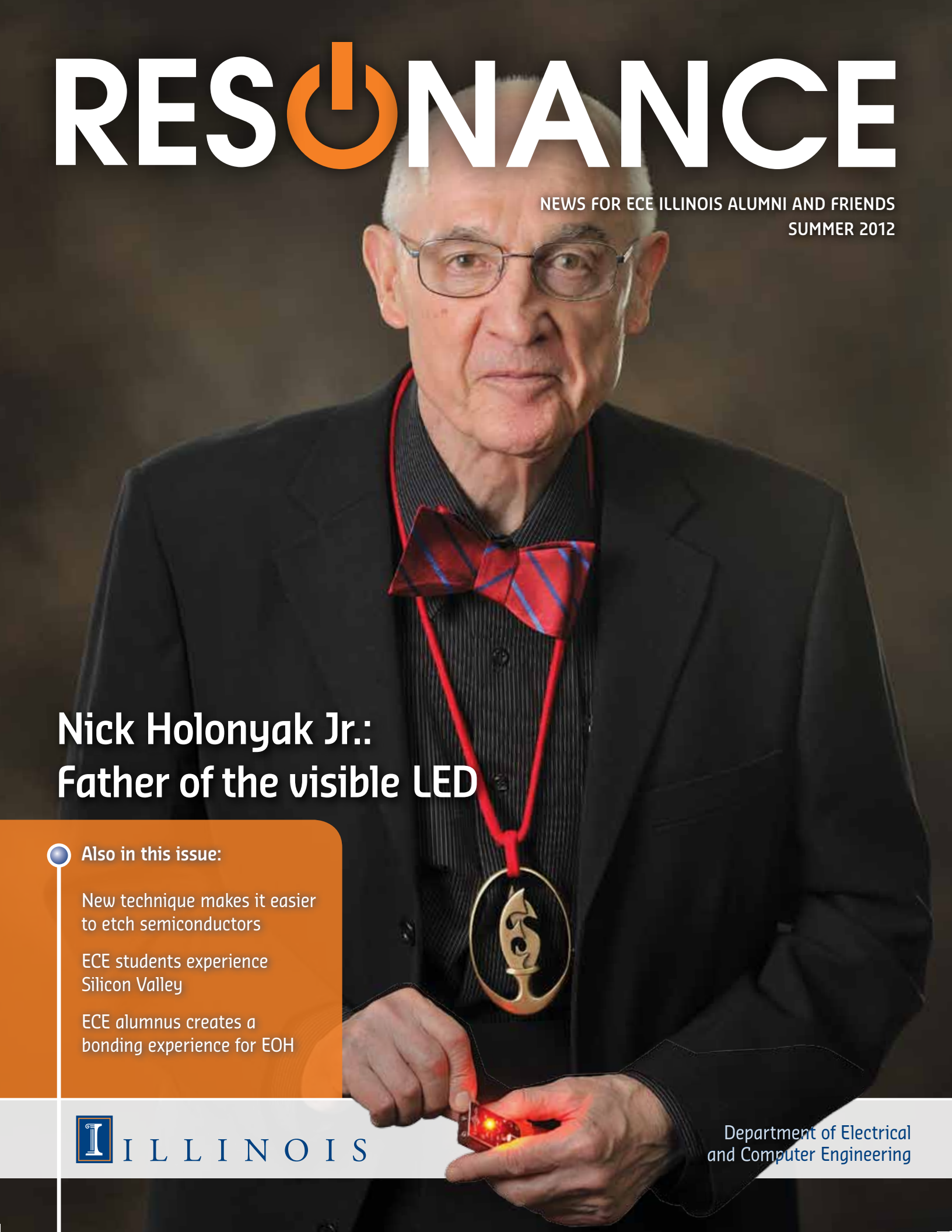
RESONANCE

NEWS FOR ECE ILLINOIS ALUMNI AND FRIENDS
SUMMER 2012



Nick Holonyak Jr.: Father of the visible LED

Also in this issue:

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University of Illinois at Urbana-Champaign
56 Everitt Laboratory
1406 W. Green Street
Urbana, IL 61801

Celebrating past achievements, committed to future innovation

Dear ECE ILLINOIS alumni and friends,

Fifty years ago this October, while at General Electric in Syracuse, New York, ECE Professor Nick Holonyak Jr. invented the world's first practical visible-spectrum light-emitting diode (LED). His invention jump-started what turned out to be a revolution in lighting that today, 50 years later, stands out as one of the most spectacular breakthroughs in our quest for energy-efficient technologies. In the U.S. alone, according to the U.S. Department of Energy, the systematic adoption of LED lighting over the next 15 years could result in savings in excess of $250 billion and eliminate the need of building as many as 40 new power plants.

The LED 50th Anniversary Symposium, which will be held on our campus on October 24–25 this year, provides us with the opportunity to celebrate this tremendous technological breakthrough, honor its inventor, and reflect upon its multifaceted and growing impact. This celebration is a singular event that brings together some of the most famous and influential names at the forefront of LED and semiconductor laser development and applications.

Listening to Nick reminiscing about his years as a graduate student at Illinois, I was reminded of the spark that lit the brilliance of his career. It was his exposure to the lectures of a newcomer to campus from Bell Labs, Professor John Bardeen. Nick's curious mind, already intrigued by the wonders of electricity, recognized in Bardeen's transistor work and in his lectures on semiconductor physics a vast, virgin field of tremendous technological potential and promise waiting to be explored.

These unique intellectual experiences make the American research university the essential element in the process of innovation. There is nothing more inspiring for the curious student than a glimpse into the possibilities of a new idea through the looking glass of the brilliant mind of its pioneering explorer.

The American research university has been the place where this has been happening routinely over the past several decades. This is where young minds from all over the globe come to join an equally diverse group of talented teachers, bold thinkers, and ambitious visionaries, and learn how to become an integral part of the gearbox of innovation. Through a long record of indisputable consistency on fulfilling its mission, the American research university established itself as the linchpin of the innovation economy for our nation and the world.

The world over, there is no other place like the American research university, where government, private sector, and academia come together, in a mutually respectful and synergistic manner, under the overarching objective to enable and nurture free inquiry, socially conscious education, groundbreaking discovery, bold innovation, and transformative entrepreneurship. Faithful to this objective, ECE ILLINOIS' faculty, students, and alumni have been at the forefront of some of the most influential and far-reaching technological discoveries and advances. For example, Nick Holonyak and his students are credited for several of the key ideas and discoveries that became the bedrock for the growth of the multibillion-dollar semiconductor laser industry.

And yet, today, the American research university and, in particular, the public research university, is confronted by considerable fiscal challenges that threaten its ability to continue delivering on its mission. Multi-year sustained reductions in state appropriations have led to increased tuition, thus undermining the ability of the public institution to carry on with its commitment to the democracy of meritocracy in the composition of its student body. The lingering uncertainty in federal research dollars is challenging our ability to acquire the resources we need and engage the talent we depend upon for sustaining our nation's competitiveness and leadership in technological innovation. For the first time in recent history, the linchpin of our innovation economy appears to be coming loose.

This is a dangerous trend that, as a nation, we simply cannot afford and need to reverse as soon as possible. On our campus, thanks to a multi-year, critical review of our operating costs and an aggressive reduction of unnecessary expenses, we have been able to minimize the harmful impact of our fiscal challenges and protect the integrity and quality of our academic mission. Along the way, the loyalty and support of our alumni has been essential and enabling, and for that, we are most thankful.

Yet to reverse the trend, much more must be done. As a nation, we need to remind ourselves that our success over the years has been founded on the conviction that it is through innovation that we prosper and through education that we put our prosperity to good use. We should not allow any near-term hardships to interfere with our long-term commitment to this conviction and our steadfast investment in the well-being of our research universities. The Nick Holonyaks of the future depend on it.

Let the celebration of the 50th anniversary of the visible LED rekindle our commitment to this conviction! I invite you to join us in this celebration, and I thank you for your support and investment in our future and the many great ideas and discoveries yet to come from the ECE ILLINOIS community.

Andreas C. Cangellaris
Department Head
M. E. Van Valkenburg Professor in Electrical and Computer Engineering

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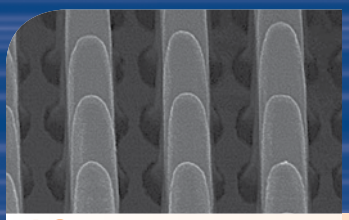

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RESONANCE is published twice a year by the Department of Electrical and Computer Engineering (ECE) at the University of Illinois at Urbana-Champaign. Comments and suggestions are welcome. Contact Tom Moone, editor, at moone@illinois.edu or mail to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

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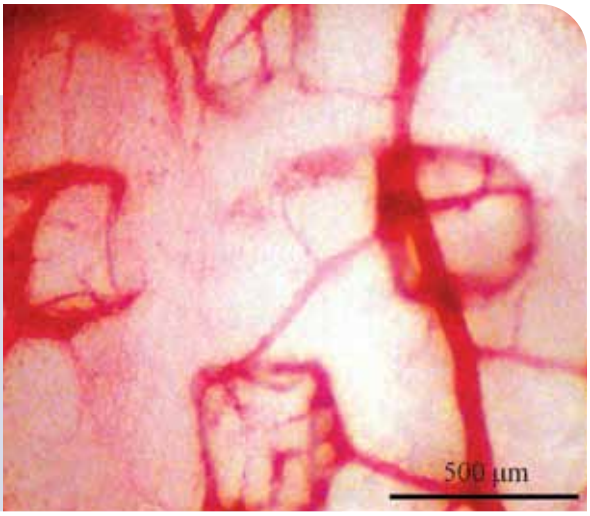
Cover Image: Nick Holonyak Jr. wears the medallion presented to him by the Engineering and Science Hall of Fame. Image by Thompson-McClellan Photography is courtesy of the Engineering and Science Hall of Fame.

Team designs a bandage that spurs, guides blood vessel growth

ECE Professor Rashid Bashir was part of a team of Illinois researchers who have developed a bandage that stimulates and directs blood vessel growth on the surface of a wound. The bandage, called a "microvascular stamp," contains living cells that deliver growth factors to damaged tissues in a defined pattern.



Steven Boppart caption

Coordinated Science Laboratory (CSL)

ECE graduate programs remain among the top in the nation

ECE ILLINOIS has again been named one of the top-ranked graduate engineering departments in the country for its graduate program, according to the annual survey by *U.S. News & World Report*. The graduate program in electrical engineering is tied with the University of California–Berkeley for third, behind Massachusetts Institute of Technology (MIT) and Stanford. The computer engineering program was ranked fifth, behind MIT, Stanford, Berkeley, and Carnegie Mellon.

Boppart presents at congressional briefing

On November 17, 2011, ECE and Bioengineering Professor Stephen Boppart (BSEE '90, MSEE '91) took part in a congressional briefing convened by the Optical Society of America (OSA). The briefing was held under the auspices of the Advisory Committee for the Congressional Research and Development Caucus.

Coordinated Science Laboratory celebrates 60 years of science

One of the oldest multidisciplinary research laboratories at the University of Illinois at Urbana-Champaign, CSL celebrated its 60th anniversary in 2011. As the incubator of a navigational compass for nuclear submarines, the plasma display, and PLATO, the first computer-assisted educational program, CSL has had a 60-year tradition of creating technology that has transformed everything from defense to medicine.

Susquehanna University names physics center for Paul Coleman

Students at Susquehanna University in central Pennsylvania can now get a taste of the hands-on, facilities-rich education long enjoyed by science and engineering students at U of I. Last fall, Susquehanna dedicated the Paul D. Coleman Physics Center, made possible by donations from family, friends, and former students of ECE Professor Emeritus Paul D. Coleman, a Susquehanna alumnus who served on the ECE ILLINOIS faculty for 37 years.

Susquehanna University names physics center for Paul Coleman (second from left).

Construction begins!

The new year brought with it a new beginning for ECE ILLINOIS. Construction on the site of the new building began in January. The excavation went rapidly and the site of the new ECE building soon featured a large hole that has slowly become filled with the walls of what will soon be the basement of the building.

A webcam (www.ece.illinois.edu/buildingcampaign/webcam.html) allows anyone to check out the progress of the new building. (Note, though, that the webcam works best with Firefox, Chrome, and Safari browsers.)

Andrew Singer (left) and Naresh Shanbhag await the start of the Illinois Marathon.

Faculty/student fundraiser

Several ECE faculty who are avid runners participated in a fundraiser for the ECE building as part of the 2012 Illinois Marathon. Students put money into cans representing the various faculty members. The one whose can had the most money collected at the end of the fundraiser period would wear a wig and cape as he ran down Green Street during the marathon.

Participating faculty included Bruce Hajek, Lippold Haken, Sanjay Patel, Naresh Shanbhag, Andrew Carl Singer, and Daniel Wasserman. More than $600 was collected for the building campaign, and Andrew Singer was the winner—he wore the wig and cape.

These developments are exciting, but the building still needs the support of our alumni and friends. We urge you to be a part of the process of completing this next stage of the legacy of ECE. To contribute to the building campaign, you can donate online at www.ece.illinois/edu/buildingcampaign. If you are interested in making a pledge over a five-year period, contact Beth Katsinas, director of advancement, at katsinas@illinois.edu or (217) 265-6285.

do your bit

A new vision of our future is taking shape. An exceptional building will soon take its rightful place among the great engineering centers at the University of Illinois. Bold and magnificent, the new ECE ILLINOIS building will honor our past, energize our future, and provide coming generations with the tools they need to imagine, to build, and to lead. The only question is—how will you be involved?

If you believe an exceptional department requires an exceptional home, join the students, staff, faculty, and alumni around the world who are doing their bit to help us build the future—one brick at a time. To contribute to the Building Campaign for ECE ILLINOIS, mail your contribution along with the enclosed reply card today or donate online now at www.ece.illinois.edu/buildingcampaign.

Show off a bit. Enjoy a lapel pin illustrating your support for this project. See our website for more information.

ECE welcomes four new faculty members

By Tom Moone

Four new faculty members joined ECE in January: Catrina Bryce, John Dallesasse, Robert Pilawa, and Maxim Raginsky.

Catrina Bryce

Robert Pilawa

John Dallesasse

Maxim Raginsky

Catrina Bryce

Professor Catrina Bryce joins ECE from the University of Glasgow, where she was a professor of photonics in the Department of Electronics and Electrical Engineering. Through her research, she has helped develop techniques for fabricating photonic integrated circuits on III-V semiconductor chips based on quantum well intermixing. She and her research team have developed several intermixing techniques applicable to a range of quantum well material systems as well as quantum dot systems. She is a fellow of the Optical Society of America and of the IEEE. She received the IEEE Certificate of Appreciation in 2005, and the IEEE Lasers and Electro-Optics Society Engineering Achievement Award in 2006.

John Dallesasse

Associate Professor John Dallesasse is both a renowned expert in the world of semiconductor manufacturing and an ECE alumnus, having received his bachelor's, master's, and PhD in 1985, 1987, and 1991, respectively. Most recently, he was the co-founder and chief technology officer for Skorpios Technologies, Inc., a venture-funded silicon photonics startup engaged in the commercialization of a groundbreaking technology for bringing the economies of scale of silicon CMOS to the world of III-V semiconductors and optoelectronics. His previous accomplishments include the discovery, with ECE Professor Nick Holonyak Jr. (BSEE '50, MSEE '51, PhD '54), of III-V oxidation, a technology that has been of critical importance to the fabrication of high-performance VCSELs (virtual-cavity surface-emitting laser) and high-reliability light-emitting diodes.

Robert Pilawa

Assistant Professor Robert Pilawa comes to ECE from the Massachusetts Institute of Technology. He is an expert in the area of power electronics, with a focus on renewable energy applications and energy efficiency. In addition to the power electronics for low-cost and efficient solar photovoltaics, he is researching new and efficient ways to capture and convert electric energy. He is interested in innovative ways for reducing the energy wasted in everyday electronics. His power electronics circuits help keep cell phones and laptops running longer and cooler, while at the same time shrinking their overall size. He works closely with industry partners to ensure that his energy-efficient solutions will find widespread use and have a positive impact on society.

Maxim Raginsky

Assistant Professor Maxim Raginsky is no stranger to the University of Illinois. He was a Beckman Foundation postdoctoral fellow at Illinois from 2004 to 2007. He is interested in understanding, modeling, and analyzing complex systems that have capabilities for sensing, communication, adaptation, decision-making, and that can operate effectively in uncertain and dynamic environments. He examines new angles and perspectives at the interface between information theory, learning, optimization, and control. He uses insights and techniques from these disciplines to develop robust and fast schemes for compression, transmission, and processing of information that deliver the data reliably, while preserving features relevant for inference, recognition, or control.

Coleman elected to National Academy of Engineering

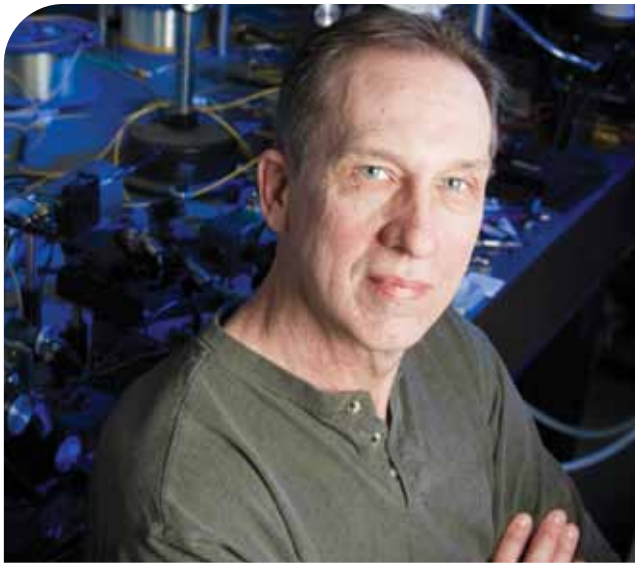
By Liz Ahlberg, U of I News Bureau

Photonics pioneer and ECE Professor James J. Coleman has been elected to membership in the National Academy of Engineering. Coleman is the Intel Alumni Endowed Chair in Electrical and Computer Engineering and an affiliate in the Department of Materials Science and Engineering.

"It is a real honor and a privilege to be elected to the National Academy of Engineering," said Coleman, a researcher in the Micro and Nanotechnology Lab and the Coordinated Science Lab. "I am fortunate to have worked over the years with an amazing group of very talented colleagues and students, at institutions that value high-quality work. This honor better reflects our collective success than anything I might have accomplished."

Coleman is among 66 new members and 10 foreign associates announced by the academy on February 9. Election to the NAE is one of the highest professional honors an engineer can garner. The 2,254 members and 206 foreign associates are an elite group distinguished by their outstanding contributions to the fields of technology and engineering.

Coleman was cited for his work in semiconductor lasers and photonic materials. His research focuses on materials for optoelectronics—devices that convert electricity into light or vice versa, such as lasers, light sensors, solar cells, and fiber optics. He helped develop metalorganic chemical vapor deposition (MOCVD), a growth method widely used to make semiconductor devices. As the director of the Semiconductor Laser Laboratory at Illinois, Coleman oversees research using MOCVD of III-V semiconductors to explore applications in lasers, quantum dots, and other optical structures.



"This is a significant recognition and prestigious honor for one of our distinguished faculty," said Dean of the College of Engineering Ilesanmi Adesida. "Jim's research has added considerable knowledge to the field of semiconductor lasers and photonic devices, and his many successful patents and contributions to the engineering literature remain a testament of those achievements. He is also an Illinois alumnus, so we are doubly proud of his achievements."

Coleman earned his bachelor's, master's, and doctoral degrees from ECE in 1972, 1973, and 1975, respectively. He worked at Bell Laboratories and Rockwell International before joining the ECE faculty in 1982. He has published more than 400 scholarly journal articles and holds seven patents. He is a fellow of IEEE, the Optical Society of America, SPIE (the International Society for Optics and Photonics), the American Association for the Advancement of Science, and the American Physical Society.

Two other 2012 NAE inductees with ECE connections

Supriyo Datta

ECE alumnus Supriyo Datta (MSEE '77, PhD '79) is the Thomas Duncan Distinguished Professor of Electrical and Computer Engineering at Purdue University. Datta was recognized "for quantum transport modeling in nanoscale electronic devices."

Chao-Han Liu

ECE Professor Emeritus Chao-Han Liu was elected a foreign associate of NAE "for contributions to ionospheric research and international leadership in atmospheric remote sensing." He is currently a distinguished scholar at Academia Sinica in Taipei, Taiwan.

Bashir elected fellow of AAAS

By Tom Moone

ECE Professor Rashid Bashir has been elected a fellow of the American Association for the Advancement of Science (AAAS). He was one of eight Illinois faculty members elected to this distinction.

Rashid Bashir

"This is a great honor," said Bashir, an Abel Bliss Professor of Engineering and the director of the Micro and Nanotechnology Lab. "I am very pleased to have received this fellowship."

Bashir is an expert in the application of micro and nanotechnology to biotechnology and medicine. In his research, Bashir works to develop what he calls "point of care" sensors. Using nanotechnology, Bashir develops devices that can be used in either a doctor's office or a patient's home to perform tests that would previously have been done in a hospital lab and that would have taken several days to perform.

"We are very interested in making devices that can rapidly sense biological entities such as DNA molecules, cancer cells, proteins, characterize and detect bacteria, and detect and count blood cells," he said.

These devices would not completely replace a lab, but they would bring the equipment closer to the patient and the physician to help make better medical decisions for the patient's care. "So you take the [blood] sample at the doctor, and rather than waiting a day or two, you get the results right there," explained Bashir.

And some of this technology could soon be on the market. Bashir is co-inventor of technology underlying Daktari Diagnostics, a company based in Boston that is developing a commercial biosensor for detection of specific types of white blood cells from whole blood. The development is aimed at the global health area of HIV/AIDS diagnosis and treatment. "They have developed prototype systems, and now we are moving forward to doing clinical studies with human blood samples," said Bashir.

Now that he has this fellowship from AAAS, Bashir feels that the word *Advancement* in the society's name brings some responsibility on its fellowship recipients. "We have to be ambassadors for advancing science and technology in the community," he said. "We have to make the public more aware of how science and engineering is changing their worlds, is changing their lives for the better. That is something we all must do."

AAAS
ADVANCING SCIENCE, SERVING SOCIETY

Bashir also had praise for the University and his colleagues and students: "I'm very happy to be here [at Illinois] and to be able to do this work with the colleagues and the students, especially," he said. "We have fantastic facilities, some great colleagues, and great students."

In addition to this recognition from AAAS, Bashir is a fellow of the American Institute of Medical and Biological Engineering (AIMBE) and of the IEEE. He received the College of Agriculture Team Research Award from Purdue University in 2006 for work in biosensors for food safety. He was also the recipient of the Joel and Spira "Outstanding Teacher Award" from Purdue University and the NSF Faculty Early Career Award in 2000.

In addition to Bashir, the others recipients from Illinois are Fouad Abd-El-Khalick (Curriculum and Instruction), Debasish Dutta (Mechanical Science and Engineering), K. Jimmy Hsia (Mechanical Science and Engineering), Keith W. Kelley (Animal Sciences), Wilfred van der Donk (Chemistry), M. Christina White (Chemistry), and James Whitfield (Entomology). These individuals were recognized for their contributions to science and technology at the Fellows Forum on February 18, 2012, during the AAAS Annual Meeting in Vancouver, Canada.

Illinois professor earns Presidential Early Career Award

By Liz Ahlberg, U of I News Bureau

ECE Assistant Professor Gang Logan Liu was among the 94 researchers to receive the 2011 Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor the U.S. government confers upon young investigators establishing their independent research careers.

Gang Logan Liu

Each PECASE recipient will receive up to five years of funding to pursue research avenues of their choice. The winners are recognized for their innovations in science and technology as well as their commitment to education and outreach.

"It is inspiring to see the innovative work being done by these scientists and engineers as they ramp up their careers—careers that I know will be not only personally rewarding but also invaluable to the nation," President Barack Obama said in the award announcement. "That so many of them are also devoting time to mentoring and other forms of community service speaks volumes about their potential for leadership, not only as scientists but as model citizens."

Liu, who is a researcher in the Micro and Nanotechnology Lab, specializes in using nanoengineering methods to understand and control molecular and cellular systems. He was nominated by the U.S. Department of Energy for his part in developing high-performance surface-enhanced Raman spectroscopy (SERS) devices and techniques, which are used to study chemicals and biological molecules adsorbed on a solid surface for energy and biodefense applications.

Liu has worked to enhance the sensitivity and reliability of large-scale integrated SERS devices and detection techniques and explores SERS applications in physics, chemistry, and biology, including proteomic microarrays, ultrasensitive 3-D living cell nanoimaging, optofluidic microdevices, and quantum nanophotonics.

Liu earned his doctorate in bioengineering at the University of California at Berkeley in 2006 and completed a fellowship at the Lawrence Livermore National Laboratory before joining the faculty at Illinois in 2008. He received his award at the White House on October 14, 2011.

O'Donnell joins ECE advancement team

By Tom Moone

Martin O'Donnell joined ECE as the assistant director of advancement in late February.

A graduate of the University of Illinois, he received his bachelor's degree in history and speech communication in 2007 and a master's in human resource education in 2008.

From 2008 until he joined ECE, he was the assistant director of Library Advancement for major gifts. There he was responsible for fundraising in 40 states. It was also there that he first encountered ECE alumni. "While at the library, I had a chance to meet with some alumni from this department, and it was exciting to see the strong ties that they had to this department and this campus," he said.

Now that O'Donnell has joined ECE, "My primary role is going to be going out and meeting with alumni, working to engage them with the department, and helping connect them back to campus," he said. As ECE's second full-time advancement professional, O'Donnell will focus most of his efforts on the East Coast and the Midwest.

"I believe that when people see the things happening on campus and in this department, they're going to want to get involved," he said. "They're going to want to come back and talk to our students, talk to our faculty, and support ECE with their time, talent, and financial resources."

O'Donnell and his wife, Emily, have a daughter, Ava. As a former student athlete during his undergraduate days, O'Donnell enjoys following the exploits of the Fighting Illini.

Martin O'Donnell

Hasegawa-Johnson and Li receive Dean's Excellence Award for Research

By Heather Punke

ECE Associate Professor Mark Hasegawa-Johnson and ECE Assistant Professor Xiuling Li are both recipients of the 2012 Dean's Award for Excellence in Research.

Mark Hasegawa-Johnson

Xiuling Li

Mark Hasegawa-Johnson

Hasegawa-Johnson, a researcher at the Beckman Institute for Advanced Science and Technology, received the award for his work in speech recognition technology. He said he was happy to be one of this year's recipients. "It's nice to have that confirmation that your research is noticed," he said.

He and his team have been working on mathematically formalizing theories from linguistics. His most recent work has been based on a particular model of human speech perception. "When [people] listen to an audio signal, there are events that stand out, or are perceptually salient to the listener," Hasegawa-Johnson said. "A lot of the information relevant to deciding exactly what the person said tends to be localized in time, very close to that perceptually salient event."

When that model of speech perception is transferred to speech recognizers, it can improve the accuracy of the recognizers. "It [the recognizer] focused differentially well on the moments of time, the 20 to 70 milliseconds right around one of these perceptually salient syllable peaks or rapid transitions," Hasegawa-Johnson said.

He and his team published this new technology, and Hasegawa-Johnson says he believes people in industry have been using those publications. "We made a decision early on that the learning technologies aren't different in a way that would be easy to patent, so instead we just published them and people have been taking advantage of these ideas, I think, and building them into commercial speech recognizers."

Xiuling Li

Li, a researcher in the Micro and Nanotechnology Lab, was also pleased to receive the Dean's Award. "I'm grateful that my research efforts got recognized," she said.

Her research group has three main themes of nanotechnology-related research they have been focusing on that earned Li the award.

One of the focuses is on nanowire-based electronics. Their discovery of the planar nanowire growth not only makes nanowire array-based electronics compatible with existing processing technology, but also enables in-plane modulation of nanowire electrical properties during growth. "We're also getting better mobilities compared to other nanowire growth methods, so the transistor will be faster," Li said.

The second area of her research is strain-induced rolled-up membranes. Thin membranes of semiconductors and their hybrid with metal and dielectrics are deposited or patterned on a flat surface, but when they are released, they "buckle up" into a tubular or helical structure. "We're basically building 3-D architectures using 2-D processing techniques," Li explained. "Imagine what the additional degree of freedom (curvature) could do to the physical properties and new applications can be enabled by the curvilinear structure," she said.

The third research area created a new semiconductor etching technique. Traditionally, people are limited to either wet etching (which is cheap, but isotopic) or dry etching (which is expensive, but directional). This new technique, called metal-assisted chemical etching (MacEtch), is the best of both worlds because it is inexpensive but directional. "So far we've demonstrated silicon-based solar cells and thermoelectric devices, [and] we're actively working on III-V based devices using this method," Li said. *(See story on page 10 for more information.)*

Li said that the research being done by her group would not be possible without the students and collaborators on this campus. "[They] are essential to the success of our research," she said.

The pair officially received their awards on April 23 at the Engineering at Illinois Faculty Awards Ceremony.

Boppart and Choquette invested as Bliss Professors

By Heather Punke

On November 11, ECE Professors Stephen Boppart and Kent Choquette were among six College of Engineering faculty invested as Abel Bliss Professors of Engineering. Other College of Engineering faculty invested were Philippe H. Geubelle (Aerospace Engineering), Jiawei Han (Computer Science), David Ruzic (Nuclear, Plasma, and Radiological Engineering), and Albert J. Valocchi (Civil and Environmental Engineering).

Stephen Boppart

Kent Choquette

Stephen Boppart

"As a faculty member in the ECE Department, the Bioengineering Department, and the Department of Internal Medicine, Steve epitomizes what the groundbreaking intersection of engineering, the physical sciences, and medicine is all about," said ECE Department Head Andreas Cangellaris in his introduction of Boppart.

Boppart expressed his gratitude to his family, colleagues, and students for their help and support throughout his career: "[I would like to thank] my many students, past and present, who have always given me a sense of perpetual enthusiasm, youthful discovery, and have always been a source for ideas and innovation."

Boppart has made many contributions to the fields of engineering, medicine, and biology. He works with imaging techniques and light to generate high-resolution, real-time, non-invasive images of biological tissue at the cellular and molecular level for diagnosing diseases such as cancer, according to the Beckman Institute website. Boppart is a fellow of IEEE, SPIE, and the Optical Society of America, among other recognitions.

Kent Choquette

Choquette was introduced by ECE Professor James Coleman, who spoke of Choquette's passion for life and his research. "Kent's work, and really everything in Kent's life, is defined by his passion," said Coleman. "When he went to Bell Labs after completing his PhD, he developed a lifelong passion for VCSELs [vertical-cavity surface-emitting lasers]."

Choquette thanked the audience, and he highlighted how helpful and encouraging his colleagues and students have been. "The quality of your research is reflected in the quality of your graduate students. I've had the great benefit and privilege to work with some outstanding students in the past and the present," Choquette said.

Choquette joined the University of Illinois in 2000, after earning his PhD from the University of Wisconsin–Madison and working in industry at AT&T Bell Laboratory and Sandia National Laboratory for 10 years. He has made major contributions to developing VCSEL devices, which now appear in numerous commercial products. Choquette was named an ECE Sony Faculty Scholar from 2004–2007, and is a fellow of IEEE, the Optical Society of America, and SPIE.

The Bliss professorships are the result of a bequest from the late Helen Eva Bliss in memory of her father, Abel Bliss Jr. Abel entered the University in 1872 to study civil engineering, but left before completing his degree. In June 1874, the University granted him a partial certificate in civil engineering. His business ventures included agriculture and real estate, and by 1929, he was a partner in the land development and oil production company of Bliss & Wetherbee. Abel died in the mid-1930s.

The generous Bliss bequest is used to advance scholarly activities in the College of Engineering.

New technique makes it easier to etch semiconductors

By Liz Ahlberg, U of I News Bureau

Xiuling Li

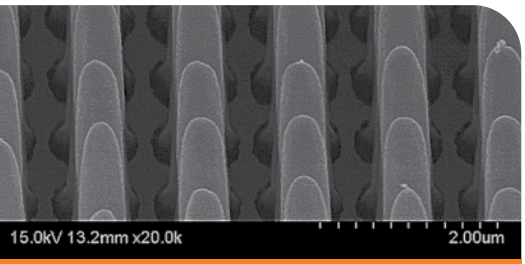
John Rogers

Creating semiconductor structures for high-end optoelectronic devices just got easier, thanks to a team of Illinois researchers led by ECE Assistant Professor Xiuling Li.

The team developed a method to chemically etch patterned arrays in the semiconductor gallium arsenide, used in solar cells, lasers, light-emitting diodes (LEDs), field-effect transistors (FETs), capacitors, and sensors. The researchers describe their technique in the journal *Nano Letters*.

A semiconductor's physical properties can vary depending on its structure, so semiconductor wafers are etched into structures that tune their electrical and optical properties and connectivity before they are assembled into chips.

Semiconductors are commonly etched with two techniques: "Wet" etching uses a chemical solution to erode the semiconductor in all directions, while "dry" etching uses a directed beam of ions to bombard the surface, carving out a directed pattern. Such patterns are required for high-aspect-ratio nanostructures, or tiny shapes that have a large ratio of height to width. High-aspect-ratio structures are essential to many high-end optoelectronic device applications.



SEM: A scanning electron microscope image of "nanopillars" etched in gallium arsenide. *Image by Xiuling Li*

While silicon is the most ubiquitous material in semiconductor devices, materials in the III-V (pronounced *three-five*) group are more efficient in optoelectronic applications, such as solar cells or lasers.

Unfortunately, these materials can be difficult to dry etch, as the high-energy ion blasts damage the semiconductor's surface. III-V semiconductors are especially susceptible to damage.

To address this problem, Li and her group turned to metal-assisted chemical etching (MacEtch), a wet-etching approach they had previously developed for silicon. Unlike other wet methods, MacEtch works in one direction, from the top down. It is faster and less expensive than many dry-etch techniques, according to Li, a researcher in the Micro and Nanotechnology Lab. Her group revisited the MacEtch technique, optimizing the chemical solution and reaction conditions for the III-V semiconductor gallium arsenide (GaAs).

The process has two steps. First, a thin film of metal is patterned on the GaAs surface. Then, the semiconductor with the metal pattern is immersed in the MacEtch chemical solution. The metal catalyzes the reaction so that only the areas touching metal are etched away, and high-aspect-ratio structures are formed as the metal sinks into the wafer. When the etching is done, the metal can be cleaned from the surface without damaging it.

Metal-assisted chemical etching uses two steps. First, a thin layer of gold is patterned on top of a semiconductor wafer with soft lithography (left). The gold catalyzes a chemical reaction that etches the semiconductor from the top down, creating three-dimensional structures for optoelectronic applications (right). *Image by Xiuling Li*

"It is a big deal to be able to etch GaAs this way," said Li, who is also affiliated with the Frederick Seitz Materials Research Laboratory and the Beckman Institute for Advanced Science and Technology. "The realization of high-aspect-ratio III-V nanostructure arrays by wet etching can potentially transform the fabrication of semiconductor lasers where surface grating is currently fabricated by dry etching, which is expensive and causes surface damage."

To create metal film patterns on the GaAs surface, Li's team used a patterning technique pioneered by John Rogers, the Lee J. Flory-Founder Chair and a professor of Materials Science and Engineering. Their research teams joined forces to optimize the method, called soft lithography, for chemical compatibility while protecting the GaAs surface. Soft lithography is applied to the whole semiconductor wafer, as opposed to small segments, creating patterns over large areas without expensive optical equipment.

"The combination of soft lithography and MacEtch make the perfect combination to produce large-area, high-aspect-ratio III-V nanostructures in a low-cost fashion," said Li.

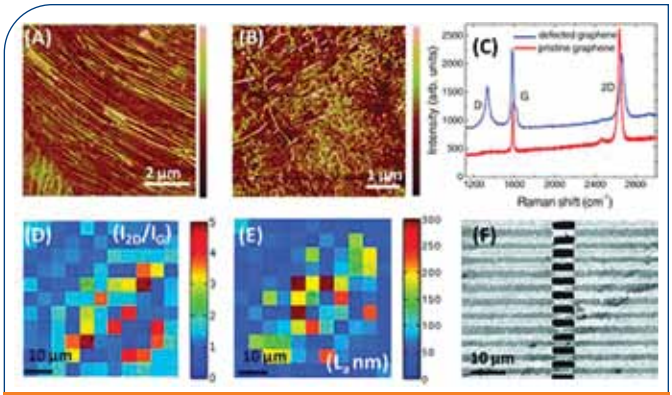
Next, the researchers hope to further optimize conditions for GaAs etching and establish parameters for MacEtch of other III-V semiconductors. Then, they hope to demonstrate device fabrication, including distributed Bragg reflector lasers and photonic crystals.

"MacEtch is a universal method as long as the right condition for deferential etching with and without metal can be found," Li said. The Department of Energy and the National Science Foundation supported this work.

Imperfections may improve graphene sensors

By Rick Kubetz, College of Engineering

Although they found that graphene makes very good chemical sensors, researchers at Illinois have discovered an unexpected twist: that the sensors are better when the graphene is "worse"—more imperfections improved performance.



(A and B) Atomic force microscopy (AFM) images of chemical vapor deposition (CVD) graphene used for sensors, (C) Raman spectra of pristine and CVD-based *defective* graphene samples, (D) map of ratio indicating the Illinois process produces graphene with few layers, (E) map of crystallite size indicative of 30 to >300 nm distance between line defects, and (F) scanning electron microscopy image of CVD graphene ribbons.

"This is quite the opposite of what you would want for transistors, for example," explained ECE Assistant Professor Eric Pop, a member of the interdisciplinary research team. "Finding that the less perfect they were, the better they worked, was counter intuitive at first."

The research group, which includes researchers from both Chemical Engineering and ECE, and from a startup company, Dioxide Materials, reported their results in the November 23, 2011, issue of *Advanced Materials*.

"The objective of this work was to understand what limits the sensitivity of simple, two-terminal graphene chemiresistors, and to study this in the context of inexpensive devices easily manufactured by chemical vapor deposition (CVD)," stated lead authors Amin Salehi-Khojin and ECE graduate student David Estrada.

The researchers found that the response of graphene chemiresistors depends on the types and geometry of their defects.

"Nearly-pristine graphene chemiresistors are less sensitive to analyte molecules because adsorbates bind to point defects, which have low-resistance pathways around them," noted Salehi-Khojin, a research scientist at Dioxide Materials and postdoctoral research associate in the Department of Chemical and Biomolecular Engineering (ChemE) at Illinois. "As a result, adsorption at point defects only has a small effect on the overall resistance of the device. On the other hand, micrometer-sized line defects or continuous lines of point defects are different because no easy conduction paths exist around such defects, so the resistance change after adsorption is significant."

"This can lead to better and cheaper gas sensors for a variety of applications such as energy, homeland security, and medical diagnostics" said Estrada.

According to the authors, the two-dimensional nature of defective, CVD-grown graphene chemiresistors causes them to behave differently than carbon nanotube chemiresistors. This sensitivity is further improved by cutting the graphene into ribbons of width comparable to the line-defect dimensions, or micrometers in this study.

"What we determined is that the gases we were sensing tend to bind to the defects," said Pop, a researcher in the Micro and Nanotechnology Lab and an affiliate with the Beckman Institute for Advanced Science and Technology. "Surface defects in graphene are either point-, wrinkle-, or line-like. We found that the points do not matter very much and the lines are most likely where the sensing happens."

"The graphene ribbons with line defects appear to offer superior performance as graphene sensors," said ChemE Professor Emeritus and Dioxide Materials CEO Richard Masel. "Going forward, we think we may be able engineer the line defects to maximize the material's sensitivity. This novel approach should allow us to produce inexpensive and sensitive chemical sensors with performance better than that of carbon nanotube sensors."

Additional authors of the paper, "Polycrystalline Graphene Ribbons as Chemiresistors," include Kevin Y. Lin of ChemE and ECE graduate students Myung-Ho Bae and Feng Xiong.

Eric Pop

Richard Masel

JENNIFER BERNHARD received the 2012 Stanley H. Pierce Faculty Award from the Illinois College of Engineering.

ECE faculty STEPHEN BOPPART and P. SCOTT CARNEY are part of a team of Illinois researchers who have developed a technique to computationally correct for aberrations in optical tomography, bringing the future of medical imaging into focus.

ANDREAS CANGELLARIS was named the 2012 recipient of the IEEE Microwave Theory and Techniques Society (MTT-S) Distinguished Educator Award.

KENT CHOQUETTE received the Nick Holonyak Jr. Award from the Optical Society of America.

SHUN LIEN CHUANG was a recipient of the 2011 Microoptics Conference Award for "significant contributions to micro/nano lasers and plasmonics."

BRIAN CUNNINGHAM was named a fellow of IEEE and a fellow of the American Institute for Medical and Biological Engineering.


Stephen Boppart


Brian Cunningham


P. Scott Carney


Zhi-Pei Liang


Shun Lien Chuang


Daniel Liberzon

ALEJANDRO DOMÍNQUEZ-GARCÍA received the Outstanding Young Engineer Award from the IEEE Power and Energy Society.

RAKESH KUMAR recently received a three-year grant from Oracle Labs to collaborate with the company to research energy efficiency in multithreaded processors. He also received a three-year grant from Intel to explore innovative ways to disperse the power that computer chips use.

ZHI-PEI LIANG was named recipient of the 2012 Otto Schmitt Award from the International Federation for Medical and Biological Engineering and was elected to the International Academy for Medical and Biological Engineering.

The National Research Foundation of Korea recently granted DANIEL LIBERZON and Hyungbo Shim of Seoul National University a three-year grant to research and develop robust nonlinear observers.


Benjamin Kuo

Benjamin Kuo, 1930–2012

ECE Professor Emeritus BENJAMIN KUO (PhD '58), a pioneering educator in the field of automatic control, died June 12. He joined the University of Illinois in 1958. During his 31 years of teaching and research, he gained a reputation as one of the eminent scholars in the field. His book *Automatic Control Systems* was published in nine editions from 1962 to 2009 and remains one of the most widely read books in the field.


David Waltz

David Waltz, 1943–2012

DAVID WALTZ, a pioneer in the fields of computer vision and artificial intelligence, died on March 22. He was 68. At the time of his death, he was director of the Center for Computational Learning Systems at Columbia University.

Waltz received his PhD from MIT in 1972. He came to the University of Illinois and was a faculty member in ECE from 1973 to 1984, as well as a researcher in the Coordinated Science Lab.

Michael Loui

YI LU and ECE graduate student Qiaomin Xie recently won the Best Paper Award at the PERFORMANCE 2011 Conference.

MICHAEL LOUI has been named the new editor of the *Journal of Engineering Education*, the journal for the American Society for Engineering Education.

Sayan Mitra

Yi Lu

SAYAN MITRA has received a prestigious Young Investigator Award from the Air Force Office of Scientific Research.

DAVID NICOL is principal investigator for a new "Lablet" that will contribute broadly to the development of security science while leveraging Illinois' expertise in resiliency to cyber attacks.

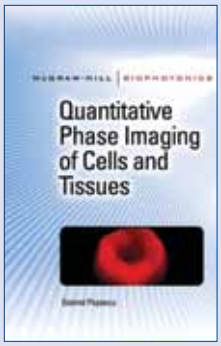
David Nicol

ERIC POP received a fellowship in the Center for Advanced Study. He will use the fellowship to continue research on the energy use and costs in society, and to write a book on energy dissipation.

Gabriel Popescu's book published

Gabriel Popescu

GABRIEL POPESCU has written *Quantitative Phase Imaging of Cells and Tissues* (McGraw-Hill, 2011), which discusses a new kind of microscopy that has been developing rapidly in recent years.



"The method is different from its older relatives because it's quantitative, as the name suggests. The word *phase* indicates that nanoscale information can be retrieved from biological structures," explained Popescu, a researcher in the Beckman Institute for Advanced Science and Technology.

The new method of microscopy covered in his book can visualize various transparent structures without labeling them with contrast agents, but, more importantly, can quantify thicknesses, volumes, and motions of cells and tissues. "If you quantify these images, then you're able to apply engineering signal processing and physics models—go beyond the pretty pictures and treat the images as signals, as information," Popescu said.

Tell Us How We're Doing

Within the next year, as ECE prepares for assessment by the Accreditation Board for Engineering and Technology (ABET), we'll be asking alumni who graduated in the last 10 years to rate our performance.

If you receive email from ECE directing you to an online survey assessing our performance with regard to the objectives and outcomes, please take a few minutes to complete the survey. Your feedback is vital to our continued success and improvement!

ECE has a long-established set of "program educational objectives" that reflect our uniqueness while conforming to ABET criteria. And periodically we check how we're doing by gathering input from alumni, students, faculty, employers, and other stakeholders. The four objectives are as follows:

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

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

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

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

These objectives are linked to a longer list of outcomes that describe more specifically what students are expected to know and be able to do by the time of graduation.

Grad student's work on phase-change memory wins two prestigious awards

By Reema Amin

ECE graduate student Feng Xiong won two prestigious awards in late 2011: the gold medal of the Taiwan Semiconductor Manufacturing Company (TSMC) Outstanding Student Research Award and the Best in Session Award at the Semiconductor Research Corporation (SRC) TECHCON 2011 conference in Austin, Texas.

The TSMC competition offered graduate students around the world a chance to present their research. Xiong first learned of the award through a colleague, Albert Liao, who had participated last year. Both Liao and Xiong have ECE Assistant Professor Eric Pop as their graduate adviser. Xiong said, "When they made the announcement of the next competition on the ECE website, Professor Pop suggested I should go for this award."

Feng Xiong

> "Right now, flash technology cannot be reduced in size or power because it is reaching its physical limitation. Unlike conventional semiconductor memories, this one-dimensional phase-change device actually stores memory as a change of resistivity."
>
> –Feng Xiong

The competition called for applicants to present their research from the past year. Xiong described his recent work that led to a 100-fold reduction in programming power of phase-change memory, a breakthrough that was published in and featured on the cover of *Science* magazine earlier this year. Such memory devices could potentially replace modern flash memory technology, as used in laptops or smartphones today.

There were four categories in the competition, and Xiong entered the Electronic Device, Process, and Patterning Technologies category. A panel of judges reviewed the submissions and chose the top six papers in each category. These finalists were invited to Taiwan to present their submissions to another panel of judges.

During his time in Taiwan, Xiong presented his work to the panel of judges. The suspense was kept until the end, because the participants did not find out their standings until the awards ceremony on the last day of the trip.

Xiong was pleased to learn that he won the top medal. "I was thrilled to win the gold!" he said. "I was a bit surprised because of the competition. Their research work was all very good, but at the same time, I also had confidence in my own work."

His confidence also received a boost at TECHCON, where he won a Best in Session Award. He received that award for his presentation on the same thesis project on low-power phase-change memory. About 440 people attended TECHCON 2011, with half from the semiconductor industry and half from academia.

"Right now, flash technology cannot be reduced in size or power because it is reaching its physical limitation," Xiong said. "Unlike conventional semiconductor memories, this one-dimensional phase-change device actually stores memory as a change of resistivity."

The phase-change memory bit has electrodes which are nanoscopic carbon nanotubes. Since the device is extremely small, its design allows for an extreme reduction of the programming power needed to write and erase the memory states.

Xiong credits Pop for initiating the idea. After the idea was born, a team of students led by Xiong implemented and improved the device design within the Micro and Nanotechnology Lab. They now also have two pending patents with the Office of Technology Management.

Pop, Xiong's adviser, has high praise for this work: "Feng's work has answered a big question in the semiconductor industry: How can we make low-power phase-change memory devices?" explained Pop. "Using carbon nanotubes as the tiniest electrodes—a few nanometers diameter—he was able to show that power can be reduced by a factor of one hundred versus the previous state of the art. Feng's work points the way forward for major companies like Intel, Samsung, and IBM, who are all interested in what the smallest and most efficient memory bits are."

Xiong remained modest about his accomplishments, but did mention the uniqueness of his work. "What I presented is pretty groundbreaking," he said.

ECE students experience Silicon Valley

By Heather Punke

Each year over winter break, some U of I students get the chance to mingle with successful entrepreneurs and alumni that call Silicon Valley home. That's all thanks to the Technology Entrepreneur Center (TEC), which hosts the trip.

In January 2012, 28 students went on the Silicon Valley Workshop weeklong trip. Eight of these students were ECE undergraduates from all four years of the program.

ECE alumnus Luke Nosek (center) was one of the many entrepreneurs students were able to meet on their trip to Silicon Valley.

Students traveled to California for one week. They visited 18 startup companies and even attended a networking party held by ECE alumnus Luke Nosek (BSCompE '96), a co-founder of PayPal and currently a partner at Founders Fund. Many of the attendees were inspired by talking to Nosek and noted the party as their favorite part of the trip.

Some of the startup offices had interesting cultures that made them stand out in the minds of students on the trip. A lot of the companies had pets in their offices, including dogs and rabbits. One of the offices even had a kegerator and DJ booth inside, which the students enjoyed seeing.

"It's a lot different from the 'regular' corporate environment that we're used to," Stephen Rice, a CompE junior who went on the trip, said during a panel about the TEC trip. He also noted that the employees said they sometimes work from 10 a.m. until 10 p.m., which he found exciting.

Most of the participating students were interested in having startups of their own and said they and their future companies benefited from the Silicon Valley experience. "We gained a lot of resources. If you need a developer, now you know someone on this trip can develop for you," said Rice.

"It was a good experience because you got personalized feedback," added Karan Uppal, an ECE senior who also participated in the trip and the panel. "You learn a lot from that and you come back and recreate or change your software and change your strategy."

Rice has been working on developing software for elementary school teachers since his older sister gave him the idea. "[The trip] changed my attitude towards starting a company," he said. "It pushed me into it."

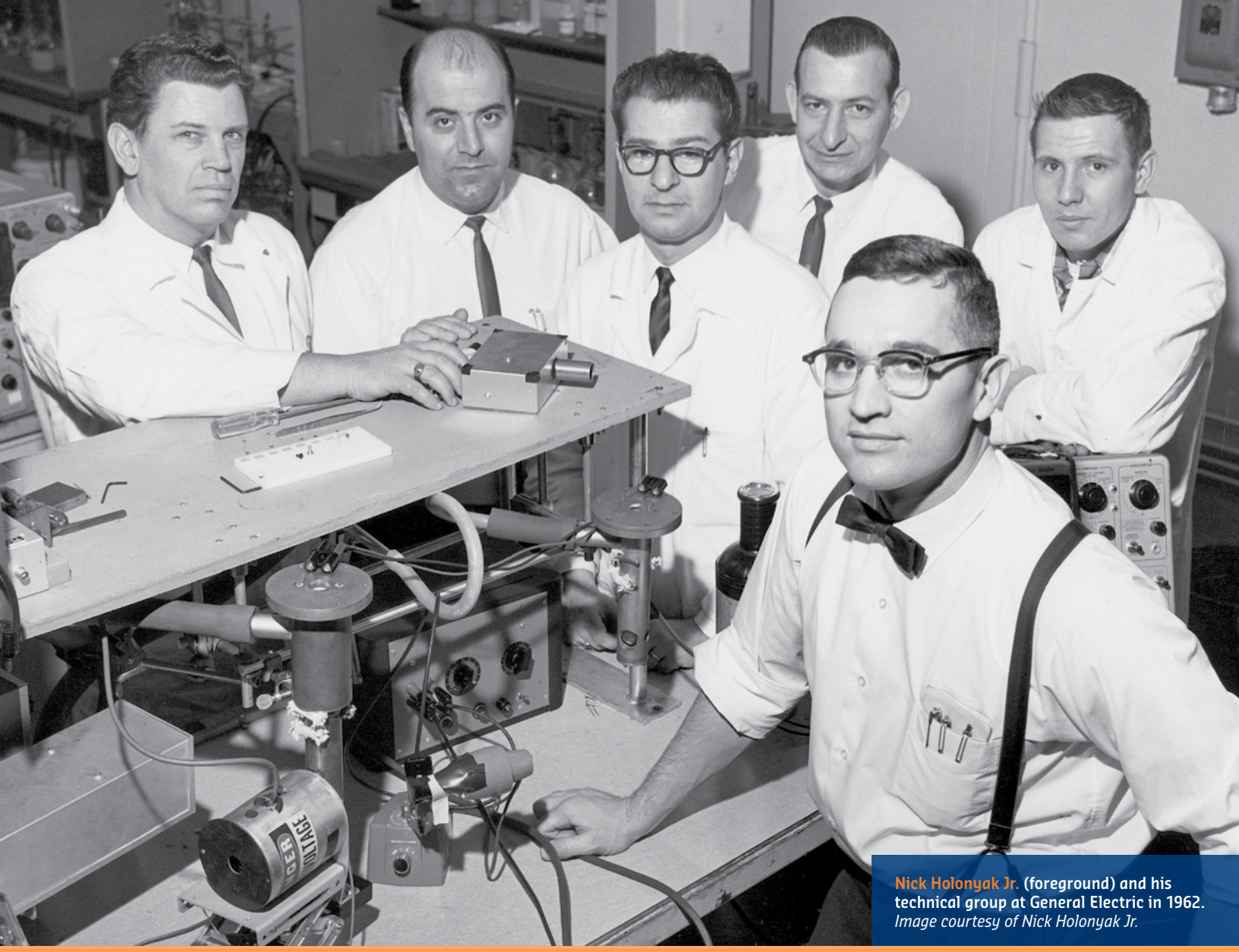
One of Rice's favorite parts of the experience was meeting Shawn Fanning, a co-founder of Napster and the new startup AirTime, on the roof of his new company. "He doesn't do a lot of media [interviews], so the fact that we got to talk to him was really special and really cool."

Uppal's favorite moment was a speech given on the last day of the trip by Industrial and Enterprise Systems Engineering alumnus Michael Callahan. "It really pumped me up to come back and really work on my startup and take it to the next level," he said.

Jed Taylor, the assistant director of TEC, said people in Silicon Valley are interested in meeting University of Illinois engineering students. "That's why the trip takes place."

Information on similar opportunities and programs sponsored by TEC can be found at **http://www.tec.illinois.edu.**

The Technology Entrepreneur Center at the University of Illinois took 28 Illinois students to Silicon Valley over the winter break for a weeklong workshop.



Nick Holonyak Jr. (foreground) and his technical group at General Electric in 1962. *Image courtesy of Nick Holonyak Jr.*

Nick Holonyak Jr.: Father of the visible LED

BY LAURA SCHMITT

On the afternoon of November 6, 2003, Nick Holonyak Jr., the son of an uneducated immigrant coal miner, stood in the East Room of the White House waiting to receive the National Medal of Technology from President George W. Bush. Perhaps he felt a sense of déjà vu. After all, 13 years earlier, Holonyak received the National Medal of Science from Bush's father in a White House ceremony. Only five other people have received both medals, which are the highest honors the president can bestow for attainment in science and technology.

This second trip to the White House was special to Holonyak for another reason. He was receiving the Technology Medal with M. George Craford and Russell Dupuis, both former students who had earned their doctorates under his supervision at Illinois. The three were honored for their contributions to developing and commercializing LED technology with applications to digital displays, consumer electronics, automotive lighting, traffic signals, and general illumination. Holonyak invented the world's first visible and practical semiconductor LED and laser in 1962 while at General Electric; Craford invented the world's first yellow LED and led subsequent R&D efforts that resulted in the highest-brightness LEDs; Dupuis developed a new crystal growth method—metal-organic chemical vapor deposition (MOCVD)—for making lasers and LEDs. Today, MOCVD dominates LED production.

"The semiconductor in the form of a p-n junction is an ultimate lamp," said Holonyak, referring to the engineered part of a semiconductor chip that emits light. "There's nothing more efficient." Interestingly, Holonyak knew that from the start, predicting in a 1963 *Reader's Digest* article that LEDs would someday replace Edison's incandescent bulb, which converts only 10 percent of its electricity into light, losing the other 90 percent as heat. An LED, on the other hand, can convert nearly all the electricity applied to it into light.

Because lighting accounts for about 20 percent of all electricity generated globally, the LED's efficiency will result in a marked decline in energy consumption. According to a recent government study, the adoption of LED lighting over 20 years in the United States alone (2010–2030) is expected to save 2,700 terawatt-hours of electricity, which translates into roughly $250 billion at today's energy prices. That's good news for consumers who today pay almost 30 percent more for electricity than they did just 10 years ago.

The savings will occur primarily as LEDs become the dominant form of lighting, replacing the inefficient incandescent bulb and its ill-fated successor, the compact fluorescent light (CFL), whose light quality, dimming capability, and longevity are inferior to LEDs.

Holonyak's 1962 invention was the byproduct of a competition among leading industrial research labs to create the first semiconductor laser. Unlike his competitors, who made their lasers, which could only generate infrared light, from conventional semiconductor material readily available at the time, Holonyak made his red laser from an unorthodox mixture of semiconductor materials of his own invention. He was certain that his alloy, made from gallium, arsenic, and phosphorus (GaAsP), would produce efficient and bright light, including laser light.

At the time, Holonyak endured criticism from his colleagues, who told him that an alloy could never make a reliable device. "They said I was nuts—an alloy is too hard to work with and its chemistry was all screwed up," said Holonyak. "They said I was just a stupid electrical engineer and no one in his right mind would have tried to make a crystal that way. They swore at me and in return I swore at them."

Although dim by today's standards, Holonyak's first red LED proved that an alloy could be used to make light-emitting devices. "I'm not a chemist or a metallurgist, but I made the alloy crystals myself because I couldn't get them—they didn't exist—and I needed and wanted them, and I had a way to do it," Holonyak said. "I followed my own notions on how to grow GaAsP and make red-spectrum p-n junctions."

According to Michael Krames, chief technology officer at LED startup Soraa, Holonyak created a roadmap that others would follow in achieving brighter and different color LEDs over the years. Today, all visible LEDs are made from a family of semiconductor alloys that Holonyak pioneered. In addition, Holonyak introduced a new laser design—the quantum well laser—in 1977 that would be used to make brighter and more efficient LEDs. "It's hard to really appreciate how momentous and impactful some of these breakthroughs were," said Krames, who earned his doctorate at Illinois under Holonyak's supervision in 1995. "They were huge. Back in his day, all of this stuff was completely unknown. It wasn't clear what to do until he and others showed the way."

Holonyak is the first to acknowledge that many researchers have played a role in advancing LED technology. "I feel privileged to have contributed a piece at the start of all of this, to an ultimate lamp, and to have had a core of talented students following me and leading the field in making high-brightness LEDs," Holonyak said. "It takes a lot of effort from a lot of people over a considerable time and nobody sitting in one place has all the answers. Science and technology comes about slowly, painfully."

Editor's note: This article is excerpted from Laura Schmitt's forthcoming book, *The Bright Stuff*.

In 1962, ECE Professor and University of Illinois alumnus Nick Holonyak Jr. invented the first practical visible-spectrum LED. The University of Illinois, College of Engineering, and Department of Electrical and Computer Engineering will celebrate Holonyak's invention and the work his colleagues, former students, and many others have done to develop the LED with the LED 50th Anniversary Symposium to be held October 24 and 25, 2012.

For information on the speakers and other activities related to the symposium, visit **LED50years.illinois.edu**.

Students launch a technical conference

By Heather Punke

A group of hardworking ECE students, led by ECE senior Ekta Shah, put together the department's first-ever technical conference in February—ECE Pulse: the Heartbeat of Innovation. Ten companies took part and more than 400 students registered for the event.

Shah, who has organized smaller ECE events in the past, learned a lot from this larger conference. "We felt like giving up many times," she said, because of the stresses and challenges involved with the planning.

Many students worked together to make ECE Pulse a successful technical conference. Front (from left): Le Wang, Éclair Gao, Ellen Wu, Ambika Srinath, Ekta Shah, Neha Shafizadah, Karmanya Aggarwal. Back: Dennis Yuan, Ankit Jain, Michael Driscoll, Ben Price, Suraj Malhotra, Gabriel Hruskovec, and Koushik Roy.

It was a three-day technical conference that included a technical competition, a keynote speaker, networking dinner, and eight tech talks. With Shah at the helm, the conference was a joint venture of IEEE, Women in Electrical and Computer Engineering (WECE), the ECE Student Advancement Committee (ECESAC), and Eta Kappa Nu (HKN).

When she started planning in December 2011, Shah had no idea the conference would grow to its final size and scope. However, she did know she wanted it to be different from the usual ECE events. "We wanted to [start] from scratch," she said.

Pulse became a successful technical conference that Shah and her team worked hard to promote. The conference had its own website (http://pulse.ece.illinois.edu) and Facebook page. ECE Department Head Andreas Cangellaris also sent out an email encouraging students to register. That took the number of registered members from around 125 to 300 in just one day. "That was really exciting. I called my team and asked them to track [the numbers] with me," Shah said. "We knew that things were working" after that.

Shah faced many challenges during planning for ECE Pulse. One of the big ones was scheduling the conference during spring semester. "Companies have an annual budget, and we missed the end of it," she said. Companies hadn't included this expense in their 2012 budget, and Shah said it was difficult to convince them to spend money. "That was the main challenge," she said.

Shah and her team showed the companies how prepared they were through the website and registration numbers, and reiterated what the companies would gain from participating in the conference. Eventually, 10 companies agreed to contribute money, time, or both to the project.

Michael Callahan, the inventor of the Audeo voice synthesizer and winner of the first-ever Lemelson-Illinois Student Prize, was the conference's keynote speaker. He discussed innovations in technology.

"That was really amazing," Shah said. "Everyone loved his speech. It was extremely motivating." Following the speech, the students and company representatives mingled during a networking dinner.

The next day of the conference had eight tech talks scheduled. "Students enjoyed the talks and asked a lot of questions," Shah said. ARM, Caterpillar, IBM, Infinera, NCSA, NVIDIA, Schlumberger, and Qualcomm all sent speakers. The event ended with a social mixer that night.

The participating companies said they enjoyed the experience, and Shah expects about 10 to 15 more companies will participate next year, bringing the total to around 25 companies.

In the end, Shah was pleased with how the conference turned out. "We got great feedback," she said. "I'm confident we have successfully laid a strong foundation for a new ECE tradition."

More information on ECE Pulse can be found at pulse.ece.illinois.edu.

Shenoy works to change solar power technology

By Heather Punke

ECE graduate student Pradeep Shenoy has an idea that could completely change how energy is converted from solar panels. Shenoy is focusing his efforts on solar energy. Photovoltaic panels need energy converters to connect the panel to the grid or load. These electronics attempt to maximize the power coming out of the panel. "Usually the power electronics process all the energy generated by the photovoltaic (PV) panel and lose energy in the process," Shenoy explained.

"We're able to get the maximum power out of each solar panel without having a cascaded energy conversion stage," Shenoy explained of his idea. "We're avoiding energy conversion for the most part and maximizing energy production through a technique called differential power processing."

Pradeep Shenoy

> "Usually the power electronics process all the energy generated by the photovoltaic (PV) panel and lose energy in the process. We're able to get the maximum power out of each solar panel without having a cascaded energy conversion stage."
>
> –Pradeep Shenoy

This is a huge change in energy conversion because it was not aimed at attempting to improve converter efficiency. "We're taking a system-level perspective," he said. "How can we, from a system level, make improvements?"

Making these system-level adjustments can have a major impact on the future of solar energy. "What this helps is to increase the overall life of the PV system, make it a lot cheaper, and also get the benefit of maximizing power production without having this energy conversion overhead," Shenoy explained.

The technology is licensed to SolarBridge Technologies, a University startup that makes solar power converters. Shenoy's adviser, Professor Philip Krien, is one of the founders of SolarBridge Technologies.

For his ingenuity, Shenoy was named one of five finalists for the 2012 Lemelson-MIT Illinois Student Prize. The prize is awarded annually to a senior 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 Technology Entrepreneurial Center (TEC) website.

Shenoy said it was an honor to be considered for the award. "It's a pretty prestigious award and it's great to be a finalist, and for the work that I've done to be considered interesting enough to be worthy of a prize like that," he said.

Shenoy was not the overall winner of the Lemelson-MIT prize. That honor went to Kevin Karsch, a doctoral student in Computer Science who developed a technique for inserting objects and special effects into photos and videos without taking physical measurements of the scene.

Not only did this idea earn Shenoy a finalist position for the student prize, but SolarBridge Technologies was awarded a $1.75 million ARPA-E grant from the U.S. Department of Energy's SunShot Initiative in order to commercialize the technology.

Shenoy said Professor Krien was a "fantastic" adviser. "He encouraged me in this idea," he said. "He knows not only the details of the project, but also how it fits in the bigger picture."

Along with Krien, Shenoy said some ECE graduate students have helped him along with his idea. Brian Johnson and Katherine Kim have been Shenoy's two main supporters. "We have a good team," Shenoy said.

After graduation, Shenoy will work at Texas Instrument's Kilby Lab (named for ECE alumnus Jack Kilby [BSEE '47]), their advanced research and development lab. "I really enjoy hands-on engineering," he said, but might consider becoming a professor further down the line.

ECE alumni really go places

By Reema Amin and Heather Punke

It is said that a degree from ECE ILLINOIS can really take you places. However, there are some places you can go that do not require the technology knowledge ECE provides. In fact, there are some places that are best traveled using the least amount of technology. Two ECE alumni recently traveled in two different directions to experience the United States of America.

Paul Bragiel

Bragiel canoes the Mississippi

Paul Bragiel (BSCompE '99) used his vacation time from his work as managing partner at I/O Ventures in San Francisco to travel the entire length of the Mississippi River by canoe with his brothers.

Bragiel and his brothers have always loved adventures. He said that they have traveled a lot together, including through Siberia. This trip was just another adventure. "We do a lot of this stuff," Bragiel said. "It was somewhat planned, but not completely. We've been wanting to do this for a long time."

Before the trip, Bragiel said the three brothers had only about four days of canoeing experience between them, so the trip was a dive into the unknown. The plan was to start at the northernmost tip of the Mississippi and canoe through the southern states, down to the Gulf of Mexico.

The trip took 61 days. Bragiel and his brothers woke up every morning between 4:30 and 6 a.m. to begin their daylong journey down the river. "The first week, you're pretty much in wilderness," Bragiel said. "You could touch the river with both your hands, go through cool forests, even see eagles and other animals."

Bragiel and his brothers stayed indoors only 10 out of the 61 nights they were on the river. "There were stretches that we went nine days without taking showers," said Bragiel. "It was mostly roughing it."

Bragiel said there were definitely some "hiccups" throughout the trip. In the middle of the journey, both Bragiel and one of his brothers sought medical attention for different illnesses. And without having a comfortable place to rest, these events made the trip much harder.

"You feel like quitting," Bragiel said. "But my brothers and I are stubborn guys. We try to do everything to get it completed."

When the trip was complete, Bragiel was happy with the outcome. "You do trips like this and you find out that America is really cool," he said. "We have a lot of political disagreements, but you really see the good side of America."

Kohlrus bikes across the country

Karl Kohlrus (right) and Deeanna Shidler

Karl Kohlrus (BSEE '79) pedaled his way through what had been his "number one bucket-list item for 20 years" last year—he successfully completed a 3,058-mile-long biking trip across the USA. "I said years ago, 'When I retire, I'm going to ride across the country,'" he said. "It was a fulfillment of a goal from decades past."

Backed by Kohlrus's wife, Christine, as the support-car driver, Kohlrus and his biking partner, Deeanna Shidler, biked from Kyle, Texas, to St. Augustine, Florida, in late January and early February 2011. In October 2011, they biked from San Diego, California, back to Kyle, Texas. Shidler had to be in Florida in February for a cruise, so the pair broke the trip into those two legs.

Each leg of the trip lasted about a month, and Kohlrus and Shidler biked around 50 miles each day. One of the traditions for cross-country bikers is to dip the bike's back wheel in the Pacific Ocean before you depart, and dip the front wheel in the Atlantic Ocean when you reach it. "We each dipped our front wheel in the Atlantic Ocean even though we were only half done. We were just celebrating because we had completed a big part of the journey."

They set off again in the fall of 2011 on the western half of the trip after each dipped their back tire in the Pacific. The second half of the journey was more interesting than the first, according to Kohlrus. In fact, that portion of the trip contained his favorite route of his whole biking career. "There was a big downhill that lasted for 10 miles" in California and they "basically coasted without pedaling for 10 miles" he said. "It was just the most exhilarating and fun ride of my entire life because it was gorgeous scenery, it was no work, and you could just enjoy it."

ECE alumnus makes strides in LED lighting

By Heather Punke

Mike Krames (PhD '95) got in on the ground floor of a startup company that is aiming to revolutionize lighting. He is chief technology officer for Soraa, a company founded in 2008 that is changing how LED (light-emitting diode) lighting products are made and used. Krames joined the company in 2009.

Mike Krames

Before he joined Soraa, Krames worked at Hewlett-Packard's Optoelectronics Division in Silicon Valley, and then formed and ran the Advanced Laboratories of Lumileds Lighting, an LED-lighting joint venture between Philips and HP, for almost 10 years.

He left that position because he "was really excited about the next big wave of technology in LEDs and lasers." While he was working at Lumileds, he had become removed from laser technology. "My PhD work was in laser diodes and my adviser, Nick Holonyak Jr., was the inventor of the first visible-spectrum laser diode, so I had kind of a warm spot for that and I was excited to get back to [it]," Krames explained.

Another reason Krames was excited to join Soraa was their work on developing the "next generation" of gallium nitride (GaN) based LEDs for lighting applications. Currently, most GaN-based LEDs utilize a foreign substrate, such as sapphire, as their material platform. Soraa is developing "GaN on GaN" technology, which uses gallium nitride as a substrate material. That is the same material used in the epitaxial active layers of the diode.

"For semiconductor devices, any time you have active layers of a material system alien to that of the substrate you're putting the material down on, it can cause all kinds of problems," Krames said. With Soraa's technology, the substrate platform and the active layers are both made of GaN. This leads to improved power-density performance and reliability of the devices, as well as simplified materials processing and lower costs.

"[They] will be higher performing and lower cost, which is what we need for widespread adoption of solid state-lighting technology," he said. "LEDs are much more efficient than conventional lighting, so this has a chance to have a huge impact on energy savings and carbon emission reduction for the nation."

Besides the technology, Krames said he enjoys being with the new company for other reasons. "The most exciting thing is building a company from the ground up," he said. "We were still very small when I joined, and I've been personally involved in building the team."

Krames said his education from ECE ILLINOIS has helped him in his career. "In my experience, it has a great system to develop in-depth understanding and hands-on work simultaneously," he said. The powerful duo of hands-on work and classroom learning has been key in Krames career. "The combination really lets you hit the ground running after graduation," he said.

Krames said he is particularly proud of his work in advancing understanding of "LED droop," a phenomenon that causes lower efficiency in GaN-based LEDs when current density is increased. He was recently interviewed for a *New York Times* article on the topic.

When he is not busy at Soraa, Krames enjoys spending time with his three children. He said he doesn't have time for many hobbies—most of his time is spent at Soraa, but he's all right with that. "It's a lot of work, a lot of long hours, and we still have a long way to go, but it continues to be very exciting."

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Raj Mittra to be honored by his students with named room in new ECE building

By Tom Moone

ECE Professor Emeritus Raj Mittra taught at the University of Illinois for nearly 40 years. During that time, he supervised 80 PhD dissertations and 76 master's theses. To honor his legacy as a researcher and a mentor, a number of former students are seeking to name a space in the new ECE building for Mittra.

Raj Mittra

> "I consider him one of the giants in ECE ILLINOIS history. He was one of the computational electromagnetics pioneers, as well as in scattering problems. When you start looking at the students he produced and at what those students have done, that's the broader impact."
>
> –ECE Professor Jose Schutte-Aine

The campaign was formally launched at a dinner held in Mittra's honor on July 10 in Chicago as part of the 2012 Antennas and Propagation Society meeting.

Mittra is a leading authority in the area of electromagnetic communications and is widely recognized as one of the first to see the potential for using computers to solve large-scale problems in electromagnetics.

"I consider him one of the giants in ECE ILLINOIS history," said ECE Professor Jose Schutt-Aine, who put the campaign in motion and who was one of Mittra's students. "He was one of the computational electromagnetics pioneers, as well as in scattering problems."

But Schutt-Aine sees Mittra's impact as an adviser and mentor as significant as his research contributions. "When you start looking at the students he produced and at what those students have done, that's the broader impact," said Schutt-Aine.

Mittra is turning 80 this year, and Schutt-Aine and several other students of Mittra's thought this presented a good opportunity to develop a campaign to honor their mentor. They hope to contact many of the graduate students Mittra supervised, as well as many of the post-doctoral researchers who worked in his lab, to contribute to this campaign.

As Mittra impacted their lives, so can these alumni impact the lives of future students. "I think this is a unique opportunity," said Schutt-Aine. "It's amazing to see how much influence this place has on alumni's careers. This is a way for them to recognize it by giving something to the next generation of students."

One such alumnus who was an early and enthusiastic participant in this campaign is Larry Nixon (BSEE '65, MSEE '66), who works as a patent attorney in Washington, DC. As an undergraduate in the early sixties, Nixon worked in the Antenna Lab and spent a lot of time on projects for Mittra. "I was programming the IBM 7090 to simulate various electromagnetic issues: structures, antennas, other things—basically solving Maxwell's equations the old-fashioned way," said Nixon.

For Nixon, this campaign was a good fit. "I had been looking for an appropriate opportunity to make a donation to the University," he said. "He made an impression on me when I was a young fellow, actually in undergraduate school as well as graduate school there. He was a mentor."

Nixon stayed to receive a master's degree from Illinois in electrical engineering. Although ECE Professor Emeritus Paul Klock was Nixon's thesis adviser, he remained close to Mittra. In fact, both Mittra and Klock attended Nixon's wedding reception in 1966.

"His door was always open. He was very friendly, very easy to talk to, and very helpful. He's had an impact on a whole lot of people," said Nixon. "But the impact of Professors Klock and Mittra on me, and the impact of many others of my EE professors at the University of Illinois on my professional life are actually continuing to this day."

Contributions are now being accepted for this campaign. If you would like to help provide future ECE students with a state-of-the art learning facility and honor Raj Mittra in the process, please contact Beth Katsinas, ECE director of advancement at katsinas@illinois.edu.

In many ways, running a large enterprise is like debugging code or testing a new system. You determine an initial approach, set some breakpoints, monitor the execution, and react to what happens next. Rather than settling for reduced functionality, a good developer keeps reviewing and revising until the desired features work as expected. It seems to me that an analytical engineering or scientific approach can serve a leader well in running a business, university, or other enterprise, just as it is effective when solving a technical challenge.

As you may have heard, the leadership of our University system has been the focus of many debates and has recently undergone many changes, but the spirit and resourcefulness of our faculty have enabled the University to emerge from these challenges even stronger than before. The faculty and staff of the ECE Department took a critical, vocal role in ensuring that our University system has top-notch, passionate leadership that cares about the unique value of all of our campuses, even if it meant a change in that leadership was necessary.

Our faculty cares about our students and the reputation of our department and is not hesitant to act if that world-renowned reputation is threatened. As an alumnus, I'm honored to support our department, our college, and our University, and I encourage all alumni to do the same. Each of us can support our department in a variety of ways. For example, many opportunities exist to come speak to students on campus, support research in the department, mentor students, and help build the new ECE building.

As the new home of ECE rises in the shadow of Beckman on the north campus, there is still much work to be done and ample opportunities to help through donations to the Building Campaign for ECE ILLINOIS. We have made great progress toward our fundraising goal and are now in the home stretch. Please check out the progress of both building construction and fundraising at **www.ece.illinois.edu/buildingcampaign**, and help us do our bit to allow the department to provide top-notch education to future electrical and computer engineers, and to conduct cutting-edge research in a modern, flexible, and innovative environment.

Sincerely,

Christopher N. George (BS CompE '97, MSEE '99, JD '02)
ECE Alumni Association
Board of Directors President

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ECE recognizes outstanding alumni achievement

On September 16, 2011, ECE recognized seven recipients of its alumni awards.

Distinguished Alumni Award recipients (from left): Joel Emer, Gordon Day, Thomas J. J. Starr, and Frederick Kish.

Distinguished Alumni Award

The Distinguished Alumni Award honors Department of Electrical and Computer Engineering alumni who have made professional and technical contributions that bring distinction to themselves, the department, and the University.

GORDON DAY (BSEE '66, MSEE '67, PhD '70) was recognized for "research contributions and leadership in metrology for the optoelectronics industry and service to the electrical engineering profession."

Day is the president of IEEE. He spent most of his career in research and management at the National Institute of Standards and Technology (NIST), where he founded and led the Optoelectronics Division. Since leaving NIST in 2003, he has focused primarily on science and technology policy. He has served as director of government relations for the Optoelectronics Industry Development Association. He is a fellow of IEEE, American Association for the Advancement of Science, the Optical Society of America (OSA), and the Institute of Physics (UK).

JOEL EMER (PhD '79) was recognized for "advancing the art of performance-modeling and measurement of microarchitectures and for contributions to the design of leading-edge microprocessors."

Emer is an Intel fellow and director of microarchitecture research at Intel in Hudson, Massachusetts. He is also an adjunct professor in computer science at the Massachusetts Institute of Technology. His research includes pioneering efforts in simultaneous multithreading, a technology now widely used in microprocessors. He is a fellow of both ACM and IEEE. In 2009, he was the recipient of the Eckert-Mauchly Award, which recognizes contributions in computer architecture.

FREDERICK A. KISH, JR. (BSEE '88, MSEE '89, PhD '92) was cited for "the development of high-brightness LEDs and for leadership in the commercialization of photonic integrated circuits."

Kish is senior vice president of Infinera Corporation, which he joined in 2001. There, he co-invented and led the effort to research, develop, and commercialize the first practical large-scale photonic integrated circuits. The large-scale PICs are at the core of Infinera's optical network products. Prior to Infinera, he was at Hewlett-Packard and Agilent. Kish is a fellow of the OSA and IEEE. His awards include the IEEE David Sarnoff Award, the IEEE LEOS Engineering Achievement Award, the OSA Adolph Lomb Award, the International Symposium on Compound Semiconductors Young Scientist Award, and the ECE Young Alumni Achievement Award, the R. T. Chien Award, and the E. C. Jordan Award from ECE ILLINOIS. He has co-authored more than 100 U.S. patents and 60 peer-reviewed publications.

THOMAS J. J. STARR (BSCompE '75, MS Computer Science '76) was recognized for "exceptional vision, leadership, and numerous technical contributions enabling the creation of ubiquitous broadband network access."

Starr serves as a lead member of technical staff at the AT&T in Hoffman Estates, Illinois. He is responsible for the development and standardization of broadband access and home-networking technologies for AT&T's network.

He serves as chairman of the Broadband Forum, a telecommunications industry association of

200 companies worldwide, and has also served as a member of the board of directors from its inception as the ADSL Forum in 1994.

In 2011, he was elected to the HomeGrid Forum's board of directors, where home-networking technology is developed. He holds 20 U.S. patents in the field of telecommunications.

Young Alumni Achievement Award recipients: Manish Goel (left) and Luke Nosek.

Young Alumni Achievement Award

The Young Alumni Achievement Award recognizes alumni less than 40 years old who have made outstanding professional contributions to their field.

MANISH GOEL (MSEE '97, PhD '00) was recognized for "work in the development, implementation, and commercialization of low-power wireless communication technologies."

A senior member of the technical staff at Texas Instruments, Goel was a founding manager of the VLSI Signal Processing team in the Systems and Applications R&D center. Currently, this team is involved in several innovative projects in the areas of low-power VLSI, DSP architectures, digital baseband modem design, security, and power management. Goel holds 19 U.S. patents.

LUKE NOSEK (BSCompE '96) was recognized for "visionary innovation and outstanding leadership in developing and supporting web and high-technology enterprises."

Nosek is currently chairman of Halcyon Molecular in Redwood City, California. In 1998, he co-founded PayPal and served as its vice president of marketing. In 2005, he co-founded Founders Fund, where he remains a managing partner. There, Nosek was the initial architect of the "founder-friendly" strategy, and later built Founders Fund's biotechnology practice from scratch. In 2009, he joined Halcyon Molecular, a Founders Fund portfolio company pursuing a novel approach to ultra-fast complete genome sequencing.

Marcia Peterman Award

The Marcia Peterman Award was established by the Electrical and Computer Engineering Alumni Association to honor the memory of Marcia Peterman, longtime secretary of the Association. This award is presented annually to a former ECE Alumni Board member for dedicated service as a member of the board.

SHEREL HORSLEY (BSEE '64, MSEE '65) received the Marcia Peterman Award "in recognition of devoted and loyal service to the University of Illinois and the Alumni Association." Horsley retired from Texas Instruments in December 2000 after more than 35 years with the company.

Sherel Horsley

Horsley has served as vice chairman of the Electronic Industries Alliance (EIA) and as a member of the EIA Board of Governors and Executive Committee. He is a past board member of the Consumer Electronics Association. Horsley is past president of the ECE Alumni Board, past board chairman of Junior Achievement of Dallas, and past president of the Dallas British American Commerce Association.

ECE alumnus creates a Bonding experience for EOH

By Tom Moone

"Other people wanted to be Bond. I wanted to be Q," said ECE alumnus Michael VanBlaricum (BSEE '72, MSEE '74, PhD '76).

A longtime collector and fan of Ian Fleming and his literary creation, VanBlaricum, in conjunction with The Ian Fleming Foundation, brought three vehicles that had been used in James Bond films to the 2012 Engineering Open House (EOH).

The vehicles on display included the Q Boat, which was built specifically for use in the film *The World Is Not Enough*. The boat was driven by James Bond in the film and performed a barrel roll on the Thames. In addition, he brought in an augmented Jaguar and Ski-Doo that were used in the film *Die Another Day*.

VanBlaricum has been a fan of James Bond and Ian Fleming since he first saw *Goldfinger* when he was 14. But it was not the exploits of the international agent that caught VanBlaricum's imagination. "I fell in love with Q and all of the gadgetry," said VanBlaricum. "Q was the engineer, and I wanted to be an engineer."

After seeing the film, VanBlaricum began reading the novels, and he was hooked. Then, as VanBlaricum said, "The collector gene kicked in." He began his collection with first editions, later adding manuscripts and other ephemera. The move to collecting movie props was a bit of an accident. Someone in the film industry who knew of VanBlaricum's interest called to tell him that the Neptune submarine from the 1981 James Bond film *For Your Eyes Only* was available, and asked if he would be interested in it.

In 1992, he became one of three co-founders of The Ian Fleming Foundation, and he is currently president of that organization. The nonprofit foundation is dedicated to preserving all things dealing with the life of Ian Fleming, as well as his creation, James Bond. The foundation currently owns 34 vehicles that were used in the films.

VanBlaricum decided to bring these three vehicles to EOH because he has long been a supporter of the event. In 1972, VanBlaricum and Pam Calvetti, who later became his wife (and was the first female PhD recipient from the Department of Aeronautical and Astronautical Engineering), were directors of that year's EOH. EOH had seen waning attendance in years prior to that, and the students knew they needed something to bring people in.

They were able to obtain a moon rock from NASA to display at EOH. That year, rather than the 3,000 attendees they had seen in previous years, there were 20,000 people lined up to see the moon rock.

Michael VanBlaricum with the Jaguar used in the James Bond *Die Another Day* film.

When talking to students about this year's event, VanBlaricum realized he could bring together two of his passions—EOH and Ian Fleming. The focus of his display is on Q and the engineering that goes into the gadgets for both the hero and the villains of the Bond books and films. It was particularly appropriate to bring the film items as 2012 marks the 50th anniversary of the first James Bond film, *Dr. No*.

In his day job, VanBlaricum works at Toyon Research Corporation in Goleta, California. Toyon is a company involved in technology development and defense-systems analysis. He also serves as a member of the ECE Alumni Board.

Of Ian Fleming and his literary output, VanBlaricum said, "They are great books. They're 200-page thrillers that are written by a journalist who was the deputy to the director of naval intelligence in World War II. So he knew what he was doing and wrote some fantastic stuff."

Alumna Jennifer Sterling receives University of Illinois Constituent Leadership Award

By Tom Moone

ECE alumna Jennifer Sterling (BSEE '89, MSEE '90) was the 2011 recipient of the University of Illinois Constituent Leadership Award. The award is given for "extraordinary service through leadership in the Department of Electrical and Computer Engineering Alumni Association." She received the award during the ECE Alumni Awards Banquet on September 16, 2011.

Jennifer Sterling and her husband, John Prueitt.

The award was established in 1984 by the University of Illinois Alumni Association to recognize alumni who have "demonstrated extraordinary leadership and/or special efforts in the organization, management, and support of a constituent alumni association (college, school, or department alumni association)," according to the Alumni Association website.

"I'm absolutely honored and completely humbled," said Sterling. "I don't really do what I do in the hopes of winning any award. So, it's very humbling."

Sterling is the director of transmission strategy and compliance for Exelon Corporation. Prior to assuming her present position in January 2007, she served as Exelon's director of transmission planning. She has also held positions in ComEd's System Planning, Bulk Power Operations, Transmission Policy and Regulatory & Strategic Services departments. She joined ComEd in 1990 and continued on with Exelon following the merger of ComEd's parent company, Unicom, with PECO in 2001.

Sterling has had a long history of service to the ECE Department. She served on the ECE Alumni Board from 1997–2005 and served as treasurer during 2003–2005. After leaving the ECE board, she served on the University of Illinois Alumni Association's Constituent Management Committee. There she helped establish best practices for the various unit-level alumni bodies throughout the University of Illinois system.

One of the events for which Sterling is most known—and something she's been doing for nearly 10 years—is organizing the annual ECE Freshman Calling Program. Every summer, a group of ECE alumni make phone calls to every incoming ECE student to welcome him or her to the department and University, and to answer any questions that the student may have.

During the summer of 2011, more than 20 alumni took part. Many participants have done this for several years. "I don't know if they look forward to or dread my yearly emails to ask them to continue, but they always continue," said Sterling.

The goal of the program is to extend a welcome to each incoming freshman and transfer student. "We really want to make sure they feel welcome and a part of ECE immediately," said Sterling.

Sterling sees the program as having a positive impact on the incoming students. "It's good to make sure students feel welcome and to make sure they have what they need to be successful right off the bat," said Sterling. "I feel we're doing a good service for the freshmen."

Sterling is a 2005 recipient of the Orange and Blue Appreciation Award. In 2006, she received the ECE Marcia Peterman Award. *(See Alumni Award story on page 26.)*

Volunteers for the calling program are always welcome. To find out more, contact Sarah Heier, alumni relations coordinator at heier@illinois.edu.

1960s

JOE OWENS (BSEE '61, MSEE '63) and his wife, Nancy, established the Nancy and Joe Owens Opportunity Fund, which provides scholarships for incoming African-American high school students through Santa Monica College in 2006. They have started a similar fund for continuing African-American students.

BOB VALLENI (PhD '69) was featured in an article in *The Sun* in Arizona. He is currently an associate professor of physics at Arizona Western College.

1970s

PETER CHU (MSEE '76) was named a Polycom fellow. Chu is the director of the Polycom Burlington Media Labs.

SUUPRIYO DATTA (PhD '79) was elected to the National Academy of Engineering. He has been a professor at Purdue University since 1981.

JOHN DAY (BSEE '70, MSEE '76) was the keynote speaker at the Science Foundation Ireland summit in Athlone in 2011.

ALAN KELLEY (BSEE '74) was appointed the president and COO of Midwest Energy Emissions Corp. Prior to that, Kelley was president and CEO of Grand Bahama Power Company.

F. THOMAS VOLTAGGIO (BSEE '74) was named a director at PositivEnergy Practice LLC. He is responsible for the design and construction administration of electrical systems.

1980s

PRITH BANERJEE (MSEE '82, PhD '84) was appointed the chief technology officer at ABB. Previously, he was the senior vice president of research and director of HP Labs at Hewlett-Packard.

PER ENGE (PhD '83) was appointed as the chief technical adviser to the CEO of Polaris Wireless. Enge is a professor at Stanford University.

MARC LEVITT (MSEE '89, PhD '90) was profiled in the September 1, 2011, issue of *Futures* magazine.

LAURIE MORVAN (BSEE '84) is an established blues artist. She released her fifth album, *Breathe Deep*, in June 2011.

IKHLAQ SIDHU (BSEE '88) was named venture adviser at ONSET Ventures. He is the founding director of the Center for Entrepreneurship and Technology at the College of Engineering at UC Berkeley.

MIKE VERDEYEN (BSEE '89) joined IBS as chief technology officer. Previously, Verdeyen was at RedPrairie.

JOSEPH HANLEY (BSEE '89) was promoted to senior vice president of technology, services, and strategy at Telephone and Data Systems, Inc. He has been with the company since 1988.

JOHN WHYTE (BSEE '82) was named senior vice president of global solutions for Trillium Solutions Group. Previously, he held positions with Recon Optical, RR Donnelley, Planetasia GCI, and IBS.

1990s

ERIC CHAMBERLAIN (BSCompE '97) joined ArcTouch Inc., a San Francisco-based mobile applications development firm, as a senior mobile engineer.

GREG GOFF (BSEE '93) joined Morningstar, Inc. as its chief technology officer in October of 2011.

ARAM LULLA (BSEE '95) was named the new general manager of the Human Resources Practice Group of Lucas Group. Lulla joined Lucas Group in 2009.

2000s

SANKALP ACHARYA (BSEE '00) is a senior software engineer at Socialware in Austin, Texas. He was interviewed for an article in the September 19, 2011, issue of the *Austin American Statesman*.

ROBERT S. BALOG, JR. (MSEE '02, PhD '06) received the 2011 Rutgers School of Engineering Award. He is an assistant professor in the Department of Electrical and Computer Engineering at Texas A&M University.

PUNEET GUPTA (BSEE '09) was part of the staff that worked on applications for the Blackberry Curve 9350 and 9370, which were launched in 2011.

VINCE LEUNG (BSCompE '00) co-founded MentorMob with Kris Chinosorn (Biology '02) in 2011. The website (MentorMob.com) aims to aggregate content on virtually any subject in order to create step-by-step how-to courses.

IN MEMORIUM

STANLEY MADER (BSEE '35) died September 12, 2011. He served four years in the United States Signal Corps as a captain.

WALTER BIGGER (BSEE '36) died February 5. He worked for Collins Radio until he opened his own business. He was the leader of the windmill theory in the U.S. Bigger also worked for the Navy Department.

PAUL GRAY (BSEE '36, MSEE '39) died September 3, 2011. He served in the Army in World War II and retired a lieutenant colonel. He taught electrical engineering at Michigan State University and worked at the Michigan Highway Department (Michigan Department of Transportation).

RALPH BURTON (BSEE '40) died on October 12, 2011. He served in the Army in World War II. Burton worked at Schlumberger Technology for many years.

THOMAS SHEDD (BSEE '40) passed away in June 2011. He worked on a railroad detector car for the Association of American Railroads for more than nine years. Shedd then worked at *Modern Railroads*, where he served as editor-in-chief.

JOHN SCHUDER (BSEE '43) died. He was a faculty member at Purdue, Doane College, the University of Pennsylvania, and was in the Department of Surgery at the University of Missouri.

ISIDORE GLICKER (BSEE '47) died September 10, 2011. He served in the Navy as an electronics technician before attending college. After college, he worked in steel mills, construction, and engineering consulting.

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
56 Everitt Laboratory
1406 W. Green St.
Urbana, IL 61801

EVERETT H. "FRITZ" EHRHART (BSEE '48) died October 8, 2011. He served in World War II in the Navy. He worked as an electrical engineer for many companies before he started work at BellSouth. Ehrhart was a deacon for many years and was a Christian missionary in the Ukraine and India.

ROBERT E. AHLGREN (BSEE '50) died January 3. He served in the 101st Airborne Division in the Army. He worked at CILCO and retired in 1985 as assistant vice president of Energy Supply. After he retired, Ahlgren owned and operated The End of the Line Sandwich Shop and TOYS-n-MORE.

HARRINGTON BREARLEY, JR. (MSEE '50, PhD '54) died August 26, 2011. He served as a communications officer in the Navy on the USS Taconic. After graduating from Illinois, he worked at General Electric. He joined the ECE ILLINOIS faculty in 1959 and moved to Iowa State University in 1965.

DANTE CASOLARI (BSEE '50) died August 31, 2011. He served in the Navy during World War II and received the Bronze Star Medal for his service. He started his electrical engineering career at Kimberly-Clark Corporation, and also worked at Fiberboard paper and Crown Zellerbach Corporation. He also worked at University of California–Santa Cruz.

WENDELL R. DUNNING (BSEE '50) died on August 5, 2011. He worked for IBM for 36 years.

JOHN G. KNOX (BSEE '50) died August 8, 2011. He founded Nafisco Inc. in 1954 and ran the company until his retirement in 2005.

RALPH P. ARENS (BSEE '51) died August 5, 2011. He served in the Navy in World War II. Arens worked for Rockwell Collins for 30 years after graduating.

RICHARD R. FAULLIN (BS '51) died August 1, 2011. He served in the U.S. Army of Occupation after World War II. He was then a sales engineer for General Electric for more than 30 years.

ARTHUR W. REYNOLDS (BSEE '51) died October 7, 2011. He served as a medic during World War II and was a registered engineer in Illinois and Indiana.

WALDO BERTONI (MSEE '52) died October 8, 2011. He was a graduate of West Point and a commissioned second lieutenant. He also was a graduate of the Industrial College of the Armed Forces and retired from the U.S. Air Force in 1977.

RONALD GEILER (BSEE '52) passed away in August 2011. He served in the Army Air Corps and the Air National Guard. He also was a radar operator and researcher at Control Systems Labs and later the Syracuse University Research Corp. Geiler later used his flying experience to become an airline pilot.

MIN LI (MICHAEL) LEE (MSEE '53) died September 13, 2011. He volunteered in the Taiwanese Air Force. He worked at the Taiwan Power Company and eventually helped build the first research nuclear reactor in Taiwan. He then joined Con Edison in New York City.

E. J. "BARNEY" HAGIN (MSEE '54, PhD '56) died in December 2011. He was an Air Force World War II veteran and a career officer. Hagin was on the original faculty of the United States Air Force Academy.

WILLIAM NICKEL (BSEE '54) died January 24. He was a member of ROCT during college. After graduation, he worked for Douglas Aircraft Company, and then served in the Air Force for two years. Nickel joined Recon Optical in 1966 and worked there until 1985, when he was transferred to Electro Dynamics. He retired in 1996.

RICHARD BERARD (BSEE '56) died March 12, 2011. He worked for Aerojet, General Dynamics, and the Naval Civil Service.

ROBERT MURPHY (BSEE '56) died August 22, 2011 in Lincoln, CA.

ROLLEN EASTER (BSEE '57) died September 16, 2011. He worked as an electrical engineer at Caterpillar for 30 years.

E. LARRY HEACOCK (BSEE '57, MSEE '66) died February 4. He was a weather officer in the Air Force and helped develop the nation's weather satellites and ground systems. He then worked for the European Space Agency. After returning to the states, Heacock worked at the National Oceanic and Atmospheric Administration (NOAA). He finished his career at World Meteorological Organization in Switzerland.

HUBERT E. (HUGH) CARLSON (BSEE '58) died October 27, 2011. He served in the Air Force after high school and was a staff sergeant stationed in Biloxi, Mississippi, as a radar instructor during the Korean War. He then attended the University of Illinois and became a communications engineer for the Eastern Division of CIPS. Later, he became a Scada System Engineer. He loved football and basketball.

WINSLOW COPE (BSEE '59) died September 19, 2011. He served in the Air Force for four years. He also worked at Collins Radio and Motorola Inc.

DONALD LACY (BSEE '59, MSEE '61) died September 25, 2011. He held engineering management positions at Western Digital, Digital Equipment, and Rockwell International. Lacy also taught computer science at universities and community colleges.

ROBERT ROY ANDERSON (BSEE '60, MSEE '61) died January 7. He served in the Navy as a radar operator, and then worked as an electrical engineer at Rockwell Collins for 31 years.

CLARENCE "CAL" HANSEN (BSEE '61) died September 16, 2011. He served in the Army during World War II before attending college. After graduation, he worked across the country as an electrical engineer.

THOMAS W. MELTON (BSEE '67) died September 7, 2011. He worked for Western Electric and helped implement the address database for E911 emergency calls. After his early retirement, Melton turned his woodworking hobby into a business. He also enjoyed building model ships and collecting coins.

TIMOTHY MENTKOWSKI (BSEE '71) died December 29, 2011. He was a trial lawyer for 30 years. He enjoyed bird watching and cross-country skiing.

THOMAS BRENDAN QUAID (BSCompE '87, MSEE '88) died on January 12, 2012. He served in the Air Force before graduating from the University. After graduation, Quaid joined Motorola. He later went to work for Spectrum Astro.

SETH ERLEBACHER (BSCompE '87, MSEE '88) died December 16, 2011. Erlebacher worked for IBM at their Fishkill and Poughkeepsie locations, where he held many roles in engineering and management. He was active in the Jewish community.

Have news to share? Visit *www.ece.illinois.edu/alumni* and complete our *Stay Connected* form.

ECE research scientist Fabio Vargas took this photo of the sodium wind/temperature lidar at the University's research facility in Chile on March 28, 2012. He was there while working with ECE Professor Emeritus Gary Swenson on a study of the upper atmosphere. It is a nine-minute exposure of the observatory with the lidar beam emanating from the roof hatch, steering to three positions in the sky for 90 seconds each. The picture shows the Southern sky with two Magallenic Clouds (dwarf galaxies visible in the Southern Hemisphere). The star traces describe a circle around the South Pole star (upper left).

The facility was developed for studies of the upper atmosphere by the Remote Sensing and Space Sciences group in the Coordinated Sciences Laboratory and supported by the Department of Electrical and Computer Engineering. Operations and data analysis are supported by the NSF, with partners providing instrumentation from the Aerospace Corporation, Utah State University, Embry Riddle University, and the University of Illinois.

Alma Mater to be moved for off-site conservation efforts

The Alma Mater Group sculpture will be moved off campus after commencement to begin what could be a yearlong treatment plan to repair the effects of years of neglect.

Robert Easter, U of I President

The Board of Trustees has appointed Robert Easter, a longtime faculty member, former interim provost, and interim chancellor on the Urbana-Champaign campus, as president of the University of Illinois. He succeeds Michael Hogan, who had been president since 2010.

Illinois making progress toward better sustainability

The University continues to improve its recycling efforts, which include not only composting and other direct waste-reduction programs, but also changes in purchasing practices and policies. For example, officials are working on a plan to create a surplus website allowing one unit to more easily transfer unused equipment to another.

University of Illinois announces plans to build the Center for Wounded Veterans in Higher Education

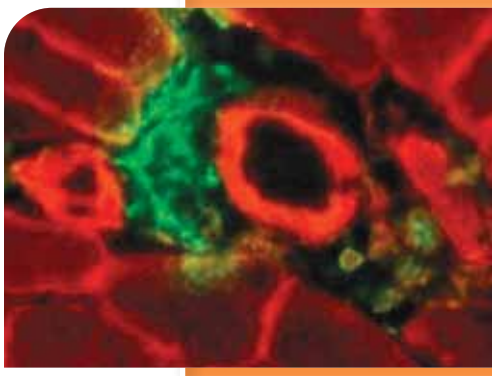
The University of Illinois announced plans to build a center that will provide educationally integrated services to student veterans of recent conflicts who have sustained severe and multiple injuries. The Center for Wounded Veterans in Higher Education will use a multidisciplinary, family-centric team approach and provide residential and non-residential services.

Rare snowy owl recovering at UI Wildlife Medical Clinic

A rare snowy owl with an injured leg is being treated at the UI Wildlife Medical Clinic. The bird's injured left wing is mobilized with a splint while it heals. The rare bird will complete his rehabilitation at the Raptor Center in Decatur before being released back into the wild.

Research using Blue Waters supercomputer has begun

Six research teams have begun using the first phase of the Blue Waters sustained-petascale supercomputer to study some of the most challenging problems in science and engineering, from supernovae to climate change to the molecular mechanism of HIV infection. The Blue Waters Early Science System, which is made up of 48 Cray XE6 cabinets, represents about 15 percent of the total Blue Waters computational system.



Exercise triggers stem cells in muscle

University of Illinois researchers determined that an adult stem cell present in muscle is responsive to exercise, a discovery that may provide a link between exercise and muscle health. The findings could lead to new therapeutic techniques using these cells to rehabilitate injured muscle and prevent or restore muscle loss with age.

Caught in the act: Team discovers microbes speciating

University of Illinois Microbiology Professor Rachel Whitaker and her colleagues found two groups of nearly identical microbes that were diverging into different species. The research was conducted on microbes found in a single geothermal hot spring in the Mutnovsky Volcano region of Kamchatka, Russia.

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