could about what people knew about semiconductor devices—not just circuits,” Trick said. “I spanned a lot of areas, and I enjoyed every minute of it.”

In 1985, Trick was selected to be department head. “It was a fun time,” Trick said. “It was a time of growth in the department.”

Much of the north campus was developed during Trick’s tenure as department head. The Microelectronics Laboratory (now the Micro and Nanotechnology Laboratory) and

the Coordinated Science Laboratory were built. That time also saw the construction of the Beckman Institute for Advanced Science and Technology.

Trick stepped down as department head in 1995. Then, with a grant from the Sloan Foundation, he began working with ECE Professor Emeritus Burks Oakley on ways to use the Internet as an educational tool. Trick helped to make homework and lectures available online using the Mallard system, which was developed by ECE Associate Professor Donna Brown.

Trick retired in 2004, but is still involved with ECE. He teaches one course per year. He has taught ECE 110: Introduction to Electrical and Computer Engineering and ECE 210: Analog Signal Processing.

“I still enjoy teaching. It keeps me in touch with things,” Trick said. “It keeps me active one semester out of the year.”

Trick also enjoys traveling with his wife to visit their six children and 12 grandchildren who live throughout the U.S. “I was somewhat of a workaholic when I wasn’t retired,” Trick said. “I always felt like there was some committee work that had to be done or some attention that had to be paid to my graduate students’ research. Now it’s nice to sit back and say I don’t have any deadlines.”



U of I partners with group that helps businesses “be green”

The Champaign-Urbana Green Business Association, believed to be the first organization of its kind in the Midwest, will help businesses assess their environmental performance, reduce their carbon footprints, and promote themselves to eco-conscious consumers. Leading the group are Anthony Santarelli, director of program development and a U of I senior; Cassie Carroll, executive director; David Wilcoxon, a CUGBA board member and associate director of environmental compliance in Facilities and Services at U of I; and Mara Eisenstein, director of public engagement and special programs.

Campus ahead of its goal to reduce energy consumption

The Urbana campus is ahead of schedule in meeting Chancellor Richard Herman’s goal of reducing energy consumption by 10 percent by fiscal year 2010. For the first 10 months of the current fiscal year (FY09), energy consumption was down by 9.6 percent over last year. As a result, the campus expects to save about \$5 million in energy costs.



Campus tests emergency preparedness

On the morning of June 2, the floor of Assembly Hall was filled with medical workers there for a different form of exercise. Staff members from McKinley Health Center and the Champaign-Urbana

Public Health District, along with representatives from the Champaign County Emergency Management Agency and the Champaign County Emergency Operations Center, conducted an emergency preparedness exercise that tested the campus’s ability to distribute medication to masses of people during an infectious disease outbreak.

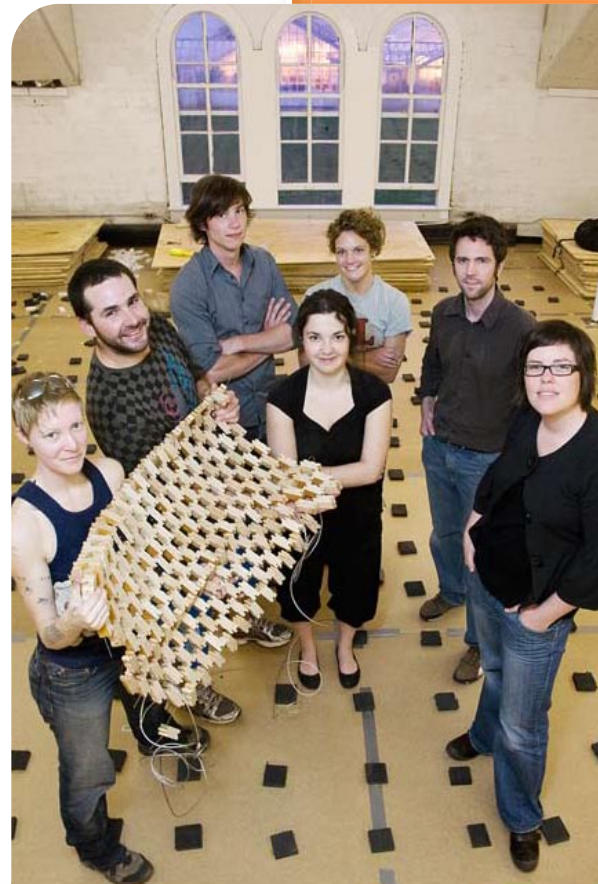
Lincoln Hall renovations moving forward

The long-awaited restoration of Lincoln Hall finally received the go-ahead as Illinois Governor Pat Quinn signed a statewide capital construction bill that included funding for the classroom building’s first renovation in 80 years. The \$57.3 million state appropriation along with \$8.3 million from the University will pay for a near-complete restoration of Lincoln Hall’s interior while maintaining its most architecturally and historically significant features. Much of the 98-year-old building’s insides will be transformed into an environmentally friendly, 21st-century teaching space. The renovation is expected to take three years.



Dance, architecture students collaborate on sustainable dance space

Students in the School of Architecture and the Department of Dance worked together to design and build a much-needed graduate dance rehearsal space on the second level of the East Art Annex 2 in Urbana. The floor of a basketball court from the Intramural-Physical Education Building was harvested during the renovation of that facility into the Activities Recreation Center. Part of the old basketball court is now being used for the dance studio floor, and other possible materials from the renovated building are now being researched for possible re-use. ↻



To read campus news as it happens, visit UI Now at www.illinois.edu/uiNow/.



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ECE Alumni Awards

Call for nominations!

Do you know a fellow ECE ILLINOIS alumnus deserving of recognition for his or her accomplishments?

Then we want to hear from you!

- **ECE Distinguished Alumni Award** honors ECE graduates who have made professional and technical contributions that bring distinction to the department and University.
- **ECE Young Alumni Achievement Award** recognizes young alumni who have made outstanding professional contributions to their fields.

For more information, and to submit a nomination online for either award, please go to www.ece.illinois.edu/alumni.

Please submit nominations no later than Friday, January 22, 2010!