Hamerschlag gets a facelift

Hamerschlag Hall may be one of Carnegie Mellon’s first buildings, but ongoing efforts in the ECE Department ensure that it’s anything but obsolete. Recent remodeling efforts last summer focused on undergraduate spaces — improving labs, updating lounge space and making the building more functional and comfortable for the students who spend so much time in it. We also consolidated the Graduate and Undergraduate Program Offices into one office suite so students can easily find answers to their academic questions. These updates, along with the creation of the Bombardier Collaboration Center, give a new look to an old building that we think current and future students will appreciate. (And even though there is a new soda machine in the building, the ECE Graduate Student Organization (EGO) is still keeping them affordable.)

Bicoastal Brilliance

In the past three years, ECE has worked to create a vibrant Ph.D. program at Carnegie Mellon Silicon Valley — the university’s campus near San Jose, Calif. More than 35 students now call that program home, working on research projects related to mobile systems and security as part of Carnegie Mellon CyLab’s Mobility Research Center.

While it’s tempting to view the bicoastal Ph.D. program as its own entity, the program is really an extension of the Ph.D. program in Pittsburgh. Students have faculty advisors on both campuses and often spend a semester or more on the Pittsburgh campus to take classes that may not be offered in Silicon Valley. Students in Silicon Valley have immediate access to the industry and research centers there, and often choose the program for its proximity to the thriving entrepreneurial climate in that region. In the end, though, ECE faculty and students at Carnegie Mellon Silicon Valley are just ECE faculty and students as in Pittsburgh — only they happen to live in California.

For more on CMU Silicon Valley, check out www.cmu.edu/silicon-valley/.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

In its early days, “EE” as a field was primarily focused on a single dominant technology that to a great extent defined the area of inquiry for practitioners of this discipline and in which it was felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale and cost.
Changing the "Balance of Power"

Continued from page 1.

and how the barrier of distance would be regarded. Eventually, as transistors displaced vacuum tubes, digital systems and the ability to create programmable computers into the hands of individuals. This has been true for centuries, though today we see it at an accelerated pace and far more broadly. Gutenberg’s development of printing using moveable type is an important milestone because it represented an increase in efficiency in producing books. Rather, it put into the hands of individuals the books and manuscripts that were once the exclusive property of the institutions of the time. The invention that books and printed materials had provided profound societal impact, and it changed the relationship between individuals and institutions.

Today we see this same process occurring at an accelerated pace. The issues associated with copyright and music downloads resulted from the technological advances that allowed individuals to produce high-fidelity copies of music and video in a manner once reserved for institutions. Essentially, technology undermined a business model for an industry. The roles of institutions such as newspapers and media companies have been fundamentally changed as the Internet and associated technologies allow individuals to widely publish news, information or opinion. This technological infrastructure has allowed individuals to do what was once reserved for institutions, and has either made those institutions irrelevant or has forced them to consider their role and added value if they are to survive. Social networking systems are not just about talking to one’s friends. Rather, as we have seen, they allow individuals to organize, communicate and interact with the logistical efficiency once available only to the institutions of the state.

We have seen how institutions that are unable to adapt to this change in the balance of power between themselves and individuals have attempted to artificially maintain old models. This has ultimately failed. At the same time, the institutions that provide the tools that empower individuals thrive.

Powerful individuals are the change in the balance of power between individuals and institutions. Technology has put into the hands of individuals the tools to create powerful communications into the hands of individuals. This has been true for centuries, though today we see it at an accelerated pace and far more broadly. Gutenberg’s development of printing using moveable type is an important milestone because it represented an increase in efficiency in producing books. Rather, it put into the hands of individuals the books and manuscripts that were once the exclusive property of the institutions of the time. The invention that books and printed materials had provided profound societal impact, and it changed the relationship between individuals and institutions.

Today we see this same process occurring at an accelerated pace. The issues associated with copyright and music downloads resulted from the technological advances that allowed individuals to produce high-fidelity copies of music and video in a manner once reserved for institutions. Essentially, technology undermined a business model for an industry. The roles of institutions such as newspapers and media companies have been fundamentally changed as the Internet and associated technologies allow individuals to widely publish news, information or opinion. This technological infrastructure has allowed individuals to do what was once reserved for institutions, and has either made those institutions irrelevant or has forced them to consider their role and added value if they are to survive. Social networking systems are not just about talking to one’s friends. Rather, as we have seen, they allow individuals to organize, communicate and interact with the logistical efficiency once available only to the institutions of the state.

We have seen how institutions that are unable to adapt to this change in the balance of power between themselves and individuals have attempted to artificially maintain old models. This has ultimately failed. At the same time, the institutions that provide the tools that empower individuals thrive.

... This technological infrastructure has allowed individuals to do what was once reserved for institutions.

CURRENTS

Editor-in-Chief Ed Schlesinger, ECE Department Head
Managing Editor Susan Critbis
Creative Director & Graphic Designer Jenn Gooch
Contributors
- Kevin Angene
- Nicholas Gentry
- Christine Swainey
Photography
- Talha Ali
- Ken Andreto
- Jean Gaudio
- Tim Kauten
- Larry Rippel

CREDITS

Assistant Professor Onur Mutlu
Mutlu Receives Young Computer Architect Award
Assistant Professor Onur Mutlu received the 2010 IEEE Computer Society TCIAA Young Computer Architect Award “for contributions to magnetic storage devices through magnetic modeling.”

Tonguz Delivers Keynote at IEEE 2010 VNC
ECE Professor Ozan Tonguz delivered the keynote address at the IEEE 2010 Vehicular Networking Conference (VNC), held last December in Jersey City, NJ. The conference emphasized the research challenges of vehicular ad hoc networks at all layers of the protocol stack, and attracted nearly 100 researchers from academia and companies like Toyota, Honda, BMW, Intel, Nokia Siemens Networks, and Denso. Tonguz’s talk, “Emerging and Future Applications of Vehicular Networks: A Vision,” elaborated on the importance of vehicular networks to sustainable energy (via electric cars), a greener environment, reduced carbon footprint and smart grid. He also discussed the burgeoning role of vehicular ad hoc networks as an important enabler.

Zhang Named to DARPA Computer Science Study Group
Assistant Research Professor Pei Zhang has been selected for the Defense Advanced Research Projects Agency’s (DARPA) Computer Science Study Group (CSSG). The CSSG supports university research in computer science, while informing a new generation of researchers on Department of Defense needs and priorities. The multi-year program consists of a funded educational experience to familiarize participants with DoD practices, and up to four years of funded research to explore and develop technologies that have the potential to transform innovative and revolutionary computer science and technology advances to the government. Zhang was selected based on his project, “SensorFly: A Controlled Mobile Aerial Sensor Network for Indoor Scouting.” Through it, Zhang aims to develop a swarm of self-deploying sensors for scouting in indoor environments.

Professor Jimmy Zhu

Assistant Research Professor Pei Zhang

Zhu Earns IEEE Magnetics Society Achievement Award
ABB Professor of Engineering and Data Storage Systems Researcher Jimmy Zhu received the IEEE Magnetics Society Achievement Award “for contributions to magnetic storage devices through magnetic modeling.” The award, which consists of a diploma with citation and cash prize, honors one of the society’s members each year for his or her highest technical achievement. It is the society’s highest award.

Zhu, who is also an IEEE fellow, is a recognized world leader in modeling magnetic devices, especially for magnetic recording and magnetoresistive memory. Zhu’s pioneering research on magnetic switching in nanostuctures has made substantial contributions to the success of magnetoresistive memory and his modeling work on microwave assisted magnetic recording and heat assisted magnetic recording are making a significant impact as industry attempts to select the next technology for future disk drive heads. He becomes the third Carnegie Mellon professor to win the IEEE Magnetics Society Achievement Award. Past CMU recipients include Emeritus Professor of ECE Stanley Charap and University Professor of ECE Mark Kryder.

Assistant Professor Onur Mutlu

Mutlu Receives Young Computer Architect Award
Assistant Professor Onur Mutlu received the 2010 IEEE Computer Society TCIAA Young Computer Architect Award “for contributions to magnetic storage devices through magnetic modeling.”

Tonguz Delivers Keynote at IEEE 2010 VNC
ECE Professor Ozan Tonguz delivered the keynote address at the IEEE 2010 Vehicular Networking Conference (VNC), held last December in Jersey City, NJ. The conference emphasized the research challenges of vehicular ad hoc networks at all layers of the protocol stack, and attracted nearly 100 researchers from academia and companies like Toyota, Honda, BMW, Intel, Nokia Siemens Networks, and Denso. Tonguz’s talk, “Emerging and Future Applications of Vehicular Networks: A Vision,” elaborated on the importance of vehicular networks to sustainable energy (via electric cars), a greener environment, reduced carbon footprint and smart grid. He also discussed the burgeoning role of vehicular ad hoc networks as an important enabler.

Zhang Named to DARPA Computer Science Study Group
Assistant Research Professor Pei Zhang has been selected for the Defense Advanced Research Projects Agency’s (DARPA) Computer Science Study Group (CSSG). The CSSG supports university research in computer science, while informing a new generation of researchers on Department of Defense needs and priorities. The multi-year program consists of a funded educational experience to familiarize participants with DoD practices, and up to four years of funded research to explore and develop technologies that have the potential to tran-
Faculty Awards & Honors

ECE Faculty Wins CIT Awards

Five ECE faculty members were honored in 2011 for their academic and research achievements at the annual CIT Faculty Awards. Raj Rajkumar, the George Washington Professor of Electrical and Computer Engineering, received the Cum Laude Award. Rajkumar, head of CMU’s GM Collaborative Lab, earned the award “for contributions to predictable real-time systems and operating systems.” He has been working for more than a decade to help modernize the auto industry and make driving safe and more economical for consumers. He is featured in a book about the new American released last spring. Rajkumar was recognized for his distinguished engineering by the Institute for Computing Machinery.

Assistant Professor David Brunley

Brunley Earns Presidential Early Career Award

Assistant Professor David Brunley won a Presidential Early Career Award for Scientists and Engineers (PECASE) — the highest honor bestowed by the U.S. government on young scientists and engineers. The PECASE program recognizes scientists and engineers who show exceptional leadership at the frontiers of knowledge early in their careers. Brunley’s award recognizes his “innovative and vital research on malware (malicious software) analysis and strong educational and outreach activities.”

“Brunley’s work is of the highest quality and has had a significant impact in the field." — D. sunset to Hamerschlag Hall. But this year, it’s not just students. Soummya Kar, Anthony Row. Franklei Pla. Jeff Weldon have joined the ECE faculty, and will enhance the department’s already strong programs in cyber-physical systems, circuits and systems, and micro and nanoelectromechanical systems.

Kar earned his Ph.D. from the Indian Institute of Technology in 2005, and his Ph.D. from CMU in 2010, when he received the A.D. White Award for his thesis, “Large Scale Networked Dynamical Systems: Distributed Inferences.” The award recognizes a Ph.D. student whose thesis work is judged to be of the highest quality and has a significant impact in the field.

For Kar, that work is creating mathematical models to increase the efficiency of cyber-physical systems. Specifically, Kar’s models help engineers use the knowledge of discovered phenomena — such as information collected from sensors attached to physical networks like cars and buildings structures — to determine the overall state of those networks. His models also allow engineers to create more energy-efficient networks while averting or mitigating disruptions, and preventing those disruptions from spreading across entire systems.

“When you have distributed information, the information given by one data point may be leveraged from the information given by another data point,“ Kar said. “My work aims to fuse this information and create a filter that gives a desired level of precision.’’

Like Kar, Assistant Research Professor Anthony Row. also studies the best way to design systems that interact directly with the environment — where poor performance and failure can have catastrophic results. Recently, Row. has an appointment in Carnegie Mellon CyLab, has focused his efforts on developing large-scale sensor networks that are energy-efficient and provide real-time properties.

“I see sensor networking as a practical mechanism for leveraging context information and new abilities to the already numerous embedded systems that surround us,” Row. said. Row. earned his Ph.D. from Carnegie Mellon in 2010.

Gianluca Pla. joined the ECE faculty at the University of Pennsylvania where he led the Penn Micro and Nano Systems (P_MNLS) Laboratory. The lab’s activities, which he will continue at CMU, target understanding the fundamental science of micro and nanoelectromechanical systems (M/NEMS) to control the properties of micro devices for design and fabrication, and devise new classes of NEMS that are directly interfaced with electronic circuits.

Pla. earned his Ph.D. in 2005 from the University of California, Berkeley, and his research focused on aluminum nitride piezoelectric resonators for filtering and frequency synthesis. That research resulted in a startup, and part of the IP was recently acquired by Qualcomm. Since earning his Ph.D., Pla. has received the Class of 2006 Alumnus of the Year Award, the IBM Young Investigator Award and three best paper awards at the IEEE Frequency Control Symposiums.

Pla.’s decision to join the CMU ECE community was influenced by the department’s dedication to creating an environment that supports continuous innovations in engineering, and for its commitment to support and fuel new technologies in the M/MNLS.

ECE’s other newest faculty member, Jeff Weldon, also earned his Ph.D. at Berkeley in 2005, His dissertation, “High Performance CMOS Transmitters for Wireless Communication,” outlined a method for making high-frequency integrated circuits faster and more affordable. The principles developed in Weldon’s work are currently used in cell phones and other electronic devices, and have been instrumental in making such devices smaller and more affordable.

“I’m really interested in the marriage of new and old materials. I want to use CMOS technology with things like carbon nanotubes. I hope to make CMOS perform new things that it doesn’t perform very well right now. This integration of new materials with the power that drives nanotechnology in the future," Weldon said.

As part of that interest in merging the old with the new, Weldon helped to create a functional radio small enough to fit inside a blood cell during his time at Berkeley. The radio consisted of an integrated transmitter/receiver made of a carbon nanotube one ten-thousandth the diameter of a human hair, that functioned simultaneously as antenna, tuner, amplifier, and demodulator.

“I love being free to work on what interests me, and the people here at CMU have been great so far,” Weldon said. “I’ve always been aware of CMU’s reputation, particularly in electrical and computer engineering, but what really convinced me to come here was my interview. I’ve visited other departments, and ECE was by far the most collaborative and supportive department I encountered. It’s an ideal place to work, especially for new faculty.”

Assistant Research Professor Francesco Franchetti

Gianluca Pla. and Ed Schlesinger join a broader community.

Assistant Research Professor Franz Franchetti

Assistant Professor Edmund M. Clarke

Clarke Elected to Academy of Arts & Sciences

Edmund M. Clarke, the FORE Systems University Professor of Computer Science and professor of ECE, was among 321 leaders in the sciences, social sciences, humanities, arts, business and public affairs elected to the American Academy of Arts & Sciences (AAAS) in 2011. Clarke is the 17th AAAS member affiliated with Carnegie Mellon.

Clarke, who won the 2007 A.M. Turing Award — often referred to as the Nobel Prize of Computer Science — joined the other 2011 members, including jazz icon Dave Brubeck, singer-songwriters Paul Simon and Leonard Cohen, actors Helen Mirren and Daniel Day-Lewis, filmmaker Ken Burns, Nobel laureates El-Chich Noguchi (chemistry) and H. David Packard (phys- ical), and Fordham University President Rev. Dr. Theodore M. Hesburgh, C.S.C., for the Oct. 1 induction ceremony at the academy’s headquarters in Cambridge, Mass.

Assistant Professor Edmund M. Clarke

ECE Professor Greg Ganger, David Edward Schlesinger Professor and Department Head Ed Schlesinger, and George Washington Professor of ECE Raj Rajkumar have been named IEEE fellows — a distinction reserved for IEEE members who have made significant contributions to systems research in areas relevant to the Institute for Complex Engineering Systems (ICES). Assistant Professor Bruno Sinopoli earned the college’s George Tallman Ladd Research Award for his outstanding research contributions to the development of the theory for computing and control technologies in cyber-physical systems. CIT’s Philip L. Dowd Award went to Biomedical Engineering and ECE Professor Jelena Kovačević to recognize her “profound contributions to biomedical engineering…” ABB Professor of Engineering, Jim Ganger, has earned CIT’s Outstanding Research Award for seminal contributions to magnetoe- nmeric random access memory (MRAM), and ECE Professor Adrian Perrig received the Benjamin Richard “Teard” Teaching Award for his essential role in developing the curriculum in cybersecurity within CIT and Carnegie Mellon, and his role in disseminating cybersecurity knowledge to the broader community.

Faculty Named IEEE Fellows

ECE Professor Greg Ganger, David Edward Schlesinger Professor and Department Head Ed Schlesinger, and George Washington Professor of ECE Raj Rajkumar have been named IEEE fellows — a distinction reserved for IEEE members who have made significant contributions to systems research in areas relevant to the Institute for Complex Engineering Systems (ICES). Assistant Professor Bruno Sinopoli earned the college’s George Tallman Ladd Research Award for his outstanding research contributions to the development of the theory for computing and control technologies in cyber-physical systems. CIT’s Philip L. Dowd Award went to Biomedical Engineering and ECE Professor Jelena Kovačević to recognize her “profound contributions to biomedical engineering…” ABB Professor of Engineering, Jim Ganger, has earned CIT’s Outstanding Research Award for seminal contributions to magnetoe- nmeric random access memory (MRAM), and ECE Professor Adrian Perrig received the Benjamin Richard “Teard” Teaching Award for his essential role in developing the curriculum in cybersecurity within CIT and Carnegie Mellon, and his role in disseminating cybersecurity knowledge to the broader community.

Faculty Named IEEE Fellows

ECE Professor Greg Ganger, David Edward Schlesinger Professor and Department Head Ed Schlesinger, and George Washington Professor of ECE Raj Rajkumar have been named IEEE fellows — a distinction reserved for IEEE members who have made significant contributions to systems research in areas relevant to the Institute for Complex Engineering Systems (ICES). Assistant Professor Bruno Sinopoli earned the college’s George Tallman Ladd Research Award for his outstanding research contributions to the development of the theory for computing and control technologies in cyber-physical systems. CIT’s Philip L. Dowd Award went to Biomedical Engineering and ECE Professor Jelena Kovačević to recognize her “profound contributions to biomedical engineering…” ABB Professor of Engineering, Jim Ganger, has earned CIT’s Outstanding Research Award for seminal contributions to magnetoe- nmeric random access memory (MRAM), and ECE Professor Adrian Perrig received the Benjamin Richard “Teard” Teaching Award for his essential role in developing the curriculum in cybersecurity within CIT and Carnegie Mellon, and his role in disseminating cybersecurity knowledge to the broader community.

Faculty Named IEEE Fellows

ECE Professor Greg Ganger, David Edward Schlesinger Professor and Department Head Ed Schlesinger, and George Washington Professor of ECE Raj Rajkumar have been named IEEE fellows — a distinction reserved for IEEE members who have made significant contributions to systems research in areas relevant to the Institute for Complex Engineering Systems (ICES). Assistant Professor Bruno Sinopoli earned the college’s George Tallman Ladd Research Award for his outstanding research contributions to the development of the theory for computing and control technologies in cyber-physical systems. CIT’s Philip L. Dowd Award went to Biomedical Engineering and ECE Professor Jelena Kovačević to recognize her “profound contributions to biomedical engineering…” ABB Professor of Engineering, Jim Ganger, has earned CIT’s Outstanding Research Award for seminal contributions to magnetoe- nmeric random access memory (MRAM), and ECE Professor Adrian Perrig received the Benjamin Richard “Teard” Teaching Award for his essential role in developing the curriculum in cybersecurity within CIT and Carnegie Mellon, and his role in disseminating cybersecurity knowledge to the broader community.
“Our goal is to lead a community across the country and around the world to build a case for a vision for CPS....”

Nicholas Gentry

4

Assistant Research Professor Anthony Rowe places a $300 plastic flying toy drone on the floor inside a parking garage in Carnegie Mellon’s Collaborative Innovation Center. The drone has four propellers and mainers about a foot-and-a-half wide. Camera lenses on the bottom and front send images to a human controller on the ground.

By design, an iPhone controls the drone — tilt the phone forward and the drone flies forward; tilt it back and the drone flies backward — but Rowe and his students are retrofitting it to fly by a plot alone. They also want to communicate with other devices across a wireless network, much like cell phones already do.

Ask Rowe what the point is and he might tell you to imagine a scenario like the aftermath of Hurricane Katrina. Light poles are down, cell phones won’t work, roads are jammed and people need to be saved. Rescue workers arrive on the scene and release small flying drones from their backpacks. Once airborne, the drones self-assemble into a grid above the city and start relaying visual information to rescue workers on the ground. At the same time, they set up an impromptu communication network that restores cell phone usage across the city, providing a lifeline for those in danger.

Unlike helicopters and state-of-the-art military drones, these easily deployable minidrones can blanket and monitor an entire city wide airspace without landing posts, fuel tanks or pilots. And at less than $1,000 per unit, they’re an affordable alternative to the $4.5 million per unit piloted military drones currently used in Hurricane Katrina’s aftermath.

Welcome to the world of cyber-physical systems — one of ECE’s most rapidly growing fields of interdisciplinary research and development.

Cyber-physical systems (CPS) result from adding computational and/or communication elements to previously passive physical tools. “To me, cyber-physical systems refer to the embedding of sensing, communications and computing into physical spaces,” said ECE Assistant Professor Bruno Sinopoli. “This makes physical spaces smarter, more comfortable and more secure.

One familiar example of a cyber-physical system is the cruise control function in cars. Once, speed regulation required constant monitoring by a human driver, but most new cars can regulate their own speed at the touch of a button. Likewise, CPS technology will allow Rowe’s drones to hover in formation and reconfigure themselves according to specified objectives without the need for direct human piloting.

Impressive as they sound, autonomous flying drones are Rowe’s latest developed project. He also created energy-monitoring applications for CMU’s FireFly Wireless Sensor Network, a low-cost, low-power hardware sensor platform that collects and transmits data in real-time. By attaching FireFly nodes to ordinary household appliances, Rowe can monitor and record household energy use in intimate detail and turn appliances on or off automatically.

“In the future, this technology and the data it collects will be vital in helping power-hungry appliances avoid operating at the same time, which will minimize expensive peak-usage periods,” Rowe said. “Appliances across an electrical grid, FireFly will increase efficiency, which will reduce the need for new power plants, help eliminate blackouts and curb the environmental impact of energy consumption.”

Like Rowe’s modified flying drones, FireFly falls into the CPS category because it gives computational and communicational (i.e., cybernetic) abilities to physical hardware that previously had no cybernetic functions.

George Westinghouse Professor Raj Rajkumar, who co-directs the General Motors-Carnegie Mellon Autonomous Driving Collaborative Research Lab, believes cyber-physical technology will improve nearly every domain of our lives. One day, buildings will adjust their temperatures according to the weather forecast, or doctors will perform battlefield surgeries from hundreds of miles away. To convert these ideas into realities, Rajkumar and Rowe are collaborating with their colleagues at CMU and around the world to advance cyber-physical technology.

“Our goal is to lead a community across the country and around the world to build a case for a vision for CPS....”
In past issues of Currents, I have described the activities and initiatives of the five (now six) ECE student organizations to give you a better idea of what life outside the classroom is like for current ECE. The department’s aim was that academic pursuits (course work and research) are as rigorous and challenging as ever — there has simply been an increase in the amount and variety of “extracurricular” activities (MAAs) offered by and for the students. Appropriately, these MAAs have been largely driven by the students themselves and are designed to be both fun and integrated with the academic mission. They also provide an alumni/industry interface.

In this issue, I’d like to focus on the ECE Alumni Relations Program — what it comprises, how alumni like you have influenced it and where it may be headed. First, let’s give it a campus-wide context.

When students graduate and become alumni of their academic institution, they eventually decide what level of connection they would like to have with their university, college and home department. This may change over time to accommodate the different stages of their lives. In other words, it’s not just a matter of interest, but availability and what can be added to existing personal and professional obligations. Fortunately, there are many ways to exercise CMU loyalty and retain that valuable campus connection throughout one’s life. Alumni need only choose what works for them and “customize” their involvement.

For example, an alumnus may enjoy returning each year for homecoming (how CMU itself is known for the spring. He or she may be asked to serve in some capacity (on a campus committee or advisory board) and decide that the commitment fits with current goals or is something “to call service” they wish to acknowledge. This person may also decide to be active in the alumni chapter in their geographic region and volunteer to plan and host social, professional or technical events for the alumni community. Still others volunteer to meet with prospective or new Carnegie Mellon students in their area, to welcome them and answer their questions. I’m proud to say that ECE alumni are active in all of these capacities.

When ECE decided, almost a decade ago, to add an academic department alumni relations program, the reasoning was straightforward. We wanted to provide discipline-specific opportunities to reconnect, and specific ways that our alumni could remain involved and informed about ECE and CMU. We knew that ECE, as an applied discipline, and a dynamic profession, had a community of alumni that would appreciate networking opportunities. Therefore, we’ve held between five and seven alumni events per year in cities with the greatest concentration of graduates with degrees from ECE.

We also saw the potential for an extended community that reflected the full lifecycle of experience, from student to alumnus to industry expert ready to return to campus with technical and career information (and jobs) for current ECE students. This latter area of activity has seen tremendous growth in the last few years, and there is evidence that it has enriched and benefited all concerned. In the adjoining column is a list of the CMU and ECE alumni who have given talks to bachelors’ and master’s and Ph.D. students in ECE just during the fall 2011 semester. They have utilized the IEEE Tech/Career Forum that is co-hosted by the IEEE student chapter and my office. (There are additional topics given by alumni that are hosted by the ECE research centers.)

Bottom line: Alumni with valuable industry, academic and entrepreneurship experience have vital information (and often career opportunities) to provide to current students. Having walked in their shoes at one time, ECE alumni also have unique credibility. It’s a student-alumnus activity with enormous mutual benefit. The challenge is finding enough available time slots and conference rooms to accommodate the level of interest by all parties.

Another platform for ECE alumni engagement emerged in fall 2010 when the ECE department head and associate department head decided to reserve two lecture sessions per year in the 18-230 sophomores seminar class to be delivered by recent ECE alumni, one in industry and one currently pursuing a Ph.D. These newly minted alumni are challenged to tell the class, in hindight, what they would have liked to know as sophomores and impart the perspective they have gained since that time. Sophomores have been appreciative of this peak into the future, and recent alumni have indicated it’s a rewarding (even cathartic) experience to relive the story and pass on some wisdom to the next generation of ECE-ers.

With community interconnectedness, there is more opportunity for topical discussions and avoidance of conflicts. Instead of relying on human drivers to stop at timed traffic signals when no opposing traffic is coming, cyber-physical cars will alert each other wirelessly, stopping or slowing down as needed. A car will become part of a cyber-physical communications network capable of considering every imaginable variable — traffic flow, oncoming cars, shortest routes, unexpected obstacles or road work — to transport passengers with maximum efficiency and safety.

That increased safety is the greatest selling point of autonomous driving.

“Humans get distracted all the time while driving, but computers are not emotional. They can be vigilant all the time,” Rajkumar said. “With the widespread implementation of autonomous driving, I can see the number of car deaths per year in the U.S. going from 35,000 to 3,500 to 300. The number may never reach zero, but by and large, autonomous driving will be a huge win for society.”

If Rajkumar and his colleagues have their way, autonomous driving won’t be sci-fi only. Technologies like Rover’s drones will improve disaster response; sensors on buildings or bridges will warn engineers of impending structural dangers; and new advances in technology in the home will provide lifelong assistance for the elderly or those with disabilities. And that’s just the start. Thanks to Carnegie Mellon researchers, the possibilities are endless.

Each year, ECE welcomes alumni back to campus for numerous opportunities to share their experiences with current ECE-ers. Thanks to our alumni for contributing to the career and professional development of our students.

ECE Senior/IMB Graduation Celebration, May 2011
Keynote Speaker: Maru Kumar, Chief Frestarter, F5 Ventures
ECE Alumni Corporation Members, IEEE Technical/Career Talk Forum, Fall 2011
Hail Altride, Director of Engineering, Sypris Electronics
Vikas Chandra, Principal Engineer, R&D, ARM
Glenn Clark, Director of R&D, Cadence Design Systems
Ruth Contrito, Division Senior Manager, Northrop Grumman Corporation
Philip Cuadra, Manager CUDA Chips Software Team, NVIDIA
Toni Duffield, Executive Producer, OnLive
Brandon Elsberg, Business Unit Manager, Eaton Corporation
Blas Falcon, Engineering Director, Cadence Design Systems
Sebastian Herbert, Associate, OC Energy
Diana Hu, Rotation Engineer Program, Intel Corporation
Charles Koh, Senior, IT Advisory Service, Ernst & Young
Michael LIBBY, Manager, Pre-Silicon Validation, Intel Corporation
Boots Lindsey, Flight Software Engineer, Boeing
Keith Marchando, Executive Vice President, Carbon Motors
Bill Muller, VP Engineering, Implementation Group, Raytheon
Michelle Ng, Manager, IT Advisory Service, Ernst & Young
Drew Perkins, Co-Founder, Allofems Corporation
Hemanth Srikanta, Firmware Engineer, Tesla Motors
Joshua Wis, Computer Engineer, NVIDIA
ECE Recent Alumni Speakers, 10/2011
Karim Elliott Fleming, Graduation School, MIT
Ajay Panagayala, Founder/Engineer
David Bombard, Co-Founder, Carnegie Mellon
Lauren Chokshi, Engineer, Northrop Grumman Corporation
Continued from previous page.

PSI Incubates CPS Technology
Susan Farrington

ECE’s cyber-physical systems programs got a big boost in 2010 with the creation of the Pennsylvania Smart Infrastructure Incubator (PSII) at the CMU campus. With funding from industrial members Bombardier and IBM, and $2.2 million in initial funding, researchers at the College of Engineering will work to blend the traditional and concrete infrastructure with cyber-infrastructure — computer networks, sensor networks, the Internet and cybersecurity. They make these systems safer, more reliable and efficient.

Research taking place under the PSI umbrella include the gamut from a project to make electric cars more practical to working on creating a middleware infrastructure that facilities communication between sensors. Some examples:

• Bombardier and CMU researchers have teamed up to work toward adapting autonomous technology for use on automated people movers (APM). Together, they hope to develop a sensor guidance system that will allow the APMs to see the track, steer themselves and detect obstacles in their way.

• The Instrumented Pipeline project aims to develop technologies to monitor pipeline delivery integrity, using a network of sensors and controls to detect and diagnose developing defects, leaks and failures.

• Sensor Array is creating a way for researchers to easily access, manage and analyze data from sensors deployed throughout campus, turning CMU into a “living testbed” for experimenting with a shared sensing infrastructure.

• The ChargeCar project unites researchers examining the urban commute to determine if cars powered by sophisticated supercapacitor battery systems can reduce the cost of ownership for a commuter car.

And that’s just the tip of the research iceberg.

This sort of collaboration calls for special work environments, and the PSI recently celebrated the completion of two new facilities. These new structures are designed to incubate technologies and relationships between Carnegie Mellon researchers and the Bombardier Smart Infrastructure Collaboration Center (top, right) and the IBM

PSI continues to add to a growing number of connection partners, including Google Carnegie, FlashRocks, Intel and others.

If Rajkumar and his colleagues have their way, autonomous driving won’t be sci-fi only. Technologies like Rover’s drones will improve disaster response; sensors on buildings or bridges will warn engineers of impending structural dangers; and new advances in technology in the home will provide lifelong assistance for the elderly or those with disabilities. And that’s just the start. Thanks to Carnegie Mellon researchers, the possibilities are endless.

For more on the PSI, visit http://www.ices.cmu.edu/psi/home.asp.
Bruce Krogh Talks CMU-Rwanda

What kind of programs will CMU-Rwanda offer?
CMU-R will offer master's degree programs aimed at preparing students to be innovators and leaders in the emerging information and communication technology (ICT) industry in Africa. Our initial program will be an MS in information technology (MIST) with a broad set of courses in software engineering, data communication networks, wireless technology, and computer security and business strategies in ICT. Elective courses will give students depth in a variety of areas related to mobile technology, broadband internet and cloud computing. The first class of students for the MSIT will be admitted this coming August. We will begin offering the MS ECE degree two years later. There will be a full staff in Kigali supporting all aspects of the program, from admissions to IT, just as we have at our other campuses.

Will students come mainly from Africa, or is CMU-R anticipating a more global reach?
CMU-R is part of a larger initiative by the Government of Rwanda (GoR) called the University of Excellence in ICT for all of Africa. Applicants will be accepted from anywhere, and we hope to have a diverse student body. But we anticipate that the majority of the students will be from Africa because of our programs' emphasis on technologies for the developing world. There will also be special financial aid for students from Rwanda and Africa at large.

How many students does CMU-R plan to admit?
The target for the first MSIT class in 2012 is 40 students. The plan is for this to grow to a steady state of 150 students in both the MSIT and MS ECE degree programs in the next six years.

What are the admission requirements for CMU-R?
CMU-R will have its own application and admissions process. The requirements for admission to CMU-R will be the same as the standards for other CMU graduate programs.

How many faculty and staff members will CMU-R have?
We will begin the first year with three faculty members. The plan is to ramp up to approximately 15 faculty members as the number of students increases. There will also be a full staff in Kigali supporting all aspects of the program, from admissions to IT, just as we have at our other campuses.

As director of the program, what are your responsibilities?
I'll be responsible for the overall development and administration of CMU-R. This includes recruiting faculty, hiring staff, and overseeing the development and delivery of the degree programs.

Rwanda conjures up certain images in peoples’ minds. Why would Carnegie Mellon — and the ECE Department — want to offer programs there?
When people hear we are opening a campus in Rwanda, their initial response is almost always surprise—it was certainly my response when I heard about it the first time. Rwanda is one of the most familiar countries in Africa and throughout the world because of the horrific genocide that occurred in 1994, only 18 years ago. What is much less known is that during the past decade Rwanda has become one of the most rapidly developing countries in sub-Saharan Africa. Following a roadmap called Rwanda Vision 2020, the GoR has been pursuing an ambitious program to establish a knowledge-based economy, and the progress has been remarkable. Rwanda has laid the foundations of a technological infrastructure along with an attractive atmosphere for business and entrepreneurship, making it an ideal location for Carnegie Mellon to establish its first presence in Africa.

As the first major U.S. research university to offer an in-country degree program in Africa, CMU and ECE have the opportunity to take leadership — and create leadership — in a region of the world that many predict may experience the most rapid technological development in history.

What made you decide to take this position?
I decided to take the position as founding director of CMU-R because it is such an amazing and unusual opportunity to be involved in developing a new program in a part of the world where the potential impact is difficult to overestimate. When making major decisions about what to do, I always ask myself, “Is this something I think I’ll be glad I did when I look back on it 10 or 15 years from now?” In this case, the answer was clear.
When Arjun Athreya stepped off the plane in Pittsburgh more than two years ago, he felt a little tateful. While the Bangalore, India, native had never been to the Steel City, living in a new place didn’t make him anxious. Rather it the prospect of studying a master’s degree in one of the nation’s top ten electrical and computer engineer programs. The direction of one of the company’s engineers was how he would get everything started: — new friendships, academics, his life.

Luckily, Carnegie Mellon ECE had him covered. “ECE has this fantastic concept of signing every student an individual faculty mentor,” Arjun said. “The first thing I did was drop by Professor James Bain’s office and talk to him about what I’d done prior to coming to Carnegie Mellon and what I wanted to do by the time I finished my master’s degree. He gave me a good outline for how I needed to proceed. That was when I really gained confidence in myself — to know that I could really do something here. More importantly, he asked me to enjoy the new country, new cultures and their offerings while I continued to focus on my goals.”

While Carnegie Mellon boasts a strong reputation in the U.S. and abroad, it may still seem odd to travel so far for a master’s degree, but Arjun said it was a natural choice. He grew up listening to his father, also an engineering graduate and entrepreneur, reminisce with colleagues about their graduate school experiences in the U.S. By the time he graduated from RV College of Engineering in Bangalore in 2009, Arjun knew that was his path as well. ECE at CMU drew his attention for multiple reasons, not the least of which was its treat- Ph.D. program. The program is right up Arjun’s alley — exploring the possibilities for developing and applying future mobile and communication technologies. He joins more than 30 ECE Ph.D. students who call the West Coast home but often spend time at the Pittsburgh campus to take advantage of its expanded course offerings.

Arjun says that just like his decision to attend grad school in the U.S., his choice to remain in Silicon Valley and pursue a Ph.D. seemed natural. Not only will he get a world-class engineering education, but he’ll have access to the brains and venture capitalists building the technology of the future.

“The bicoastal program is more than giving you a student’s or his degree,” he said. “It’s also about making the most of being at the right time and right place.”

While Arjun doesn’t rule out a career as an industrial researcher, he really hopes to develop a practical solution to a research problem that he can market. “I wouldn’t hesitate to take the entrepreneurship road,” he said. “All I need is some support, advice and motivation. ECE and CMU have fantastic people and support for such a vision.”

For now, he continues to build his success in the Ph.D. program on the strong foundation he received in the PMP.

“During the last hour of Arjun’s last day at Cisco, his manager notified him that the company planned to file for a U.S. pat- ent on the work he’d done. So along with gaining experience with some of the best engineers in the U.S., he also had a chance to work with a leading patent attorney. Not bad for a summer job.”

In fact, Arjun’s experience at Cisco and his interactions with Silicon Valley’s movers and shakers inspired him to apply for ECE’s bicoastal Ph.D. program at CMU Silicon Valley. The program is right up Arjun’s alley — exploring the possibilities for developing and applying future mobile and communication technologies. He joins more than 30 ECE Ph.D. students who call the West Coast home but often spend time at the Pittsburgh campus to take advantage of its expanded course offerings.

Arjun says that just like his decision to attend grad school in the U.S., his choice to remain in Silicon Valley and pursue a Ph.D., the PMP enrolls about 100 students each year from a pool of more than a thousand applicants.

PMP students also often take summer internships while in the program, and Cisco Systems recruited Arjun for a research project at the company’s San Jose office. Under the direction of one of the company’s principal engineers, Arjun built a software converter that mapped the network management interface definitions in Cisco’s internal language to a language called YANG, which is still in its draft stages during his internship — not an industry standard — Arjun had little established technical support to rely on compared to other languag- es, like JAVA or C. Undaunted, he learned the language fresh, like he did Cisco’s internal management interface language. He spent the first month of his internship learning, the second month doing the actual programming, and the final month implement- ing the converter and integrating it into Cisco’s operating system.

While many may have found the experience overwhelming, Arjun thrived on its challenge.

“It was a fantastic experience, working on something new that was mission-critical to Cisco,” he said. “More importantly, I was able to use all the research experience I had gathered at CMU. I could quickly ramp up because of the training that we had here.”

Ganger, who is internationally recognized for his work in storage systems, distributed systems and operating systems, earned the Stephen J. Jatras Professorship in Electrical and Computer Engineering. “This is a wonderful recognition and I am honored to represent the Stephen J. Jatras Professorship and contribute to the continuing research activities at this world-class institution,” said Ganger, director of the university’s Parallel Data Lab (PDL) and co-Pi on the newly formed Intel Science and Technology Center for Embedded Computing.

Since 2001, Ganger has served as director of the PDL, where he is collaborating with HP labs on a research initiative focused on cloud computing and security issues through the HP Labs Innovation initiative focused on cloud computing and security issues through the HP Labs Innovation initiative. He has authored more than 130 journal articles, conference papers and technical reports. The IEEE fellow has also received numerous honors and awards for his research contributions, including three HP Labs Innovation Research awards, the ACM Distinguished Engineer Award, and multiple best paper awards for several software engineering research publications.

Ganger has worked to help modernize the auto industry and make driving safe and more economical for the consumer. He is featured in a book about the new American economy released this past spring, and was selected as a distin- guished engineer by the Association for Computing Machinery. He has authored more than 150 publications with six best paper awards in peer-reviewed forums, and received the prestigious Technical Achievement and Leadership Award from the IEEE Technical Committee on Real-Time Systems.

“Raj is an outstanding researcher and a stellar example of our longstanding tradi- tion of collaborative, problem-solving research designed to advance engineer- ing practice for the benefit of consumers and industry,” Schlesinger said.
Ganger, Narasimhan head New Intel Science and Technology Centers

Intel Corporation has two new homes on the Carnegie Mellon campus, and ECE faculty members are heading up both of them.

Stephen J. Jatras Professor of ECE Gregory Ganger and Associate ECE Professor Priya Narasimhan will head two new Intel Science and Technology Centers (ISTC) based at CMU that will focus on cloud and embedded computing. Each center involves multiple universities and will receive $15 million over the next five years.

The ISTC for Cloud Computing forms a new research community that broadens Intel’s “Cloud 2015” vision with new ideas from top academic researchers. In addition to CMU, the center includes researchers from the Georgia Institute of Technology, the University of California at Berkeley, Princeton University and Intel. Researchers will explore technology that will have important implications for the cloud, from more efficient and effective support of big data analysis to making the cloud more distributed and localized by extending cloud capabilities to the network and client devices.

“This will be an excellent platform for open collaboration research into underlying technologies essential to allowing cloud computing to reach the promise of dramatically improving efficiency, ubiquity and productivity for large-scale and user-facing applications across so many critical areas of information technology, from social networks and medicine to science and government,” said Ganger, who is a co-PI of the ISTC for Cloud Computing with Intel Research Scientist and Adjunct Professor of Computer Science Phil Gibbons.

Narasimhan, who directs Carnegie Mellon’s Mobility Research Center, is a co-PI of the ISTC for Embedded Computing along with Mei Chen, a senior research scientist at Intel. The center forms a new collaborative community to drive research to transform experiences in the home, car and retail environment of the future. In addition to CMU, this center incorporates the expertise of researchers from Cornell University, the University of Illinois at Urbana-Champaign, the University of Pennsylvania, Penn State University, the Georgia Institute of Technology, the University of California at Berkeley and Intel.

“These new ISTCs are expected to open amazing possibilities,” said Justin Rattner, Intel chief technology officer. “Imagine, for example, future cars equipped with embedded sensors and microprocessors to constantly collect and analyze traffic and weather data. That information could be analyzed and shared in the cloud so that drivers could be provided with suggestions for quicker and safer routes.”

The centers represent the next $30 million installment of Intel’s five-year, $100 million ISTC program to increase university research and accelerate innovation in a handful of key areas. Intel previously announced ISTCs in visual computing and secure computing, headquartered at Stanford University and the University of California at Berkeley, respectively. CMU researchers are also part of the ISTC for Secure Computing.
CMU, Penn Engineering Receive $3.5 Million for Innovative Transportation Research

Chriss Swaney

The U.S. Department of Transportation has awarded Carnegie Mellon’s College of Engineering and the University of Pennsylvania’s School of Engineering and Applied Science a $3.5 million grant for the next two years to conduct research and implement technologies for improving the safety and efficiency of transportation. Through this new University Transportation Center (UTC), CMU and Penn will explore cutting-edge technologies that could influence everything from the safety of vehicles and roads to the analysis of traffic flow. The consortium will also establish a workforce development program to train graduate students in modern transportation-related technologies and policymaking.

This Carnegie Mellon/Penn UTC for technologies for Safe and Efficient Transportation, or T-SET UTC, a Tier I National Center, will be located at Carnegie Mellon in Pittsburgh. Raj Rajkumar, the George Westinghouse Professor of ECE and Robotics at CMU, will serve as the director.

"State-of-the-art computing and communication technologies can significantly advance the safety and efficiency of transportation, since extending the physical infrastructure is both very expensive and limited by existing road layouts," Rajkumar said. He also says that the new center taps a broad swath of new and ongoing research at both universities.

"The idea behind the center was to bring together computer science, electrical engineering and mechanical engineering to do research that will impact how people commute, drive and move around the country," said Daniel Lee, an associate professor in Penn’s engineering school and the lead Penn faculty member on the proposal.

Research in the areas of vehicular information technologies, autonomous vehicles, enhancements for safer driving and the development of novel human-vehicle interactions without overloading the driver will be a large part of the center’s work. Technology deployment, collaboration and diversity of the technical workforce will also be key goals.

At Carnegie Mellon, the new center will also engage work underway by Traffic 21, a multidisciplinary research team working to design and deploy information and communications for developing safer, more economic transportation solutions that could ultimately save more than 30,000 lives lost each year in traffic accidents.

“We are especially grateful for the support of the Hillman Foundation in providing needed matching funds through the Traffic21 Initiative that enabled us to win this competition,” Rajkumar said. The foundation enabled the university to launch the Traffic21 Initiative in July 2009.

The Carnegie Mellon/Penn UTC was chosen as one of 22 grant recipients out of 63 applicants in a competitive process, aimed at eliciting transformative transportation research from the nation’s universities. A consortium called CT-SET will be associated with the T-SET UTC. This consortium has partnered with more than 20 private, government and nonprofit organizations, including the City of Philadelphia and the City of Pittsburgh, among others.

“CMU, Penn Engineering Receive $3.5 Million for Innovative Transportation Research” was authored by Chriss Swaney.
Build18 Teams Find Their Inner Entrepreneurs

ECE students made headlines in January when more than 120 tinkers and gadgeters participated in the department’s Build18 initiative, a week of building and speed hacking for students, by students. Now in its third year, the engineering festival encourages groups of students to innovate and create solutions to problems they choose themselves, free from the pressure of tests, exams and formal project reviews. ECE students run the event, coordinating everything from the project applications to finding corporate sponsors. The department kicks in lab space, equipment and conference rooms. The result? A weeklong hackfest that gives students a chance to find their inner entrepreneurs.

“Build18 is a great and unique opportunity to complement our studies with the application of real-world engineering skills. That means using what we learn in electrical and computer engineering to create a cool product in a short time. We work in teams to devise innovative technical solutions, on the fly, with the equipment available,” said Erik Schmidt, an ECE senior and Build18 leader.

This year, some of the projects featured at the end of the week included a sensor-sensitive vest to monitor safety features for the avid cyclist and a specially designed “Embarrass-You-Awake-Inator“ digital clock that posts photos to Twitter to incentivize the sleeper to wake up. They were just two of more than 30 projects that filled the halls of Hamerschlag to overflowing. (For a complete list of projects, see www.build18.org.)

Build18 also attracted attention from both local and national media, with stories landing in the Pittsburgh Tribune-Review and publications like the New Jersey Herald.

Following their project demos, Build18 participants attended a dinner and banquet, where six teams earned recognition for their hacking efforts:

Outstanding Project: FPGA Game of Life (Assistant Teaching Professor Bill Nace, Ross Daly, Paul Kennedy, Greg Nazario)

First Penguin — for the “first penguin to jump off the iceberg into unknown waters,” inspired by Randy Pausch’s “Last Lecture”: Printensity (Harrison Rose, Robbie Wedler)

Builder’s Choice: RGB Propeller Clock (Costas Akrivoulis, Jitu Das, John Howland, Allan Wang)

Faculty Award — for the team with the most polished product at the end of the week: Nixie Tube Retro Clock (Laura Bloch, Sam Klonaris, Derek Miller, Sara Roy)

Officer’s Choice: Mindnet (Neil Abcouwer, Daniel Jacobs, Ben Wasserman)

Lab Rat — for the team that consistently made it to the lab first and left last: LED Bike Safety Vest (Pronoy Biswas, Chris Leaf)

While initial project demos took place in January, Build18 teams tinkered throughout the semester, refining their creations for the final project showcase at ECE Day in May.

For more on Build18, visit http://www.build18.org/.

Emily Grove applies sensors to teammate Billy Keyes’ head as part of their Personal Soundtrack Device, which uses heart rate, ambient light level and sound level in the environment to generate a soundtrack that loosely corresponds to what is happening around the user.

Pronoy Biswas and Chris Leaf won the Lab Rat Award — first in the lab and last to leave — for their work on LED Bike Safety Vest. The vest will display data pertinent to a biker’s safety for other motorists, like speed and if the biker is coming to a stop.

Anand Pattabiraman and Nikhil Bikhchandani’s Find Another Device System (FADS) has two parts: a central hub and device tags. As you move closer to your missing device, either the hub or the device itself will beep or blink.

Esha Uboweja and Samantha Traiman developed Afterthought, an audio recorder that can capture what was just said without premeditation. Just hit a button and it captures what just happened.
Build18 Teams Find Their Inner Entrepreneurs

ECE students made headlines in January when more than 120 tinkerers and gadgeters participated in the department’s Build18 initiative, a week of building and speed hacking for students, by students. Now in its third year, the engineering festival encourages groups of students to innovate and create solutions to problems they choose themselves, free from the pressure of tests, exams and formal project reviews. ECE students run the event, coordinating everything from the project applications to finding corporate sponsors. The department kicks in lab space, equipment and conference rooms. The result? A weeklong hackfest that gives students a chance to find their inner entrepreneurs.

“Build18 is a great and unique opportunity to complement our studies with the application of real-world engineering skills. That means using what we learn in electrical and computer engineering to create a cool product in a short time. We work in teams to devise innovative technical solutions, on the fly, with the equipment available,” said Erik Schmidt, an ECE senior and Build18 leader.

This year, some of the projects featured at the end of the week included a sensor-sensitive vest to monitor safety features for the avid cyclist and a specially designed “Embarrass-You-Awake-Inator” digital clock that posts photos to Twitter to incentivize the sleeper to wake up. They were just two of more than 30 projects that filled the halls of Hamerschlag to overflowing. (For a complete list of projects, see www.build18.org.)

Build18 also attracted attention from both local and national media, with stories landing in the Pittsburgh Tribune-Review and publications like the New Jersey Herald.

Following their project demos, Build18 participants attended a dinner and banquet, where six teams earned recognition for their hacking efforts:

Outstanding Project: FPGA Game of Life (Assistant Teaching Professor Bill Nace, Ross Daly, Paul Kennedy, Greg Nazario)

First Penguin — for the “first penguin to jump off the iceberg into unknown waters,” inspired by Randy’s Pausch’s “Last Lecture”: Printensity (Harrison Rose, Robbie Wedler)

Builder’s Choice: RGB Propeller Clock (Costas Akrivoulis, Jitu Das, John Howland, Allan Wang)

Faculty Award — for the team with the most polished product at the end of the week: Ninie Tube Retro Clock (Laura Bloch, Sam Klonaris, Derek Miller, Sara Roy)

Officer’s Choice: Mindnet (Neil Abcouwer, Daniel Jacobs, Ben Wasserman)

Lab Rat — for the team that consistently made it to the lab first and last to leave: LED Bike Safety Vest (Pronoy Biswas, Chris Leaf)

While initial project demos took place in January, Build18 teams tinkered throughout the semester, refining their creations for the final project showcase at ECE Day in May.

For more on Build18, visit http://www.build18.org/.

Pronoy Biswas and Chris Leaf won the Lab Rat Award — first in the lab and last to leave — for their work on LED Bike Safety Vest. The vest will display data pertinent to a biker’s safety for other motorists, like speed and if the biker is coming to a stop.

Emily Grove applies sensors to teammate Billy Keyes’ head as part of their Personal Soundtrack Device, which uses heart rate, ambient light level and sound level in the environment to generate a soundtrack that loosely corresponds to what is happening around the user.

Anand Patabiraman and Nikhil Bikhchandani’s Find Another Device System (FADS) has two parts: a central hub and device tags. As you move closer to your missing device, either the hub or the device itself will beep or blink.

Esha Uboweja and Samantha Traiman developed Afterthought, an audio recorder that can capture what was just said without premeditation. Just hit a button and it captures what just happened.

The U.S. Department of Transportation has awarded Carnegie Mellon’s College of Engineering and the University of Pennsylvania’s School of Engineering and Applied Science a $3.5 million grant for the next two years to conduct research and implement technologies for improving the safety and efficiency of transportation. Through this new University Transportation Center (UTC), CMU and Penn will explore cutting-edge technologies that could influence everything from the safety of vehicles and roads to the analysis of traffic flow. The consortium will also establish a workforce development program to train graduate students in modern transportation-related technologies and policymaking.

This Carnegie Mellon/Penn UTC for technologies for Safe and Efficient Transportation, or T-SET UTC, a Tier 1 National Center, will be located at Carnegie Mellon in Pittsburgh. Raj Rajkumar, the George Westinghouse Professor of ECE and Robotics at CMU, will serve as the director.

“The idea behind the center was to bring together computer science, electrical engineering and mechanical engineering to do research that will impact how people commute, drive and move around the country,” said Daniel Lee, an associate professor in Penn’s engineering school and the lead Penn faculty member on the proposal.

Research in the areas of vehicular information technologies, autonomous vehicles, enhancements for safer driving and the development of novel human-vehicle interactions without overloading the driver will be a large part of the center’s work. Technology deployment, collaboration and diversity of the technical workforce will also be key goals.

At Carnegie Mellon, the new center will also engage work underway by Traffic 21, a multidisciplinary research team working to design and deploy information and communications for developing safer, more economic transportation solutions that could ultimately save more than 30,000 lives lost each year in traffic accidents.

“We are especially grateful for the support of the Hillman Foundation in providing needed matching funds through the Traffic21 Initiative that enabled us to win this competition,” Rajkumar said. The foundation enabled the university to launch the Traffic21 Initiative in July 2009.

The Carnegie Mellon/Penn UTC was chosen as one of 22 grant recipients out of 63 applicants in a competitive process, aimed at eliciting transformative transportation research from the nation’s universities. A consortium called CT-SET will be associated with the T-SET UTC. This consortium has partnered with more than 20 private, government and nonprofit organizations, including the City of Philadelphia and the City of Pittsburgh, among others.
ECE’s Global Reach Extends to China

CMU, Sun Yat-sen
Develop Joint Institute of Engineering

By the time the next issue of Currents hits mailboxes, Carnegie Mellon’s ECE Department will have faculty and students on the ground, operating a graduate program in China. The program is part of a collaboration between CMU and Sun Yat-sen University (SYSU) to establish a joint Institute of Engineering in Guangzhou, China, that will begin offering master’s and doctoral degrees in electrical and computer engineering in 2013. SYSU is located in southern China in Guangzhou along the Pearl River Delta, an important economic and technological hub of the Asia-Pacific region.

“We are pleased to partner with Sun Yat-sen University, which has a long history as one of China’s finest institutions,” said CMU President Jared L. Cohen. “Working with SYSU, we hope to usher in a new era of engineering education in China. We look forward to bringing CMU’s innovative style, technological expertise and creative problem-solving to the region.”

“We selected CMU because its great academic and research reputation fits nicely with south China’s vision of growing its global IT and electronics companies and training a critical mass of IT professionals with an innovative and entrepreneurship mindset,” said SYSU President Xu Ningheng, one of China’s top physicists.

The mission of the joint Institute of Engineering, led in the planning stages by ECE’s ABB Professor of Engineering Jimmy Zhu, will be to deliver world-class education in engineering, perform cutting-edge research and development, and find solutions to real-world engineering problems. Another goal is to help implement successful technology transfer to China-based industries, including helping move Chinese industries from mass-production to technology-innovation-based businesses.

The program will accept 80 master’s students and five Ph.D. students per academic year, with the master’s program taking roughly three semesters and the doctoral program requiring four to five years. During the program, students at both levels will spend a portion of their time on the Pittsburgh campus, and will also have the chance to take classes in Pittsburgh via distance learning facilities. Research funding will be available to faculty members in Pittsburgh to explore collaboration efforts with colleagues in China.

“This is the first effort between a top-notch, world-renowned engineering school and a prominent university in China to issue a program that trains highly qualified people to perform innovative research, make an impact on the world and invent new technology,” said Zhu. “For a university like Carnegie Mellon, the goal is really to make an impact on the world. This initiative will do just that.”

Watch www.ece.cmu.edu for news as this exciting collaboration moves forward.

Intel Corporation has two new homes on the Carnegie Mellon campus, and ECE faculty members are heading up both of them.

Stephen J. Jatras Professor of ECE Gregory Ganger and Associate ECE Professor Priya Narasimhan will head new Intel Science and Technology Centers (ISTC) based at CMU that will focus on cloud and embedded computing. Each center involves multiple universities and will receive $15 million over the next five years.

The ISTC for Cloud Computing forms a new research community that broadens Intel’s “Cloud 2015” vision with new ideas from top academic researchers. In addition to CMU, the center includes researchers from the Georgia Institute of Technology, the University of California at Berkeley, Princeton University and Intel. Researchers will explore technologies that will have important implications for the cloud, from more efficient and effective support of big data analysis to making the cloud more distributed and localized by extending cloud capabilities to the network and client devices.

“Imagine, for example, future cars equipped with embedded sensors and microprocessors to constantly collect and analyze traffic and weather data. That information could be analyzed and shared in the cloud so that drivers could be provided with suggestions for quicker and safer routes.”

The centers represent the next $30 million installment of Intel’s five-year, $100 million ISTC program to increase university research and accelerate innovation in a handful of key areas. Intel previously announced ISTCs in visual computing and secure computing, headquartered at Stanford University and the University of California at Berkeley, respectively. CMU researchers are also part of the ISTC for Secure Computing.

Ganger, Narasimhan
Head New Intel Science and Technology Centers

Associate ECE Professor Priya Narasimhan and Stephen J. Jatras Professor of ECE Gregory Ganger
When Arjun Athreya stepped off the plane in Pittsburgh more than two years ago, he felt a little feverish. While the Bangalore, India, native had never been to the Steel City, living in a new place didn’t make him anxious. Rather, it was the prospect of studying a master’s degree in one of the nation’s top ten electrical and computer engineer- ing programs. When the idea hit him lightly, he wasn’t sure how he would get everything started here — new friendships, academics, his life.

Luckily, Carnegie Mellon ECE had him covered.

“ECE has this fantastic concept of as- signing every student an individual faculty mentor,” Arjun said. “The first thing I did was drop by Professor James Bain’s office and talk to him about what I’d done prior to coming to Carnegie Mellon and what I wanted to do by the time I finished my mas- ter’s degree. He gave me a good outline for how I needed to proceed. That was when I really gained confidence in myself — to know that I could really do something here. More importantly, he asked me to enjoy the new country, new cultures and their offerings while I continued to focus on my goals.”

While Carnegie Mellon boasts a strong reputation in the U.S. and abroad, it may still seem odd to travel so far for a mas- ter’s degree, but Arjun said it was a natural choice. He grew up listening to his father, also an engineering graduate and entrepre- neur, reminisce with colleagues about their graduate school experiences in the U.S. By the time he graduated from RV College of Engineering in Bangalore in 2009, Arjun knew that was his path as well. ECE at CMU seemed natural. Not only will he get a world-class engineering education, but he’ll have access to the brains and venture capi- talists building the technology of the future.

“The bicoastal program is more than giving a student his or her degree,” he said. “It’s also about making the most of being at the right place at the right time.”

While Arjun doesn’t rule out a career as an industrial researcher, he really hopes to develop a practical solution to a research problem that he can market. “I wouldn’t hesitate to take the entrepreneurship road,” he said. “All I need is some support, advice and motivation. ECE and CMU have fantast- ic people and support for such a vision.”

For now, he continues to build his success in the Ph.D. program on the strong founda- tion he received in the PMP.

“During the last hour of Arjun’s last day at Cisco, his manager notified him that the company planned to file for a U.S. pat- ent on the work he’d done. So along with gaining experience with some of the best engineers in the U.S., he also had a chance to work with a leading patent attorney. Not bad for a summer job.”

In fact, Arjun’s experience at Cisco and his interactions with Silicon Valley’s movers and shakers inspired him to apply for ECE’s bioacoustic Ph.D. program at CMU Silicon Valley. The program’s goal is to teach Arjun’s alley — exploring the possibilities for developing and applying future mobile and commu- nication technologies. He joins more than 30 ECE Ph.D. students who call the West Coast home but often spend time at the Pittsburgh campus to take advantage of its expanded course offerings.

Arjun says that just like his decision to attend grad school in the U.S., his choice to remain in Silicon Valley and pursue a Ph.D. seemed natural. Not only will he get a world-class engineering education, but he’ll have access to the brains and venture capital- ists building the technology of the future.

“The bicoastal program is more than giving a student his or her degree,” he said. “It’s also about making the most of being at the right place at the right time.”

While Arjun doesn’t rule out a career as an industrial researcher, he really hopes to develop a practical solution to a research problem that he can market. “I wouldn’t hesitate to take the entrepreneurship road,” he said. “All I need is some support, advice and motivation. ECE and CMU have fantast- ic people and support for such a vision.”

For now, he continues to build his success in the Ph.D. program on the strong founda- tion he received in the PMP.

“I think the best thing about my experience in the master’s program was my fantastic working relationship with my faculty advis- or,” Arjun said. “The second important takeaway from the program would be the relationships I developed with my fellow classmates and people in industry. Last, but not least, I think I have a good relation- ship with many faculty members here. It’s much more than attending their classes and listening to their lectures. It’s more about how we want to do together in the future and how we could collaborate to achieve good results.

“The kind of training and support you get here at CMU ECE gives you the confidence and zeal to go out, create an interesting engineering problem you believe you can solve, and actually work toward that solu- tion,” he said.

Now, he doesn’t have anything to fear.

Ph.D. seems natural. Not only will he get a world-class engineering education, but he’ll have access to the brains and venture capi- talists building the technology of the future.

“If you want to do a Ph.D., CMU is a great place to be,” Arjun said. “By the time I finished my master’s degree, I knew that was my path. I went to CMU ECE and signed every student an individual faculty mentor,” Arjun said. “The first thing I did was drop by Professor James Bain’s office and talk to him about what I’d done prior to coming to Carnegie Mellon and what I wanted to do by the time I finished my mas- ter’s degree. He gave me a good outline for how I needed to proceed. That was when I really gained confidence in myself — to know that I could really do something here. More importantly, he asked me to enjoy the new country, new cultures and their offerings while I continued to focus on my goals.”

While Carnegie Mellon boasts a strong reputation in the U.S. and abroad, it may still seem odd to travel so far for a mas- ter’s degree, but Arjun said it was a natural choice. He grew up listening to his father, also an engineering graduate and entrepre- neur, reminisce with colleagues about their graduate school experiences in the U.S. By the time he graduated from RV College of Engineering in Bangalore in 2009, Arjun knew that was his path as well. ECE at CMU seemed natural. Not only will he get a world-class engineering education, but he’ll have access to the brains and venture capi- talists building the technology of the future.

“The bicoastal program is more than giving a student his or her degree,” he said. “It’s also about making the most of being at the right place at the right time.”

While Arjun doesn’t rule out a career as an industrial researcher, he really hopes to develop a practical solution to a research problem that he can market. “I wouldn’t hesitate to take the entrepreneurship road,” he said. “All I need is some support, advice and motivation. ECE and CMU have fantast- ic people and support for such a vision.”

For now, he continues to build his success in the Ph.D. program on the strong founda- tion he received in the PMP.

“I think the best thing about my experience in the master’s program was my fantastic working relationship with my faculty advis- or,” Arjun said. “The second important takeaway from the program would be the relationships I developed with my fellow classmates and people in industry. Last, but not least, I think I have a good relation- ship with many faculty members here. It’s much more than attending their classes and listening to their lectures. It’s more about how we want to do together in the future and how we could collaborate to achieve good results.

“The kind of training and support you get here at CMU ECE gives you the confidence and zeal to go out, create an interesting engineering problem you believe you can solve, and actually work toward that solu- tion,” he said.

Now, he doesn’t have anything to fear.
CMU-R will offer master’s degree programs aimed at preparing students to be innovators and leaders in the emerging information and communication technology (ICT) industry in Africa. Our MS degree program will be an MS in information technology (MSIT) with a broad set of core courses in software engineering, data communication networks, wireless technology, information security and business strategies in ICT. Elective courses will give students depth in a variety of areas related to mobile technology, broadband internet and cloud computing. The first class of students for the MSIT will be admitted this coming August. We will begin offering the MS ECE degree two years later. There will be 150 students in both the MSIT and MS ECE degree programs in the next six years.

What are the admission requirements for CMU-R?

CMU-R will have its own application and admissions process. The requirements for admission to CMU-R will be the same as the standards for other CMU graduate programs.

How many faculty and staff members will CMU-R have?

We will begin the first year with three faculty members. The plan is to ramp up to approximately 15 faculty members as the number of students increases. There will also be a full staff in Kigali supporting all aspects of the program, from admissions to IT, just as we have at our other campuses.

As director of the program, what are your responsibilities?

I’ll be responsible for the overall development and administration of CMU-R. This includes recruiting faculty, hiring staff, and overseeing the development and delivery of the degree programs.

Rwanda conjures up certain images in peoples’ minds. Why would Carnegie Mellon — and the ECE Department — want to offer programs there?

When people hear we are opening a campus in Rwanda, their initial response is almost always surprise — it was certainly my response when I heard about it the first time. Rwanda is one of the most familiar countries in Africa and throughout the world because of the horrific genocide that occurred in 1994, only 18 years ago. What is much less known is that during the past decade Rwanda has become one of the most rapidly developing countries in sub-Saharan Africa. Following a roadmap called Rwanda Vision 2020, the GoR has been pursuing an ambitious program to establish a knowledge-based economy, and the progress has been remarkable. Rwanda has laid the foundations of a technological infrastructure along with an attractive atmosphere for business and entrepreneurship, making it an ideal location for Carnegie Mellon to establish its first presence in Africa. As the first major U.S. research university to offer an in-country degree program in Africa, CMU and ECE have the opportunity to take leadership — and create leadership — in a region of the world that many predict may experience the most rapid technological development in history.

What made you decide to take this position?

I decided to take the position as founding director of CMU-R because it is such an amazing and unusual opportunity to be involved in developing a new program in a part of the world where the potential impact is difficult to overestimate. When making major decisions about what to do, I always ask myself, “Is this something I think I’ll be glad I did when I look back on it 10 or 15 years from now?” In this case, the answer was clear.

Can a musical fountain controller change the course of someone’s future? It sure can. Just ask Haatri Khan, who designed and implemented one as a minor course project during his junior year in the electrical and electronics engineering program at India’s National Institute of Technology Karnataka. In that project, he fell in love with embedded systems. And just like that, he was on a road that would eventually lead him to Samsung, via Carnegie Mellon’s Professional Master’s Program in ECE.

Khan said he was inspired to travel to Pittsburgh to earn his master’s degree at Carnegie Mellon was simple. “While researching which U.S. universities to apply to for a master’s program, Carnegie Mellon’s ECE Department became an obvious choice for me because of the courses it offers and research it performs in embedded systems.”

Like Arjun Athreya (see story on previous page), Khan at first felt anxious when he arrived in Pittsburgh. But as time went on, his interactions with faculty members and newfound friends helped ease that anxiety and encouraged him as he became more focused on pursuing his goals. Also like Athreya — and many of his PMP colleagues — Khan jumped at the chance to take a summer internship, in his case with Samsung Telecommunications America in Dallas during the summer of 2008.

Professionally, the internship introduced him to the mobile phone industry. “It was my first look at how the devices were done in the real world, my first chance at contributing toward software that went into the hands of millions of customers,” he said. More than that, the internship offered him an opportunity to interact with interesting, dedicated people in the industry.

The work he did and connections he made at Samsung led to a full-time job offer from Samsung. “I accepted. Since joining the company’s Device Management team, he’s worked on Samsung’s Android devices, developing device management solutions customized for Samsung’s Sprint customers for the first year, then adapting that solution for Verizon’s Android devices the next year. Earlier this year, Samsung promoted Khan to senior engineer and appointed him technical lead for developing a solution to make Android devices more enterprise-friendly, in an effort to enable widespread acceptance of Android mobile devices in both local and global enterprises. In this role, he coordinates technical teams in the U.S., South Korea and at other Samsung centers across the globe.

Khan says his ECE education was vital to enabling the work he does today. “Most of the courses I took during my stay at CMU form the backbone of what I do at work. But the most significant lesson I learned during my CMU ECE education was the emphasis on applying one’s knowledge to solving real-world problems,” he said. “Anyone can gather knowledge, but to apply that knowledge to solve existing technical challenges in the most efficient manner is an art one learns at CMU.”

Bruce Krogh Talks CMU-Rwanda

CMU announced plans earlier this year to extend its global academic reach to Rwanda, where it will be the first major higher education institution in the U.S. to offer graduate engineering degree programs. Initially, the university will establish and operate an academic program in Kigali that offers a master’s degree in information and communication technology. CMU-Rwanda (CMU-R) will also work with the Rwandan government to develop an innovation incubator, advanced practical training programs, executive education programs and a mobility research center.

ECE Professor Bruce Krogh will lead the Rwanda program, and provides insight into its offerings, plans for the future and the university’s decision to open a campus there.

What kind of programs will CMU-Rwanda offer?

CMU-R will offer master’s degree programs aimed at preparing students to be innovators and leaders in the emerging information and communication technology (ICT) industry in Africa. Our MS degree program will be an MS in information technology (MSIT) with a broad set of core courses in software engineering, data communication networks, wireless technology, information security and business strategies in ICT. Elective courses will give students depth in a variety of areas related to mobile technology, broadband internet and cloud computing. The first class of students for the MSIT will be admitted this coming August. We will begin offering the MS ECE degree two years later. There will be 150 students in both the MSIT and MS ECE degree programs in the next six years.

What are the admission requirements for CMU-R?

CMU-R will have its own application and admissions process. The requirements for admission to CMU-R will be the same as the standards for other CMU graduate programs.

How many faculty and staff members will CMU-R have?

We will begin the first year with three faculty members. The plan is to ramp up to approximately 15 faculty members as the number of students increases. There will also be a full staff in Kigali supporting all aspects of the program, from admissions to IT, just as we have at our other campuses.

As director of the program, what are your responsibilities?

I’ll be responsible for the overall development and administration of CMU-R. This includes recruiting faculty, hiring staff, and overseeing the development and delivery of the degree programs.

Rwanda conjures up certain images in peoples’ minds. Why would Carnegie Mellon — and the ECE Department — want to offer programs there?

When people hear we are opening a campus in Rwanda, their initial response is almost always surprise — it was certainly my response when I heard about it the first time. Rwanda is one of the most familiar countries in Africa and throughout the world because of the horrific genocide that occurred in 1994, only 18 years ago. What is much less known is that during the past decade Rwanda has become one of the most rapidly developing countries in sub-Saharan Africa. Following a roadmap called Rwanda Vision 2020, the GoR has been pursuing an ambitious program to establish a knowledge-based economy, and the progress has been remarkable. Rwanda has laid the foundations of a technological infrastructure along with an attractive atmosphere for business and entrepreneurship, making it an ideal location for Carnegie Mellon to establish its first presence in Africa. As the first major U.S. research university to offer an in-country degree program in Africa, CMU and ECE have the opportunity to take leadership — and create leadership — in a region of the world that many predict may experience the most rapid technological development in history.

What made you decide to take this position?

I decided to take the position as founding director of CMU-R because it is such an amazing and unusual opportunity to be involved in developing a new program in a part of the world where the potential impact is difficult to overestimate. When making major decisions about what to do, I always ask myself, “Is this something I think I’ll be glad I did when I look back on it 10 or 15 years from now?” In this case, the answer was clear.

Can a musical fountain controller change the course of someone’s future? It sure can. Just ask Haatri Khan, who designed and implemented one as a minor course project during his junior year in the electrical and electronics engineering program at India’s National Institute of Technology Karnataka. In that project, he fell in love with embedded systems. And just like that, he was on a road that would eventually lead him to Samsung, via Carnegie Mellon’s Professional Master’s Program in ECE.

Khan said he was inspired to travel to Pittsburgh to earn his master’s degree at Carnegie Mellon was simple. “While researching which U.S. universities to apply to for a master’s program, Carnegie Mellon’s ECE Department became an obvious choice for me because of the courses it offers and research it performs in embedded systems.”

Like Arjun Athreya (see story on previous page), Khan at first felt anxious when he arrived in Pittsburgh. But as time went on, his interactions with faculty members and newfound friends helped ease that anxiety and encouraged him as he became more focused on pursuing his goals. Also like Athreya — and many of his PMP colleagues — Khan jumped at the chance to take a summer internship, in his case with Samsung Telecommunications America in Dallas during the summer of 2008.

Professionally, the internship introduced him to the mobile phone industry. “It was my first look at how the devices were done in the real world, my first chance at contributing toward software that went into the hands of millions of customers,” he said. More than that, the internship offered him an opportunity to interact with interesting, dedicated people in the industry.

The work he did and connections he made at Samsung led to a full-time job offer from Samsung. “I accepted. Since joining the company’s Device Management team, he’s worked on Samsung’s Android devices, developing device management solutions customized for Samsung’s Sprint customers for the first year, then adapting that solution for Verizon’s Android devices the next year. Earlier this year, Samsung promoted Khan to senior engineer and appointed him technical lead for developing a solution to make Android devices more enterprise-friendly, in an effort to enable widespread acceptance of Android mobile devices in both local and global enterprises. In this role, he coordinates technical teams in the U.S., South Korea and at other Samsung centers across the globe.

Khan says his ECE education was vital to enabling the work he does today. “Most of the courses I took during my stay at CMU form the backbone of what I do at work. But the most significant lesson I learned during my CMU ECE education was the emphasis on applying one’s knowledge to solving real-world problems,” he said. “Anyone can gather knowledge, but to apply that knowledge to solve existing technical challenges in the most efficient manner is an art one learns at CMU.”
Dear ECE Alumni,

In past issues of Currents, I have described the activities and initiatives of the five (now six) ECE student organizations to give you a better idea of what life outside the classroom is like for current and past ECE students. The Department is proud that academic pursuits (course work and research) are as rigorous and challenging as ever – there simply has been an increase in the amount and variety of “extracurricular” activities (MAAs) offered by and for the students. Approximately, 100 MAAs have been largely driven by the students themselves and are designed to be a bridge between the curriculum and the professional world. They also provide an alumni/industry interface.

In this issue, I’d like to focus on the ECE Alumni Relations Program – what it comprises, how alumni like you have influenced it and where it may be headed. First, let’s give it a campus-wide context.

When students graduate and become alumni of their academic institution, they eventually decide what level of connection they would like to have with their university, college and home department. This may change over time to accommodate the different stages of their lives. In other words, it’s not just a matter of interest, but availability and what can be added to existing personal and professional obligations. Fortunately, there are many ways to exercise CMU loyalty and retain that valuable campus connection throughout one’s life. Alumni need only choose what works for them and “customize” their involvement.

For example, an alumnus may enjoy returning each year for homecoming (and Colonial Day) as a matter of tradition and transition. He or she may be asked to serve on a curriculum committee (on a campus council or advisory board) and decide that the com- mitment fits will current goals or is simply a “call to service” they wish to acknowledge. An alumnus may decide to be active in the alumni chapter in their geographic region and volunteer to plan and host social, professional or technical events for the alumni community. Still others volunteer to meet with prospective or new Carnegie Mellon student targets in their area, to welcome them and answer their questions. I’m proud to say that ECE alumni are active in all of these capacities.

When ECE decided, almost a decade ago, to add an academic department alumni relations program, the reasoning was straightforward. We wanted to provide discipline-specific opportunities to reconnect, and specific ways that our alumni could remain involved and informed about ECE and CMU. We knew that ECE, as an applied discipline and professional organization, had a community of alumni that would appreciate networking opportunities. Therefore, we’ve held between five and seven alumni events per year in cities with the greatest concentration of graduates with degrees from ECE.

We also saw the potential for an extended community that reflected the full lifecycle of experience, from student to alumni to industry expert ready to return to campus with technical and career information and jobs for current ECE students. This latter area of activity has seen tremendous growth in the last few years, and there is evidence that it has enriched and benefited all concerned. In the adjacent column is a list of the CMU and ECE alumni who have given talks to bachelor’s, master’s and Ph.D. students in ECE just during the fall 2011 semester. They have utilized the IEEE TechCareer Forums, an alumni event that is co-hosted by the IEEE student chapters and the college. (There are additional talks given by alumni that are hosted by the ECE research centers.)

The second column indicates that ECE alumni events are everywhere! Here’s a-by-the-numbers look at just how far we reach.

Each year, ECE welcomes alumni back to campus for opportunities to share their experiences with current ECE-ers. Thanks to our alumni for contributing to the career and professional development of our students.

In the adjacent column is a list of the CMU and ECE alumni who have given talks to bachelor’s, master’s and Ph.D. students in ECE just during the fall 2011 semester. They have utilized the IEEE TechCareer Forums, an alumni event that is co-hosted by theIEEE student chapters and the college. (There are additional talks given by alumni that are hosted by the ECE research centers.)

In the adjacent column is a list of the CMU and ECE alumni who have given talks to bachelor’s, master’s and Ph.D. students in ECE just during the fall 2011 semester. They have utilized theIEEE TechCareer Forums, an alumni event that is co-hosted by theIEEE student chapters and the college. (There are additional talks given by alumni that are hosted by the ECE research centers.)

Alumni@ECE

Susan Farrington
Cyber–Physical Systems

Nicholas Gentry

Assistant Research Professor Anthony Rowe places a $300 plastic flying toy drone on the floor inside a parking garage in Carnegie Mellon’s Collaborative Innovation Center. The drone has four propellers, and maneuvers about a foot-and-a-half wide. Camera lenses on the bottom and front send images to a human controller on the ground.

By design, an iPhone controls the drone — tilt the phone forward and the drone flies forward; tilt it back and the drone flies backward — but Rowe and his students are retrofitting it to fly without a plot. They also want it to communicate with other devices across a wireless network, much like cell phones already do.

Ask Rowe what the point is and he might tell you to imagine a scenario like the aftermath of Hurricane Katrina. Linelines are down, cell phones won’t work, roads are jammed and people need to be saved. Rescue workers arrive on the scene and release small flying drones from their backpacks. Once airborne, the drones self-arrange into a grid above the city and start relaying visual information to rescue workers on the ground. At the same time, they set up an impromptu communications network that restores cell phone usage across the city, providing a lifeline for those in danger.

Unlike helicopters and state-of-the-art military drones, flying minidrones can blanket and monitor an entire citywide airspace without landing pads, fossil fuels or pilots. And at less than $1,000 per unit, they are an affordable alternative to the $4.5 million per-unit priced military drones actually used in Hurricane Katrina’s aftermath.

Welcome to the world of cyber-physical systems — one of ECE’s most rapidly growing fields of interdisciplinary research and development.

Cyber–physical systems (CPS) result from adding computational and/or communications elements to previously passive physical tools. “To me, cyber-physical systems refer to the embedding of sensing, communications and computing into physical spaces,” said ECE Assistant Professor Bruno Sinopoli. “This makes physical spaces smarter, more cybernetic (i.e., cybernetic) abilities to physical hardware that previously had no cybernetic functions.”

George Westinghouse Professor Raj Rajkumar, who co-directs the General Motors–Carnegie Mellon Autonomous Driving Collaborative Research Lab, believes cyber-physical technology will improve nearly every domain of our lives. One day, buildings will adjust their temperatures according to the weather forecast, or doctors will perform battlefield surgeries from hundreds of miles away. To convert these ideas into realities, Rajkumar and Rowe are collaborating with their colleagues at CMU and around the world to advance cyber-physical technology.

“Our goal is to lead a community across the country and around the world to build a case for CPS...”

Continued from previous page.

and idea sharing. In that context, ECE alumni (as natural innovators and problem-solvers) are starting to provide the input and feedback we need to further develop this academic AP program. (Why operate in a vacuum when an extraordinary community can tell you its preferences?)

Here are just a few of the ideas surfacing about how to focus, improve and increase ECE alumni community engagement:

• Choose and use electronic media that will enable alumni to keep the connections they make at ECE/SOC events and have more frequent updates.

• Develop an opt-in approach for alumni who want to be aware of career opportunities aimed at them.

• Identify topics that target trends in ECE alumni professional activity (e.g., entrepreneurship) and find unique ways to deliver content by tapping into alumni expertise in specific areas.

• Expand the number and type of area alumni events by having alumni volunteers coordinate/suggest some of that activity.

If you have input on these ideas or other suggestions for consideration, please send them to alumni@ece.cmu.edu.

I think it’s safe to say that ECE will continue to offer the same type of programming that has been well-received while looking for new ways to engage and connect our alumni, both on campus and around the globe.

Susan Farrington ECE Director, Alumni & Student Relations

ECE Makes Major Advances in Cyber–Physical Systems

Alumni Association Honors ECE Grads

Carnegie Mellon’s Alumni Association named two ECE grads among the winners of its Alumni Awards, presented this past fall during the university’s Cèilidh weekend. First presented in 1950, the Alumni Awards recognize alumni, students, and faculty for their service to both CMU and its alumni, and for their achievements in the arts, humanities, sciences, technology and business.

Nikhil Balram (B’86, ’88, ’92) earned the Achievement Award for his instrumental role in bringing movie-theater quality video to consumers’ homes. His video-processing algorithms fuel devices such as rear-projection and LCD flat-screen televisions, DVD and Blu-ray players and recorders, projectors, audio-visual receivers, and flat-panel computer displays. Balram has held senior leadership positions at Faroudja Labs, National Semiconductor and Marvell Semiconductor Inc. He is currently president and CEO of Ricoh Innovations Inc.

Keith A. Eich (E’02, ’04, HNZ’04) received CMU’s Recent Alumni award for his dedication to Carnegie Mellon students and alumni. Eich became vice president of operations and project management for LegalZoom.com this past summer, and previously served as director of digital distribution operations for GE/NBC Universal, where he worked on the broadcast of the 2008 Olympics and received a General Electric Ovation Award. As president of Carnegie Mellon’s Los Angeles Alumni Chapter, he built chapter leadership, improved the number and range of alumni programs and forged stronger ties with the university’s West Coast Drama Alumni group. Eich is a frequent guest speaker at Carnegie Mellon, and has referred numerous job opportunities to the university’s Career and Professional Development Center.
ECE Faculty Win CIT Awards

Five ECE faculty members were honored in 2011 for their academic and research achievements at the annual CIT Faculty Awards. Raj Rajkumar, the George Westinghouse Professor of Electrical and Computer Engineering at Carnegie Mellon, was honored for his contributions to the field of wireless sensor networks. The award is made to one or more individuals within Carnegie Mellon who have made significant contributions to systems research in areas relevant to the Institute for Complex Engineered Systems (ICES). Assistant Professor Bruno Sinopoli earned the college’s George Tallman Ladd Research Award for his outstanding research contributions to the development of the theory for computing and control technologies in cyber-physical systems. CIT’s Philip L. Dowd Award went to Biomedical Engineering and ECE Professor Juliana Kovacic to recognize her “profound contributions to biomedical engineering...” ABB Professor of ECE, Tony Ganger, was named to the class of 2011, while Rajkumar was named to the class of 2012.

Ganger, the Stephen J. Katras Professor of ECE and computer science and director of the university’s Parallel Data Lab, was honored “for contributions to metadata integrity in file systems.” Ganger has a broad range of research interests in computer systems, including operating systems, storage/file systems, security, networking and distributed systems. He is particularly interested in developing new ways to structure computer systems to address technology changes and enable new applications.

IEEE cited Sinopoli for “contributions to electro-optic devices and heat-assisted magnetic recording.” Since joining Carnegie Mellon in 1985, Sinopoli’s research interests have included broad areas of technology in semiconductor and electro-optic materials, information storage and nanotechnology. He was founding co-director of the ECE Collaborative Research Lab at CMU, served as associate department head from 1998 to 2004 and head of the university’s Data Storage Systems Center from 2004 to 2006. His excellence as an educator earned him the College of Engineering’s Benjamin Rich and Teare Award in 2001.

Rajkumar, head of CMU’s GM Collaborative Lab, earned the rank elevation “for contributions to predictable real-time systems and operating systems.” He has been working for more than a decade to help modernize the auto industry and make driving safe and more economical for consumers. He is featured in a book about the new American released last spring, and was recognized by a distinguished engineer by the Association for Computing Machinery.

ECE Faculty Welcomes New Faculty Members

Welcome to the College of Engineering’s newest faculty members. The College has welcomed five new faculty members to its faculty.

Professor Edmund M. Clarke
Clarke elected to Academy of Arts & Sciences

Edmund M. Clarke, the FORE Systems University Professor of Computer Science and professor of ECE, was among 212 leaders in the sciences, social sciences, humanities, arts, business and public affairs elected to the American Academy of Arts & Sciences (AAAS) in 2011. Clarke is the 17th AAAS member affiliated with Carnegie Mellon.

Clarke, who won the 2007 A.M. Turing Award — often referred to as the Nobel Prize of Computer Science — joined the other 211 members, including jazz icon Dave Brubeck, singer-songwriters Paul Simon and Leonard Cohen, actors Helen Mirren and Daniel Day-Lewis, filmmaker Ken Burns, Nobel laureates El-Chich Noguchi (chemistry) and H. David Politzer (physics), and Ford CEO Alan Mulally, for the Oct. 1 induction ceremony at the academy’s headquarters in Cambridge, Mass.

Franchetti, Voronenko Part of Winning HPC Challenge Team

Assistant Research Professor Franz Franchetti and Ph.D. alumnus Yegeyn Voronenko were part of a team that took top honors in last winter’s HPC Challenge.

Brumley Earns Presidential Early Career Award

Assistant Professor David Brumley won a Presidential Early Career Award for Scientists and Engineers (PECASE) — the highest honor bestowed by the U.S. government on young scientists and engineers. The PECASE program recognizes scientists and engineers who show exceptional leadership at the frontiers of knowledge early in their careers. Brumley’s award recognizes his “innovative and vital research on malware (malicious software) analysis and strong educational and outreach activities.”

“Brumley is the 17th AAAS member affiliated with Carnegie Mellon. Clarke, who won the 2007 A.M. Turing Award — often referred to as the Nobel Prize of Computer Science — joined the other 211 members, including jazz icon Dave Brubeck, singer-songwriters Paul Simon and Leonard Cohen, actors Helen Mirren and Daniel Day-Lewis, filmmaker Ken Burns, Nobel laureates El-Chich Noguchi (chemistry) and H. David Politzer (physics), and Ford CEO Alan Mulally, for the Oct. 1 induction ceremony at the academy’s headquarters in Cambridge, Mass.”

When you have distributed information, the information given by one data point may be irrelevant from the information given by another data point,” Ka said. “My work aims to fuse this information and create a filter that gives a desired level of precision.”

Like Ka, Assistant Research Professor Anthony Rowe also studies the best way to design systems that interact directly with the environment — where poor performance and failure can have catastrophic results. Recently, Rowe, who has an appointment in Carnegie Mellon CyLab, has focused his efforts on developing large-scale sensor networks that are energy-efficient and provide real-time properties.

Franchetti, Voronenko Part of Winning HPC Challenge Team

Assistant Research Professor Franz Franchetti and Ph.D. alumnus Yegeyn Voronenko were part of a team that took top honors in last winter’s HPC Challenge.

Assistant Professor David Brumley

Brumley won a Presidential Early Career Award for Scientists and Engineers (PECASE) — the highest honor bestowed by the U.S. government on young scientists and engineers. The PECASE program recognizes scientists and engineers who show exceptional leadership at the frontiers of knowledge early in their careers. Brumley’s award recognizes his “innovative and vital research on malware (malicious software) analysis and strong educational and outreach activities.”

“Brumley is the 17th AAAS member affiliated with Carnegie Mellon. Clarke, who won the 2007 A.M. Turing Award — often referred to as the Nobel Prize of Computer Science — joined the other 211 members, including jazz icon Dave Brubeck, singer-songwriters Paul Simon and Leonard Cohen, actors Helen Mirren and Daniel Day-Lewis, filmmaker Ken Burns, Nobel laureates El-Chich Noguchi (chemistry) and H. David Politzer (physics), and Ford CEO Alan Mulally, for the Oct. 1 induction ceremony at the academy’s headquarters in Cambridge, Mass.”

When you have distributed information, the information given by one data point may be irrelevant from the information given by another data point,” Ka said. “My work aims to fuse this information and create a filter that gives a desired level of precision.”

Like Ka, Assistant Research Professor Anthony Rowe also studies the best way to design systems that interact directly with the environment — where poor performance and failure can have catastrophic results. Recently, Rowe, who has an appointment in Carnegie Mellon CyLab, has focused his efforts on developing large-scale sensor networks that are energy-efficient and provide real-time properties.

“I see sensor networking as a practical mechanism for bringing contextual information and new abilities to the already numerous embedded systems that surround us,” said Rowe, who earned his Ph.D. from Carnegie Mellon in 2010.

Gianluca Plazza joined the ECE faculty from the University of Pennsylvania, where he led the Penn Micro and Nano Systems (PNNLS) Laboratory. The lab’s activities, which he will continue at CMU, target understanding the fundamental science of micro and nano-electromechanical systems (M/NEMS) to control and manipulate properties of matter, design and fabrication, and devise new classes of M/NEMS that are directly interfaced with electronic circuits.

Piazza earned his Ph.D. in 2005 from the University of California, Berkeley, and his research focused on aluminum nitride piezoelectric resonators for filtering and frequency synthesis. That research resulted in a startup, and part of the IP was recently licensed to Qualcomm. Since earning his Ph.D., Piazza has received five New Faculty NSF CAREER Awards, two NSF CAREER Awards, and three best paper awards at the IEEE Frequency Control Symposiums.

Piazza’s decision to join the CMU ECE community was influenced by the department’s dedication to creating an environment that supports continuous innovations in engineering, and for its commitment to support and fuel new technologies in the M/NEMS field.

“I think that the ECE community at CMU will offer the opportunity to grow the scientific discoveries and device-level engineering done by my group in the areas of community, sensing, and computing into system-level prototypes that could be deployed into commercial products,” Piazza said. “I strongly believe that the excellent cadre of colleagues I join in the ECE Department will favor the broader collaboration efforts that are required to fully engineer innovative devices into systems.”

ECE’s newest faculty member, Jeff Weldon, also earned his Ph.D. at Berkeley in 2005. His dissertation, “High Performance CMOS Transmitters for Wireless Communication,” outlined a method for making high-frequency integrated circuits faster and more affordable. The principles developed in Weldon’s research are commonly used in cell phones and other electronic devices, and have been instrumental in making such devices smaller and more affordable.

“I’m really interested in the marriage of new and old materials. I want to use CMOS technology with things like carbon nanotubes. I hope to make CMOS perform new functions that it doesn’t perform very well right now. This integration of new materials with the power that drives nanotechnology in the near future,” Weldon said.

As part of that interest in merging the old with the new, Weldon helped to create a very functional radio small enough to fit inside a blood cell during his time at Berkeley. The radio consisted of an integrated transmitter/receiver made of a carbon nanotube one thousandth the diameter of a human hair. The nanotube functioned simultaneously as antenna, tuner, amplifier and demodulator.

“I love being free to work on what interests me, and the people here at CMU are very open and great so far,” Weldon said. “I’ve always been aware of CMU’s reputation, particularly in electrical and computer engineering, but what really convinced me to come here was my interview. I’ve visited other departments, and ECE was by far the most collaborative and supportive department I encountered. It’s an ideal place to work, especially for new faculty.”
and how the barrier of distance would be regarded. Eventually, as transistors displaced vacuum tubes, digital systems and applications made it possible to create powerful computer systems into the hands of individuals. This has been true for centuries, though today we see it at an accelerated pace and far more broadly. Gutenberg’s development of printing using movable type was important simply because it represented an increase in efficiency in producing books. Rather, it put into the hands of individuals the books and manuscripts that were once the exclusive property of the institutions of the time. The invention that books and printed materials provided had profound societal impact, and it changed the dynamic between individuals and institutions.

Today we see this same process occurring at an accelerated pace. The issues associated with copyright and music downloads resulted from the technologi cal advances that allowed individuals to produce high-fidelity copies of music and video in a manner once reserved for institutions. Essentially, technology undermined a business model for an industry. The roles of institutions such as newspapers and media companies have been fundamentally changed as the Internet and associated technologies allow individuals to widely publish news, information or opinion. This technological infrastructure has allowed individuals to do what was once reserved for institutions, and they have either made institutions irrelevant or have forced them to consider their role and their added value if they are to survive. Social networking systems are not just about talking to one’s friends. Rather, as we have seen, they allow individuals to organize, communicate and plan popular movements with logistical efficiency once available only to the institutions of the state. We have seen how institutions that are unable to adapt to this change in the balance of power between themselves and individuals have attempted to artificially maintain old models. This has ultimately failed. At the same time, the institutions that provide the tools that empower individuals thrive.

Technologies being developed in the field of electrical and computer engineering will no doubt continue to accelerate this trend and change the nature of the relationship between institutions and individuals. Technological innovations that emerge from ECE will address the most important challenges facing society today. It is no wonder that individuals who seek the opportunity to make profound and important contributions to electrical and computer engineering at Carnegie Mellon are leading many of the most important advances today. Awards Competition. The goal of the competition, which culminates in an awards ceremony at the yearly Supercom putering Conference, is to focus the high performance computing (HPC) community’s attention on developing a broad range of hardware and software capabilities necessary to productively use HPC systems. The HPC Challenge Awards are administered by DARPA’s High Productivity Computing Systems (HPCS) program and sponsored by IDC, a premier global provider of market information, advisory services, and events for the information technology, telecommunications, and consumer technology markets.

Moura Receives SPS Technical Achievement Award

University Professor José M. F. Moura earned the 2010 IEEE Signal Processing Society (SPS) Technical Achievement Award. The annual award “honors a person who, over a period of years, has made outstanding technical contributions to theory and/or practice in technical areas within the scope of the society, as demonstrated by publications, patents or recognized impact on the field.” Moura was recognized for his fundamental contributions to statistical signal processing. He received the award, which consists of a certificate of appreciation and a check, at the 2011 International Conference on Acoustics, Speech and Signal Processing last May in Prague.

Rajkumar Earns Carnegie Science Award

Rajkumar, the George Westinghouse Professor of Electrical Engineering, earned a Carnegie Science Award in the Information Technology category. The award, established in 1997, recognizes and promotes innovation in science and technology across western Pennsylvania. Specifically, the Information Technology Award honors innovation in the development and commercialization of an information technology based solution resulting in significant business impact.

For more than a decade, Rajkumar has worked to help modernize the auto industry and make driving safer and more economical for the consumer. His work also permeates corporate and government sectors. He is the principal founder and CEO of Pittsburgh-based TimeSys Corp., a company specializing in embedded software and services and, was instrumental in launching a national research initiative by the National Science Foundation on cyber-physical systems.

Changing the “Balance of Power” Continued from page 1.

... This technological infrastructure has allowed individuals to do what was once reserved for institutions....
Hamerschlag gets a facelift

Hamerschlag Hall may be one of Carnegie Mellon’s first buildings, but ongoing efforts in the ECE Department ensure that it’s anything but obsolete. Recent remodeling efforts last summer focused on undergraduate spaces — improving labs, updating lounge space and making the building more functional and comfortable for the students who spend so much time in it. We also consolidated the Graduate Student Organization (GSO) into one office suite so students can easily find answers to their academic questions. These updates, along with the creation of the Bombardier Collaboration Center, give a new look to an old building that we think current and future students will appreciate. (And even though there is a new soda machine in the building, the GSO is still keeping them affordable.)

Bicoastal Brilliance

In the past three years, ECE has worked to create a vibrant Ph.D. program at Carnegie Mellon Silicon Valley — the university’s campus near San Jose, Calif. More than 35 students now call that program home, working on research projects related to mobile systems and security as part of Carnegie Mellon CyLab’s Mobility Research Center.

While it’s tempting to view the bicoastal Ph.D. program as its own entity, the program is really an extension of the Ph.D. program in Pittsburgh. Students have faculty advisors on both campuses and often spend a semester or more on the Pittsburgh campus to take classes that may not be offered in Silicon Valley. Students in Silicon Valley have immediate access to the industry and research centers there, and often choose the program for its proximity to the thriving entrepreneurial climate in that region. In the end, though, ECE faculty and students at Carnegie Mellon Silicon Valley are just as invested as students in Pittsburgh — only they happen to live in California.

For more on CMU Silicon Valley, check out www.cmu.edu/silicon-valley.

Electrical and Computer Engineering: Changing the “Balance of Power”

T.E. Schlesinger, Schramm Professor and Head, Carnegie Mellon ECE

ECE Welcomes New Faculty Members

A new academic year brings new faces, and this year it wasn’t just students. Meet four new faculty members who joined the ECE team.

ECE Makes Major Advances in Cyber-Physical Systems

Intel has two new homes at Carnegie Mellon, and ECE faculty members are heading up both of them.

Ganger, Narasimhan Lead New Intel Centers

The Department of Transportation has awarded CIT and Penn’s School of Engineering and Applied Science $3.5 million to conduct research on cyber-physical systems.

CMU ECE is collaborating with Sun Yet-sen University to offer graduate degrees in China.

More than 120 thinkers and gadgeters gathered to show off their creations during ECE’s BuildIt initiative this semester.

ECE, Penn Receive Grant for Transportation Research

ECE’s Global Reach Extends to China

Currents Q&A: Bruce Krogh Talks CMU-Rwanda

He talks to Currents about plans for CMU-Rwanda, what to expect and why he accepted the offer to direct the program.

ECE’s Global Reach Extends to China

Professor Bruce Krogh is on the ground, leading efforts there.

Currents Q&A: Bruce Krogh Talks CMU-Rwanda

They felt the signal challenges of the day resided. One hundred years ago, the center of attention in EE was on rotating machines and the electrical systems that powered them. The development of this technology influenced society and resulted in the introduction of electrical systems that changed the lives of individuals. Over time, EE turned its attention to technologies associated with communications: radio, radar and then television. As the focus of attention in EE, the development of these systems forever changed how society communicates in terms of speed, scale...