DEPARTMENT OF ELECTRICAL ENGINEERING & COMPUTER SCIENCE

EECS NEWS



2010 University of Kansas



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Cover Image

In March, Angela Oguna, a then junior in electrical engineering, and Megan Peck, a doctoral student in computer science, received national awards. Oguna is the first KU student to win a prestigious Google Anita Borg Memorial Scholarship. Peck earned a NSF Graduate Fellowship through its STEM Fellows in K-12 Education (GK-12) program. GK-12 fellows improve teaching skills while enriching science, technology, engineering, and mathematics (STEM) content in K-12 classrooms.

Newsletter Staff

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PERSPECTIVE



EECS Chair Glenn Prescott

t has been an exciting year at EECS! For the first time at KU, a professor of computer science has been named provost. Dr. **Jeffrey Vitter** became the chief academic and operating officer for the Lawrence campus in July. He brings extensive academic and

administrative leadership along with an outstanding research program to KU. Provost Vitter will be a strong advocate for the Department within Strong Hall.

We were fortunate to have **Xin "Felicity" Fu** join our faculty as an assistant professor in August. Before coming to KU, Dr. Fu was part of the inaugural class of Computing Innovation Fellows. The fellowship sponsors the top emerging researchers in postdoc positions. Her research includes computer architecture and hardware reliability.

Dr. Fu is the 12th new EEC faculty member in the last five years. Our tremendous growth has given us opportunities to expand into functional programming, bioinformatics, electromagnetic compatibility, and other evolving areas within EECS. In addition to these new areas, we are retooling more established classes. We have added four new computer science labs that focus on realworld problems. Our students further develop critical thinking and teamwork skills and gain practical experience. Additionally, each semester EECS faculty offer special-topics courses that focus on current issues and student interests. Recent courses include *Development of Commercial Software,* in conjunction with Perceptive Software, and *Computational Neuroscience*. The new labs and courses represent our continual efforts to better prepare our students for success in the real world.

EECS faculty members excel at collaborative, innovative, and multidisciplinary research. The Center for Remote Sensing of Ice Sheets (CReSIS), led by Deane E. Ackers Distinguished Professor of EECS **Prasad Gogineni**, will receive more than \$17 million from the National Science Foundation (NSF) to continue its innovative research on the changing conditions of the world's polar ice. The renewal award brings the total award to \$36.9 million, representing the largest grant ever awarded to support research at KU.

EECS Associate Professor **Xue-wen Chen** is leading development of a searchable online database and library that links the 50-plus volumes of the "Treatise on Invertebrate Paleontology," published by KU's Paleontological Institute. Data mining tools and other technology will enable greater access to critical information on climate change, evolution, and other biodiversity research. The collaborative KU project is supported by a \$1.5 million NSF grant.

Unique educational and research experience help our students garner national honors. **Megan Peck**, a doctoral student in CS, earned a NSF Fellowship. The Graduate STEM in K-12 Education (GK-12) partners future scientists and science, technology, engineering, and mathematics (STEM) teachers. EE senior **Angela Oguna** and CS doctoral student **Daniel Fokum** earned prestigious honors from Google while EE seniors **Levi Lyons** and **Andrea Valdivia** interned with Washington Internships for Students of Engineering and Goldman Sachs, respectively.

We will build on the great success of this year in 2011. Follow our accomplishments at www.eecs.ku.edu or at our Facebook page, www.facebook.com/KUEECS. Rock Chalk, Jayhawk!

Did You Know?

EECS gives back to Lawrence. EECS staff and faculty participated in "Adopt a Family" this holiday season through Ballard Community Services. Generous cash donations purchased new clothes and toys for three children and clothes for their father. The family also received a gift card for groceries.



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International Foundation Selects EECS/KU as a Partner University

here is no way (yet) to wirelessly network multiple aircraft traveling at Mach speeds over vast areas, but EECS researchers are developing technologies to better enable the collection and transmission of data from remote locations. In recognition of these efforts to improve telemetering—measuring at a distance—the International Foundation for Telemetering donated \$60,000 to EECS and named KU a partner university in June.

A nonprofit organization, IFT promotes the professional and technical interests of the telemetering community by sponsoring conferences, educational activities, and technical publications.

"This partnership will help KU strengthen opportunities for some of the best young minds out there," said **Stuart Bell**, dean of KU's School of Engineering. "I'm pleased that IFT sees the value and promise of the work being conducted here."

IFT funds will help purchase equipment for EECS labs and senior design projects and support EECS students traveling to present research at conferences. The Department also created \$1,000 IFT fellowships, which Ph.D. students **Egemen Cetinkaya, Ehsan Hosseni**, and **Justin Rohrer** and graduate student **Tristan Bull** received this fall. As one of only six partner universities of IFT, KU can present additional gift requests and proposals at the annual meeting of the IFT Board of Directors. KU will host the 2011 meeting in May.

"We are extremely honored to form this partnership with the IFT," said EECS Associate Professor **Erik Perrins**, who detailed KU's telemetry-related programs at the IFT board meeting in May. "We have been involved with the IFT

and the larger telemetry community for the past five years and we look forward to having a synergistic relationship with them for many years to come. We are excited to host the IFT board next spring and let the board members see our engineering programs up close."

During the meeting, Dr. Perrins highlighted a trio of telemetry-related projects at KU's Information and Telecommunication Technology Center. The first is a NASA communication system with severe size and power constraints that must transmit large amounts of data. Dr. Perrins is the principal investigator on the NASA project and serves as a coinvestigator on a second project, which is led by EECS Associate Professor **James P.G. Sterbenz**. Dr. Sterbenz is leading development of a wireless networking



(Back row) EECS Assistant Professor Andy Gill, EECS Associate Professor James P.G. Sterbenz, and EECS Associate Professor Erik Perrins were recognized for their research. The International Foundation for Telemetering named KU a partner university and donated \$60,000 to EECS, allowing for the creation of IFT fellowships. (Middle Row) EECS Ph.D. students Ehsan Hosseni and Justin Rohrer and (Front row) EECS graduate student Tristan Bull and EECS Ph.D. student Egemen Cetinkaya received \$1,000 fellowships.

system for dynamic aircraft. This system will give test ranges new capabilities to conduct multiple tests simultaneously. In the third project, Dr. Perrins and EECS Assistant Professor **Andy Gill** are developing hardware prototypes of a system to locate and correct errors that naturally occur in noisy transmissions. The forward error correction prototypes use hardware description languages developed by Dr. Gill. ■

Ph.D. students Egemen Cetinkaya, Ehsan Hosseni, and Justin Rohrer and graduate student Tristan Bull received \$1,000 International Foundation for Telemetering Fellowships.





o provide students with more hands-on experience, EECS faculty have created four new labs to enhance established computer science courses.

This fall Ph.D. students Wesley Peck and Michael Jantz taught labs for Compiler Construction (EECS 665) and Introduction to Operating Systems (EECS 678). Both courses are taught by EECS Assistant Professor Prasad Kulkarni. In Peck's 665 lab, students learn basic concepts in computer systems design and assembly level programming and create simple embedded systems. Embedded systems, which are a combination of computer hardware and software, control smart phones, automobiles, airplanes, medical equipment, household appliances, and other devices. The EECS 678 lab provides in-depth, practical experience in several OS concepts. Students must fully understand operating systems in order to develop efficient and secure software.

"The compiler lab has been absolutely beneficial," said graduate student **Hemaiyer Sankaranarayanan**. "It has helped us gain a good practical understanding of the theoretical concepts in the class. It would have been almost impossible to understand the intricacies of a compiler without lab exercises."

In *Data Structures* (EECS 560) with EECS Associate Professor **Nancy Kinnersley**, students learn numerous strategies for efficiently storing and organizing massive data. They implement four or five algorithms and data structures during class projects. The new lab, created by Dr. Kinnersley and her teaching assistant, Ph.D. student **Christopher Redford**, allows students to work with nearly 20 algorithms and data structures. Students gain a solid grasp on concepts and strategies for implementing new and unfamiliar data structures, Redford said.

In the spring semester, a new lab was introduced in *Software Engineering I* (EECS 448). EECS Associate Professor **Douglas Niehaus**' course addresses all phases of the software development process from requirements and design to implementation and maintenance. The new lab, taught by graduate student **Jared Straub,** enables students to gain hands-on, in-depth experience with specific tools and techniques commonly used in software engineering, said Dr. Niehaus.

Altman Joins EECS Student Services

aureen Altman is the new assistant for EECS Undergraduate Student Services. She helps advise students, updates and maintains their records, and prepares materials for and assists with orientation, advising, graduation.

and other EECS events and committees.

It has been a busy fall for Altman. She planned *Plugged In*, a welcome event for



nearly 100 new students interested in majoring in EECS, and helped revise the Undergraduate Handbook, including revamping the course sequence charts. In addition to these endeavors, she coordinated advising for the spring semester and dealt with scheduling and enrollment issues.

"I want to thank faculty, staff, and students for their patience and support" Altman said. "There were a lot of things going on at once this fall. I learned a great deal about procedures and how much I can count on people in the office. I feel like I have truly found a home at EECS."

Altman started in June, replacing **Allison Carfagna** who moved back to Boston.



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early 100 freshmen, undecided engineering, and transfer students attended *Plugged In*, an EECS welcome event in August. *Plugged In* gives new KU students interested in majoring in EECS an opportunity to learn about the Department, meet EECS faculty and students, and connect with other students. In the atrium of Eaton Hall, students enjoyed free pizza while viewing senior design projects and learning about student organizations.

Adam Crifasi and Austin Arnett, who started the EECS graduate program this fall, showed their senior design project, "Ultrasonic Tracking System/Jukebox." Crifasi, Arnett, and **Tyler Leiker** (all BSEE '10) put album covers at specific locations on the floor and then chose what to play by placing a mobile ultrasonic transmitter on the desired selection. The Tracking System would recognize when the transmitter was located on the album and begin playing a song from that CD.

"I think it is important for all underclassmen, though especially freshman, to see a product created by other students only a few years ahead of them. The *Plugged In* event is important to spark an initial interest in EECS, develop motivation, and realize the potential of the degree," Crifasi said.

EE senior **Levi Lyons**, president of KU-IEEE, talked with students about the organization. IEEE is the largest professional association dedicated to advancing technological innovation. KU-IEEE hosts social events and meetings that provide educational and professional development opportunities. "By sharing my experience, I hope students were encouraged to major in EECS and learned more about the numerous opportunities available to them as EECS graduates."

-Jason Henslee (BSEE '00, MSEE '03)

Students moved into Spahr Engineering Classroom where they received an overview of the Department from the Associate Chair for Undergraduate Studies, EECS Professor **David Petr**, and learned of different EECS classes from faculty members. Alumni **Linda Schellpeper** (BSCS '04), **Jason Henslee** (BSEE '00, MSEE '03) and **Mitchell Trope** (BSCoE '02, MSCoE '04) spoke about their experiences as EECS students. Schellpeper is a software architect at the Cerner Corporation, Henslee is an engineer with JT3, and Trope is a software engineer at Garmin.

"I feel the event is beneficial to the students," Henslee said. "As a new student to KU, I think it helps to hear from recent KU EECS alumni. By sharing my experience, I hope students were encouraged to major in EECS and learned more about the numerous opportunities available to them as EECS graduates."



Nearly 100 new students attended an EECS welcome event in August. Plugged In gives new KU students interested in majoring in EECS a chance to learn more about the Department from students, faculty, and alumni.

(Top Left Picture) EE senior Levi Lyons (left), the president of KU-IEEE, talks with students about the organization. KU-IEEE provides members with opportunities for educational, technical, and professional development.



Philip Jennings, an EE

senior, plays notes on a

keyboard that are then

analysis can isolate

easier.

individual frequencies to make their detection

processed using Fourier's Analysis. Fourier's

New Displays Earn EECS Second Place at Engineering Expo

ECS students placed second at the School of Engineering Expo in February. The annual event offers kindergarten through high school students hands-on learning opportunities in science and engineering. "Where in the World," the theme of this year's Expo, was intended to show students the global nature of engineering.

"This was a great effort," said **Levi Lyons**, organizer of EECS events for Expo. "I think we added a number of new and exciting elements to the Expo."

Lyons added that approximately 30 EECS students volunteered for Expo. EE seniors **Jessica Scott** and **Philip Jennings**, who graduated in May, and EE freshman **Jalashree Mehta** turned a classroom into a laser tag arena—complete with cardboard forts, castles, and other hiding places. Laser tag was designed to show the transmission of microwave waves and how they can be applied to practical applications. **Jake Hamilton**, a then junior in EE, developed the Laser Balloon Pop for the Expo. He turned a flash light into a laser able to pop balloons. He demonstrated how darker balloons soak up more light, making it easier for them to be popped. A number of volunteers blew up balloons to keep up with the demand.

In addition to new demonstrations, EECS brought back a few favorites. **William Blake**, a doctoral student in computer science, manned the popular Ultra Arcade Machine. Students flocked to the video game where they learned about the computer science that went into developing it. Blake also prepared GeoWall for the Expo. GeoWall is a low cost, virtual reality visualization device. Students donned special glasses to see chemistry elements in eye popping 3D. **Bryan Garrard**, a then EE junior, ran Geo Wall.

Since 1911, the School of Engineering has held the Expo each year to show younger students the possibilities within engineering, science, and math. The Engineering Student Council organizes the free, public two-day event that usually draws up to 1,000 visitors. EE student Audrey Seybert helps a student with a video

student with a video game in the Computer Commons on the first floor of Eaton Hall.



◄ William Blake, a Ph.D. student in computer science, explains the computer science that went into developing the Ultra Arcade Machine.

John Jakabosky, an EE senior, produces sound by running a high frequency and high voltage current between two nails.





New Faculty

New Provost, Computing Innovation Fellow Join Department

effrey Vitter is the new provost and executive vice chancellor at KU. He is also a professor in EECS and affiliated with the Information and Telecommunication Technology Center. Dr. Vitter has pioneered the development of important subfields dealing with massive data. He is a leading authority on external memory algorithms, which alleviate the bottleneck



between small but fast internal memory and large but slow external storage.

Dr. Vitter served as Texas A&M's provost and executive vice president for academics from 2008 to 2009, leading the university in the development of its academic master plan and launching initiatives affecting faculty start-up allocations, multidisciplinary priorities, and diversity.

As the Frederick Hovde Dean of the College of Science at Purdue University from 2002 to 2008, Dr. Vitter led the development of two strategic plans, establishing a dual focus of excellence in core departments and in multidisciplinary collaborations. He led the development of a new outcomes-based college curriculum and oversaw net growth by roughly 60 faculty members.

At Duke from 1993 to 2002, Dr. Vitter held a distinguished professorship and chaired the Department of Computer Science for more than eight years. From 1980 to 1993, he progressed through the faculty ranks and served in administrative roles at Brown University.

Dr. Vitter has more than 280 book, journal, conference, and patent publications. He is a Guggenheim Fellow and a fellow of the American Association for the Advancement of Science, the Association for Computing Machinery, and the Institute of Electrical and Electronics Engineers. He was named a National Science Foundation Presidential Young Investigator and won a Fulbright scholarship. To learn more about Dr. Vitter's illustrious career, go to www.provost.ku.edu/jsv/index.shtml.



ECS Assistant Professor **Xin Fu** is improving hardware reliability in tiny microprocessors found in smartphones,



netbooks, and other devices. Dr. Fu has developed software to analyze and improve microprocessor reliability in the presence of soft errors, which destroy data but do not permanently damage hardware.

She taught Advanced Computer Architecture (EECS 700) this fall. The course focused on emerging technologies for highperformance, low-power, and resilient microprocessors.

Before coming to KU, Dr. Fu was part of the inaugural 60-member class of Computing Innovation (CI) Fellows in 2009. The award sponsors the top emerging researchers in computing in postdoctoral positions. At the University of Illinois at Urbana-Champaign, Dr. Fu helped test the SoftWare Anomaly Treatment, an innovative method to detect and repair computer systems.

"Xin Fu is an expert in hardware reliability, specifically on architectural solutions for the problem," said Fu's CI mentor, **Sarita Adve**, a professor of computer science at the University of Illinois. "Xin's dissertation research was unique in that it considered the interactions between multiple failure mechanisms and looked at performance, power, and reliability holistically. Such an approach will be increasingly important to solve some of the most vexing problems in computer systems design. I was fortunate to have Xin in my lab as a postdoc for a year and I have no doubt she will be a great asset to KU. I look forward to many exciting results from her in the near future."

Dr. Fu received her Ph.D. in Computer Engineering from the University of Florida in 2009. Her dissertation was on the "Characterizing, Modeling, and Mitigating Microarchitecture Vulnerability and Variability in Light of Small-Scale Processing Technology." She completed undergraduate studies in Computer Software and Theory at Central South University in China.



Faculty Awards

Integrating Education, Research Prof. Kulkarni Earns Prestigious NSF CAREER Award

ECS Assistant Professor **Prasad Kulkarni** has received one of the most prestigious National Science Foundation honors given to junior faculty members. The Faculty Early Career Development (CAREER) award supports junior faculty who excel at integrating teaching and research.

Dr. Kulkarni's research focuses on building more secure and better performing software systems. *Security and Performance* (EECS 700), introduced in the Fall 2009 semester, incorporates his research and gives students opportunities to investigate security, protection, and performance aspects on modern software and hardware. Additionally, Dr. Kulkarni's work forms the basis of *Compiler Construction* (EECS 665), which was offered this fall, and *Virtual Machines* (EECS 700).

"Professor Kulkarni is a dedicated mentor," said EECS Ph.D. student **Micahel Jantz**, who conducts research under the direction of Dr. Kulkarni. "He listens to my ideas, discusses the development of my projects, and provides timely and meaningful feedback whenever I have questions."

At KU's Information and Telecommunication Technology Center (ITTC), Dr. Kulkarni is developing a more secure and efficient framework for virtual machines (VMs), which ensure compatability between applications and the devices running them. Cell phones, PDAs, and computers are among the billions of devices that have VM software running Internet programs. To limit the cost and start-up time, current VMs apply only basic security checks. Devices are then left vulnerable to malicious software that can corrupt and steal private data—from passwords to address books.

Dr. Kulkarni's new VM framework will slice out the security management and program monitoring tasks and perform them simultaneously with the main program. The framework will reduce the overhead of monitoring and security tasks and allow more secure and efficient execution of future programs.

"These highly selective grants are awarded to junior faculty members who are considered to be academic leaders of the future. Prasad is a dedicated researcher and highly deserving of this honor, and his work is critical to our national prominence in cyber security," said ITTC Director **Perry Alexander**, Sharp Professor of EECS.

Dr. Kulkarni received his B.S. in Computer Engineering from Poona University in 2001 and earned M.S. and Ph.D. degrees in Computer Science from Florida State University in 2003 and 2007, respectively.



FACULTY AWARDS » »

Students, Faculty Present Alexander with Teaching Excellence Awards

ECS Professor **Perry Alexander** received the 2010 John E. and Winifred E. Sharp Professorship during the School of Engineering graduate recognition ceremony in May. A School of Engineering faculty committee selected Dr. Alexander for his remarkable dedication to his students and exceptional innovation in the classroom.

"Professor Alexander is, and will continue to be, one of the most valuable professors that I have ever encountered," said **Jason Agron** (BSCoE '04, MSCoE '06). "His passion for teaching is one of the main reasons why I became so interested in Computer Engineering research—and why I am still active in teaching and research to this day."

The three-year Sharp

award includes an annual

personal award of \$5,000



Eta Kappa Nu president Philip Jennings (left) presents EECS Professor Perry Alexander with the Harry Talley Excellence in Teaching Award at the EECS Graduate Banquet. Prof. Alexander won the Sharp Professorship from the School of Engineering the following day.

plus access to \$5,000 annually for instructional development.

A day earlier, Dr. Alexander received the Harry Talley Excellence in Teaching Award at the EECS Graduation Banquet. It is the "Professor Alexander is, and will continue to be, one of the most valuable professors that I have ever encountered. His passion for teaching is one of the main reasons why I became so interested in Computer Engineering research—and why I am still active in teaching and research to this day."

-Jason Agron (BSCoE '04, MSCoE '06)

third time he has won the Talley Award. Graduating EECS seniors select the professor who has contributed significantly to their undergraduate education and has developed a strong rapport with them.

"Perry stands out as a professor because of his loyalty to his students. He genuinely cares about them and the education they're receiving," said Ph.D. student **Jennifer Lohoefener** (BSCoE' 04). "He's enthusiastic about his lectures and challenges his students to think beyond the text. It's easy to see how much he truly enjoys his work."

Since coming to KU in 1999, Dr. Alexander has received numerous honors including a Kemper Fellowship for Teaching Excellence and an ASEE Midwest Region Outstanding Educator Award.

Did You Know?

EECS Professors teach more than 90 percent of undergraduate classes. They bring their expertise, experience, and enthusiasm into the classroom. Our faculty members use their research as teaching tools to enrich the classroom experience. EECS professors have garnered national and university awards for their teaching.





id seeing EECS Professor **Arvin Agah** receive the 2010 ING Excellence in Teaching Award during the KU vs. University of Colorado football game spark the greatest comeback in KU history? We may never know.

Dr. Agah's highlight's include the Robot Sumo Wrestling competition where student teams developed, built, and programmed a robot able to force fellow classmates' robots outside the "wrestling mat." The 72-match round robin tournament was the final project for his *Robot Intelligence* course in 2008. Dr. Agah's students won first place in the multi-university Cerner Corporation Software Design Competition in 2006. The *Software Development Lifecycle* course required students to build software that could present, collect, and analyze patient information on a specialized PDA.

"Professor Agah always finds challenging projects that force students to think for themselves and truly learn the material to succeed. His role is often a mentor who guides students toward success but never simply hands them the solution," said **Richard Stansbury**, who had Dr. Agah as a professor and advisor. Stansbury (BSCoE '02, Ph.D.CS '07) is now an assistant professor at Embry-Riddle Aeronautical University. **Christopher Gifford** (BSCS '05, MSCS '06, Ph.D.CS '09) had Dr. Agah as faculty advisor for the Space Robotics Challenge held at the 2008 IEEE International Conference on Robotics and Automation. When Gifford and fellow graduate students came to Dr. Agah about the Challenge, he created a special projects class for them. Gifford said Dr. Agah's attention to the needs and interests of his students is part of what makes him a great teacher.

"Professor Agah's courses are always hands-on, enabling students to work on real problems and find real solutions. He puts an emphasis on the material as well as the experience, which becomes valuable when moving on to life beyond the classroom," said Gifford, who is now an information systems analyst at The Johns Hopkins University Applied Physics Laboratory.

KU graduate **Shannon Skoglund** is among the Perceptive Software staff that is co-teaching a graduate course on software engineering with Agah.

"I'm very impressed with Professor Agah's willingness to reach out to companies in the area and try innovative ways of teaching a class," Skoglund said. "I think the real-world exposure is both rare and very valuable in a university setting."

Interim Athletic Director Sean Lester and ING representative John O'Brian honor EECS Professor Arvin Agah (third from left) with the ING Teaching Excellence Award during the KU vs. CU football game on Nov. 6. KU Provost and EECS Professor Jeffrey Vitter (fourth from left) attends the presentation.

Photo by Edward Kennington/University Relations



FACULTY AWARDS » »

Outstanding Teaching, Industrious Research Lead to Promotions

rs. **Shannon Blunt** and **Erik Perrins** have received tenure and promotion to EECS associate professor. Since joining EECS in 2005, the two have epitomized teacher-scholars. Their strong student evaluations and growing research programs have made them standouts in the School of Engineering.

Dr. Blunt received the Harry Talley Excellence in Teaching Award in 2008. Graduating EECS seniors bestow the Talley Award on the faculty member who has contributed most significantly to their education and development. His courses include digital signal processing, electronic circuits, and electromagnetics.

"Dr. Blunt is creative and ambitious. He teaches you how to attack problems and then lets you run with them," said Ph.D. student **Tom Higgins** (BSEE '05, MSEE '07 with Honors). "He helps students understand both the theory and practical application of signal processing."

Dr. Blunt is the co-editor of the new "Principles of Waveform Diversity and Design." It is the first book to discuss current and future applications of waveform diversity and design in radar and sonar, communications systems, and other technologies.

From developing covert communication for soldiers to processing brain imaging scans, Dr. Blunt's research in adaptive signal processing has broad applications in radar, communications, and biomedical imaging.

Dr. Perrins' expertise is in wireless communications. His courses include signals and systems, probability theory, digital communication theory, and forward error correction coding.

"In his classes, he establishes a good connection with students through his charisma and his sense of humor," said Ph.D. student **Ehsan Hosseini**. "He can explain the course material well and allows students to become actively involved by giving practical projects. He always makes time for his students and tries to help them as much as he can. I also believe his years of experience in industry and academia make him a good project manager."



EECS Associate Professor Erik Perrins (left) answers a question for Ph.D. student Ehsan Hosseini. They are developing a communication system for future space missions that can transport large amounts of data while adhering to severe size and power constraints. Dr. Perrins received tenure in August.

Dr. Perrins' current research is at the intersection of wireless communications and digital hardware design. He is collaborating on a multi-university NASA research project to develop communication systems for future space missions. Communication systems must transmit large amounts of scientific and operational data while adhering to severe size, weight, and power constraints.

He was instrumental in EECS being named a partner university of the International Foundation for Telemetering. For more on the IFT award, please see page 2.



Graduate student Justin Metcalf (left) and Dr. Shannon Blunt discuss their research in radarembedded communications, which allows secure messages to "piggyback" on existing radio signals. Dr. Blunt was granted tenure this summer.



KU Center for Teaching Excellence Honors Trio of EECS Professors

hree EECS professors were honored as outstanding teachers at the 13th annual Celebration of Teaching reception in May. The reception was sponsored by KU's Center for Teaching Excellence.

EECS students nominated Professor **Kenneth Demarest**, Associate Professor **Swapan Chakrabarti**, and Assistant Professor **Andy Gill** for awards. Criteria included effective teaching, communication of expectations, and use of interactive activities to enhance the classroom experience.

EE student **Levi Lyons** was charged with nominating EECS professors from each major (EE, CoE, and CS) for the award. He asked people to vote in the computer commons and created an event on Facebook. He then presented Profs. Demarest, Chakrabarti, and Gill with their awards at a luncheon held by the KU Center for Teaching Excellence.

"Prof. Demarest is a really good teacher. He is excited and keeps you interested," said Ph.D. student **Cenk Sahin**. "You can always stop by his office and ask questions."

While Dr. Demarest specializes in electromagnetic and fiber optic communications, Dr. Chakrabarti's expertise includes digital logic design and computer architecture.

"Dr. Chakrabarti is a great teacher," said **Christa Curette** (BSCoE '10). "He breaks elements down very well and prepares you for success."



Graduate student Adam Crifasi (right) and EECS Assistant Professor Andy Gill discuss Crifasi's senior project during Plugged In. Dr. Gill was honored by the KU Center of Teaching Excellence in May.

Dr. Gill has taught courses in functional programming. Functional programs are often shorter and easier to understand than traditional imperative programs. They offer a more standardized structure embedded with security and information assurance practices.

"Prof. Gill takes time to really explain things and uses terminology and concepts that students can understand. He cares about the success of his students," said graduate student **Tristan Bull** (BSCoE '08).

Did You Know?

Two multi-million dollar interdisciplinary research centers support EECS faculty research and technology development. The Information and Telecommunication Technology Center (ITTC) and the Center for the Remote Sensing of Ice Sheets (CReSIS), a NSF Science and Technology Center, are located in Nichols Hall on West Campus.

UNDERGRADUATE SPOTLIGHT

Meet Katherine Courtney

What are your tips for new students?

- > Don't buy a lot of blue t-shirts. You'll get plenty over the next four years.
- Buy a watch. Professors don't like it when you check the time on your cell phone.
- When scheduling classes, remember it's a lot easier to go downhill than up in 10 minutes.
- ► Get to know your advisor. They can be really helpful when picking classes and can be great for letters of reference.
- ► Go to office hours. Despite what you may think, teachers really do want you to succeed in their classes.
 - > Dress in layers. Classrooms can be hot and labs are often freezing.
- ► Go to a basketball game. If you're not a fan when you get here, you should be by the time you leave. (Also, try to learn the clap for the fight song.)
- ► Join an Engineering club. I've really enjoyed my involvement with SWE [Society of Women Engineers]. As an underclassman, you can find people who actually know what's going on in classes and who can recommend the best classes to take.
- ► Jimmy Johns, Pizza Shuttle, and a lot of other restaurants deliver to Eaton, and they accept Beak'em Bucks. On a related note, convince your parents to invest heavily in Beak'em Bucks.
- ▶ You'll be busy, but try to find something to do outside of Engineering. I've been involved with Student Ambassadors since my freshman year. Joining Ambassadors was probably the greatest thing I've done while at KU.

U STUDENT MBASSADO

Major: Computer Science Hometown: Lansing, KS Anticipated Graduation: May 2011 Future Plans: Garmin

What does a typical day look like for you?

I don't really have a "typical" day. Usually at least once a week, I start my day going to a professor's office hours (usually Professor Kong's for help with Algorithms). After getting my questions answered, I'll either go to the library to do homework or study for a test or head to the lab to work on a project until class. After classes, I'll either head home to work on homework or go to the lab. At night, I work as a math and physics tutor for the Athletics Department. Also, some days I give campus tours or spend a few hours in Allen Fieldhouse camping for the Ambassador basketball camping group.

What has your overall experience as an EECS student been like?

Exhausting, challenging, and fun. When I first came to KU, I did not have any programming experience. I wasn't sure if I had what it took to be a computer science major. Once I figured out that I shouldn't try to write the whole thing in one sitting but rather break it up into functions and write it step-by-step, things became a lot easier. It's a lot of work, it's frustrating at times, and sometimes it can be a little tedious, but I've really enjoyed being a student in the EECS Department.

What have been some of your favorite times at KU?

It was amazing my freshman year when the football team won the Orange Bowl and the basketball and debate teams won their respective National Championships. I watched the KU-Memphis game in Allen Fieldhouse, and it was incredible. We did all the cheers as if we were in San Antonio, and we stormed the court after the victory.

What are your plans after graduation?

I will be working at Garmin for the Aviation group. I'm really excited about having a job and contributing to society. I'm also probably more excited than I should be about having my own washer and dryer. Eventually, I would like to get a dog and name it either Java or Perl, depending on the color.



STUDENT SUCCESS

Oguna Wins Google Scholarship, National Research Award

A ngela Oguna, who started her senior year in EE this fall, received a pair of prestigious awards during the spring semester. She became the

first KU student to win a Anita Borg Memorial Scholarship and received a Demonstration of Energy-Efficient Developments (DEED) grant from the American Public Power Association.



The \$10,000 Google scholarships were awarded to 32 exceptional female undergraduate and graduate students across the United States in computer science and related technical fields.

The Anita Borg Institute for Women and Technology and Google created the highly competitive scholarship to encourage women to pursue careers in computer science and technology and to become leaders and role models.

"I am definitely ready for senior year now. This award alleviates a considerable financial burden," Oguna said. "I am grateful for the

support that I have received from my family, my friends, and my mentors who have been instrumental in my success at KU." The DEED grant is funding Oguna's independent research on the integration of Smart Grid technology for small-scale consumers. Her research will generate detailed information about real-time energy use and cost. As a result, consumers will be able to make more informed decisions about their consumption. Her industry sponsor is the Kansas City Board of Public Utilities.

The Nairobi, Kenya, native hopes this research will better equip her to help make rural electrification a reality in sub-Saharan Africa.

"Angela is a highly motivated student. She has taken the initiative on a number of projects and activities during the past few years," said EECS Professor **Gary Minden**. "Her motivation and initiative are complemented with a solid engineering foundation."

According to Oguna, her interactions with graduate students and her peers have been instrumental to her success. She would encourage students to utilize the resources that KU offers to their full advantage.

The following students received EECS scholarships for the 2010-2011 academic year. Scholarships totaled over \$232,000.

Leslie Aghoghovbia, Michael Albert, Avery Arjo, Cameron Atwill, Joshua Baden, Bradley Bell, Balaji Bhaskar, Manas Bhatnagar, William Blake, James Butts, Emily Dellwig, Robert Devine, Logan Downes, Abderrahmane Elandaloussi, Gordon Fry, Danielle Fuller, Zachary Garber, Tamara Gaynes, Rachel Gilman, Chris Greinke, Christopher Hale, Jacob Hamilton, Wenshuai Hou, Christopher Hudson, Marianne Jantz, Mason Johnson, Monte Jones, Robert Knight, Alec Kohl, Darryl Lam, Sean Leach, Peter Lesslie, George Li, Levi Lyons, Brady Maasen, Andrew Manderfeld, Jared Mar, Stacy Mar, Gregory Matthies, David Mattione, Michael McGuire, Jalashree Mehta, Devin Mullins, Michael O'Donnell, Angela Oguna, Masayuki Pak, Richard Potts-Moore, Sam Riss, Parker Roth, Keeler Russell, Lane Russell, Nicholas Sanders, Dylan Sanders, Derek Scalzi, Garrett Scarlett, Kathryn Scherich, Joel Schmelzle, Chandler Schmidt, Christopher Seasholtz, Nathaniel Snyder, Jonathan Stacy, Sameer Surampalli, Christopher Teters, Antoni Tonev, Joseph Wachtel, Ian Weller, Matthew Werner, Isaac Wilson, and Mikhail Zakharov.



STUDENT SUCCESS » »

Lyons Interns on Capitol Hill

evi Lyons spent the summer before his senior year on Capitol Hill as an intern in the prestigious Washington Internships for Students of Engineering (WISE) program. Eleven interns learned how regulatory measures, funding priorities, and other public policies impact science and technology.

During the nine-week internship, WISE interns met with members of Congress, the Administration, non-governmental organizations, and industry leaders to better understand how public policy is made and how engineers and scientists can influence legislation and funding. Interns researched and presented papers on engineering-related public policy issues important to their sponsoring agency.

Lyons delved into the policies and issues surrounding interstate electrical transmission lines needed to transport wind and other renewable energy. States have fragmented statutes governing where transmission can be placed, which has stymied the development of a national interstate transmission infrastructure. His paper, "Breaking the Deadlock: Expediting Interstate Transmission Siting," explores the best solution to balance state and federal needs and advance the siting of interstate transmission infrastructure.

"This experience opened my eyes to the extraordinary need for scientists and engineers to actively engage in the policy



EECS student Levi Lyons stands with IEEE WISE Coordinator Erica Wissolik (center) and fellow IEEE WISE Intern Kristi Chin. Lyons was a summer intern in the Washington Internships for Students of Engineering (WISE) program.

Photo Courtesy of IEEE

process," Lyons said. "More scientists and engineers need to help shape policy that will be based on sound science. This internship has changed my career path. I am applying to graduate schools and searching for careers in energy policy. "

Lyons was sponsored by IEEE (Institute of Electrical and Electronics Engineers), the world's largest professional association dedicated to advancing technological innovation. IEEE chose Lyons, president of the KU student chapter of IEEE, out of more than 90,000 student members.

"IEEE-USA was pleased to sponsor Levi for the 2010 WISE Internships. He was great to work with and his enthusiasm for public service and the Washington policy experience was infectious," said IEEE-USA Managing Director **Chris Brantley**. "His work is helping inform IEEE-USA's Energy Policy Committee and the IEEE Power and Energy Society, and has been shared with state legislators and energy officials here in Washington."

Professional Groups Offer Many Benefits

By joining a professional society, students build a professional network, participate in professional development opportunities, and learn about various careers in their field.

Organizations have national conferences and sponsor professional development activities. They also provide publications that track developments in the field, trends, and policy and legal changes. Members-only websites offer message and job boards and member contact information. Professional organizations provide scholarships and sponsorships for active members.

EE seniors **Levi Lyons** and **Angela Oguna** serve as president of KU-IEEE and the KU chapter of the National Society of Black Engineers, respectively. CS senior **Katherine Courtney** is president of the KU Society of Women Engineers. EE senior **Andrea Valdivia** is past president of the KU Society of Hispanic Engineers. They have taken advantage of leadership and internship opportunities available to active members.

Many professional associations have substantially reduced membership fees for students. For more information on professional organizations available to EECS students, go to www.eecs.ku.edu/ prospective_students/undergraduate/ organizations and www.engr.ku.edu/ undergraduate/student_organizations. html.



Self Fellowship Provides 'Life-Changing Experience'

t's like Worlds of Fun on crack," said **Jacob Hamilton** of his experience at the World Expo in China.

Hamilton, a senior in EE, is among the Self Engineering Leadership Fellows who went on a 10-day trip to Beijing and Shanghai in August. The World Expo served as a capstone project, combining the pillars of the SELF Program business, entrepreneurship, leadership, management, and communication—as well as engineering. This was the first senior class of the Self Fellow program.

At the Expo, students broke into small groups to reach as many of the 240 featured countries as possible. Each country had its own pavilion to display culture and new innovation related to the "Better City, Better Life"-themed Expo. With more than half the world's population living in cities, sustainable urban development concerns all nations. Students filled four cameras with video and pictures and kept a blog on their website, http://sites.google.com/site/ projectshanghaiku/. "My favorite pavilion was the Portuguese pavilion," said Hamilton, a Topeka native. "The entire exterior of the building was made out of cork, highlighting its use as a green building material. Inside the pavilion, they showed how green energy in Portugal is expanding extremely fast, with a goal of an estimated 45 percent of all electricity to be renewable."

Throughout the fall 2010 and spring 2011 semesters, the Fellows are giving presentations on their travels, China's economy, and the future of engineering to high school students and other groups. Hamilton has helped produce two documentaries on his experience, *Energy Technology* and *Cultural Relationships*.

"We have given presentations to our sponsors and a high school group. We also presented at the Dean's Advisory Board, which was a very rewarding event. Being able to talk with successful alumni from KU engineering, we were able to learn from their experiences," Hamilton said.

Students raised more than \$30,000 for the trip. Fellows received donations from KU Endowment and School of Engineering

alumni who had an interest in China. They toured the offices of donors lon Geophysical Corp., Black and Veatch, and Google while in China. Before traveling to Shanghai, students spent a few days in Beijing



EE senior Jake Hamilton, second from the right in the back row, and other Self Fellows take in the sights in Shanghai.

where they saw the Great Wall of China, the Summer Palace, the Forbidden City, Tiananmen Square, and other historical landmarks.

"This project was a life-changing experience," Hamilton said. "Being able to go overseas to see the Expo was incredible. We learned about cultures and engineering practices from dozens of countries. The planning process before, during, and after also taught us extremely important teamwork skills that will prove useful to our careers in the future."

The SELF program for undergraduates is developing engineers and computer scientists who have the entrepreneurship, business skills, and vision needed to guide technology-based corporations. For more information, go to http://www.engr. ku.edu/self/.

Each of the 240 countries featured at the World Expo had its own pavilion to display culture and new innovation related to a Better City, Better Life. The Indian Pavilion, on the left, and the Saudi Arabia Pavilion are featured in this photo.

Photos Courtesy of Jake Hamilton



STUDY ABROAD » »

ndrea Valdivia has not let off the accelerator since declaring two of her three majors and attending a Society of **Hispanic Professional Engineers** (SHPE) national conference her first semester. She has interned with Ford, GE Healthcare, and Goldman Sachs and held leadership positions in SHPE, Upsilon Pi Epsilon, an honors society for computer science students, the Alpha Delta Pi and Order of Omega, and the Hispanic American Leadership Organization (HALO). She will graduate this May with degrees in Computer Science, Global and International Studies (GIST), and Economics.

"I've been able to better intertwine my interests and make my time at KU a bit more unique," says Valdivia. "Though many find my three degrees to be very different and unrelated, they are much more correlated than they appear to be. The reality is technology and business initiatives are quite connected within an evolving global economy."

"Andrea is a very dedicated and motivated student. Her ability to work effectively, both individually and as a member of a team, is impressive," said EECS Professor **Arvin Agah**.

During her interview with Goldman Sachs, she learned of its growing Hong Kong office. The comment piqued Valdivia's interest and led her to do some research on the city. After learning of its growing global importance as the financial center of China's booming economy, Valdivia decided to spend the semester in Hong Kong. She is the only student from KU and among five students from the Midwest out of 145 American students at the University of Hong Kong. She has enjoyed explaining that Kansas is more than farms to Chinese and American students.

Valdivia has explored different parts of the main and smaller islands of Hong Kong on the weekends. She and fellow students have ventured into the heart of Hong Kong to eat at restaurants, shop at massive commercial centers, and visit traditional Chinese markets. Valdivia was able to travel to mainland China where she was able to see the Great Wall of China, Tiananmen Square, the Forbidden City, and other historical sites.

"I cannot express how important it is for students to study abroad! It is a rare opportunity that will help you grow and develop as an individual, student, and future professional," says Valdivia. "You will learn about different cultures and may find a new interest or passion that you would not necessarily find staying in Kansas."

KU

"I cannot express how important it is for students to study abroad! It is a rare opportunity that will help you grow and develop as an individual, student, and future professional. You will learn about different cultures and may find a new interest or passion that you would not necessarily find staying in Kansas."

–Andrea Valdivia

Her high school math teacher, Mr. Sprenkel, first suggested computer science as a major, citing her abilities in math, problem solving, and programming. Valdivia decided to co-major in GIST to set her apart from fellow computer science majors. Her Latin heritage (she is fluent in Spanish) and love of travel also made GIST an appealing major.

She joined the KU chapter SPHE as a freshman. At national conferences. Valdivia met representatives from Fortune 500 corporations along with those from smaller companies. She learned about the various career opportunities for technologists. Her first internship was with Ford Motor Company in the summer of 2008, working in Global Services Delivery to provide IT services for Ford's Europe and Asia divisions. The next summer she interned with GE Healthcare and was responsible for several projects that revolved around HP platform upgrades. She worked with GE's Repair & Development Center on component failure analysis in older platforms and helped identify a key solution that would lead to an estimated \$1.4 million in savings. She was asked to extend her internship to conduct market research on new software in Kansas City hospitals.

"After my GE internship, I realized having more business/econ knowledge would

have helped me better present the importance of my findings on component failures to the business side," Valdivia said. "Fortunately, I was able to add a degree in Economics while still keeping graduation within five years."

This past summer she was a Technology Summer Analyst at Goldman Sachs. As part of the Cross Divisional Projects & Architecture team, she worked on a key business initiative for the firm that required integration with its technology division. She served as a project manager for smaller analysis, testing, and integration parts of the project.

"There have been a number of EECS classes and professors that have helped prepare me for my internships in industry," says Valdivia. "Specifically, Dr. Agah's EECS 448 [*Software Engineering I*] has been the most career-oriented class I have taken at KU. My experience in developing a Nintendo DS game, which was part of EECS 448, is a great conversation starter in interviews. My one-on-one conversations with Dr. [**Perry**] **Alexander**, Dr. [**Man**] **Kong**, and Dr. [**Nancy**] **Kinnersley** have helped guide my academic and career development."

Students Gain New Global Perspective

Studying abroad is a life-changing event that also enhances students' resumes. Students experience new cultures, people, and languages while strengthening their problem solving and intercultural communication skills. International experience is key in an increasingly interconnected global economy.

EECS courses are offered in universities in Australia, China (Hong Kong) Germany, Great Britain, and Korea. Students will need to work with their EECS advisor and the Office of Study Abroad to find the best program for them. The earlier students start planning the better, says **Michele Arellano**, assistant director of the Office of Study Abroad. She adds that more than 30 percent of KU undergraduates participate in Study Abroad annually, making it an integral part of the Jayhawk experience.

Shorter programs are offered over summer, winter, and spring breaks while longer programs last a semester or academic year. Students must have courses preapproved for longer programs to ensure they stay on track for graduation. According to Arellano, students who study abroad are twice as likely to graduate on time as their peers who have not participated in the program.

For more information, go to www. studyabroad.ku.edu/.

GRADUATE SPOTLIGHT

Meet Christopher Gifford, Ph.D.

Gifford (BSCS '05, MSCS '06) received his Ph.D. with honors in computer science in the fall of 2009. He is now an information systems analyst at The Johns Hopkins University Applied Physics Laboratory.

What are your top tips for new graduate students?

1. Go at your own speed. Each person has his or her own speed for grad school, which is relative to your situation outside of the classroom.

2. Get involved in as many professional activities as possible, to grow, gain experience, and network.

3. Your goal as a grad student is to become an expert, sometimes the expert, in a particular field, focus, or technique. Find your niche. This niche will make you unique and be a valuable asset during your job search.

4. Make a plan early, stick to it, and make progress every day. There will be times when you will need to force yourself to document your work,

analyze results with excruciating detail,

or write your thesis/dissertation. These tasks aren't necessarily fun, but they are essential to completing your work.

5. Finally, take time to enjoy the college experience. To avoid burn out, be sure and take time for yourself. This helps keep you fresh for when you encounter difficulties in your coursework or research. What you do during grad school is largely expected to guide your early professional career, so have fun and spend the time to challenge yourself.

and with my research."

Can you describe a specific challenge at KU and how you overcame it?

Managing the "project" that is grad school is a daunting task. Where do I start? What should my project be? What do I want to get out of grad school? Your advisor will greatly assist you in this process, but you must take the time to think about the entire process, make a plan, and establish deliverables and timelines. What you are essentially doing is project management, and it is a challenge.

What was a typical day like for you in grad school?

For me, a typical day was similar to an 8-5 work day. I woke up at the same time everyday to establish a routine. When I wasn't in class, I was making progress on coursework or research. Evenings were spent doing coursework and relaxing, leaving the "work day" to make progress on research goals. Committing to this routine helped me stay focused.

What was your overall experience as an EECS student?

My overall experience as an EECS student was, honestly, everything I hoped it would be. I had opportunities to work on great projects with great people and experience success in the classroom and with my research. I feel what you get out of grad school is based on how much you push yourself to go beyond what is average or adequate. You must actively seek an experience that contains opportunities and work that both excites you and prepares you for your future as a professional.

"My overall experience as an EECS student was,

opportunities to work on great projects with great

Christopher Gifford (BSCS '05, MSCS '06, Ph.D.CS '09)

people and experience success in the classroom

honestly, everything I hoped it would be. I had

STUDENT SUCCESS

Peck Earns National Science Foundation Fellowship

n March, **Megan Peck**, a doctoral student in computer science, received a \$30,000 National Science Foundation fellowship through its Graduate STEM in K-12 Education (GK-12) program. GK-12 supports partnerships between future scientists and science, technology, engineering and mathematics (STEM) teachers to improve Fellows' teaching and communication skills, advance STEM education in middle schools, and provide role models for younger students.

Peck is bringing ideas from computer science and math into an 8th grade math class at Landon Middle School in Topeka. In collaboration with partner teachers, she is developing interactive demonstrations and other projects aimed at igniting student interest in scientific study. After students learned about algorithms, Peck explained the importance of correctness and precision in algorithms. Students wrote

an algorithm for making a peanut butter and jelly sandwich. They had to give step-by-step directions rather than assuming that someone (or a computer) could fill in the blanks. It is one of many lessons Peck has given at Landon.

"I'm very grateful for the fellowship and enjoy the challenge of incorporating some basic computer science and math that I've learned into the middle school curriculum," said Peck, who graduated with distinction in Computer Engineering from KU in 2006 and started work on her doctorate the following semester. "I believe opportunities to interact with and learn from different groups will make me a much more effective educator."

Peck has been a teaching assistant for the *Computer System Design Lab* (EECS 541) and the *Digital Systems Design Lab* (EECS "Megan is an ideal candidate for helping us build this bridge between scientists and the public. A graduate of Lansing High School, Megan is someone whom students will identify with. She is smart and articulate and understands that we must find new ways to capture and challenge students' natural curiosity about the world around them."

Dr. Steven Case, coordinator of KU GK-12

443). While the content is obviously different, Peck said that helping students problem solve was similar to her TA experience.

"This is a perfect fellowship for Megan," said Sharp Professor of EECS **Perry Alexander**. "She is an excellent theoretical computer scientist and wants to be an educator. After being a teaching assistant for several years, this is a logical next step in her preparation for an academic career."

Science teaches students to observe, test, and collect evidence before making conclusions. People can use science to become better critical thinkers and problem solvers. Science must be taught in a way that allows students to integrate this thought process into their daily lives.

"Megan is an ideal candidate for helping us build this bridge between scientists and the public," said **Steven Case**, Director of the KU Center for Science Education, . "A graduate of Lansing High School, Megan is someone whom students will identify with. She is smart and articulate and understands that we must find new ways to capture and challenge students' natural curiosity about the world around them."

STUDENT SUCCESS » »

Fokum Is Invited to Google GRAD Conference

aniel Fokum was among 75 students invited to participate in Google's inaugural Graduate Researchers in Academia of Diverse backgrounds (GRAD) Computer Science Forum in January. Designed to build and strengthen networks among emerging computer scientists, the event featured round table discussions along with technical talks from Google researchers and those within academia.

"Coming from a group that is typically underrepresented in computer science, I was inspired to see this diverse group of researchers," said Fokum, a Ph.D. student in computer science from Cameroon, West Africa. "I exchanged business cards with a number of participants. While an important networking event, the forum also highlighted the importance of diversity."

Google engineers selected Fokum for his academic excellence and leadership in computing. As part of his dissertation research, Fokum has helped develop ITTC's Transportation Security SensorNet

Ph.D. student Daniel Fokum (standing) helps one of his students in Introduction to Digital Logic Design lab. Fokum was selected to participate in Google's Graduate Researchers in Academia of Diverse backgrounds (GRAD) Computer Science Forum.

(TSSN). TSSN integrates hardware, software, and sensors to enable realtime monitoring of goods en route. **Victor Frost**, Dan F. Servey Distinguished Professor of EECS, serves as the principal investigator on the project.

Fokum earned his M.S. in Computer Science with an emphasis in Networking at the University of Missouri-Kansas City in 2005 and B.A. in Computer Science from Park University in 2000. ■

Robb Award Winners

he goal of the David D. and Mildred H. Robb fund is to expose EECS graduate students to new, innovative ideas. All recipients presented papers at the conferences they attended.

Serhiy Morozov; Intl Conference on Computing, Communications, and Control Technologies, April 2010. Morozov recently won the Young Scholar/Researcher and Student Paper Competition at the Conference.

Maryam Mahani; IEEE Intl Conference on Robotics and Automation, May 2010.

Chris Redford; Intl Conference on Artificial Intelligence and Pattern Recognition, July 2010.

William Blake and Logan Smith; Intl Geoscience and Remote Sensing Symposium, July 2010.

Michael Jantz; Compilers, Architectures, and Synthesis for Embedded Systems, October 2010. ■

EECS graduate students may apply for a Robb Award at www.eecs.ku.edu/current_ students/graduate/robb_award.

Did You Know?

EECS students receive travel and other grants from international conferences to present their research. For example, this fall graduate student Zaid Hijaz was awarded a travel grant to present his research at the Military Communications (MILCOM) Conference in San Jose. Hijaz' research explores how covert communications will work in 4th generation of wireless devices.

CReSIS Researchers Attend USA Science, Engineering Expo

By Nick Mott

ECS Assistant Professor **Carl Leuschen**, EECS Ph.D. student **Aqsa Patel**, and graduate student **Austin Arnett** helped man the Center for Remote Sensing of Ice Sheets (CReSIS) booth at the USA Science and Engineering Expo in Washington, D.C., this October. The Expo was the finale of the two-week USA Science and Engineering Festival, which was designed to reignite children's interest in science, technology, engineering, and math (STEM).

More than 250,000 visitors participated in hands-on activities and exhibits, contests, theatre, art and music, and lectures that celebrated science. CReSIS was among 15 National Science Foundation (NSF) organizations invited to attend the Expo and the only representative from Kansas. In all, 600 technology companies, universities, research institutions, government agencies, and other invited participants showcased their research on the National Mall and surrounding areas.

In the CReSIS booth, students flew a model of the Meridian aircraft over a block of simulated ice and viewed the radar results on a computer screen. A simulation of sea level rise developed by Haskell Indian Nations University and KU showed the landward migration of coastlines. The flight simulator gave students the opportunity to feel like pilots.

Radar is a difficult concept to teach children because it is invisible. By incorporating the computer screen and ice block simulation, CReSIS' display made the invisible visible.

Using a multidisciplinary approach, CReSIS researchers create new ice-penetrating radars, vehicles, and computer models that measure the current state and changes in polar ice and then predict the impact on global climate change and sea-level rise. A recent report in *Scientific American* cites a British economist as saying that 200 million people currently live within 1 meter above sea level, including residents in eight of the 10 largest cities in the world.

booth. A simulation of sea level rise shows the landward migration of coastlines.

▼ EECS Assistant Professor Carl Leuschen (kneeling), Arnett, and Ph.D. student Aqsa Patel assemble the CReSIS booth at the USA Science and Engineering Expo in October.

Patel, a Ph.D. student in electrical engineering, helps a student guide the flight simulator. After flying over a block of simulated ice, students viewed the radar results on a computer screen.

Photos by Jill Hummels

Graduate Banquet

he following students were honored at the Spring Graduation Reception on May 15.

Outstanding Senior Award

Based on overall achievement, the award is presented to a graduating senior in EE, CoE, and CS

Austin Arnett (EE), Ryan Kanoknukulchai (CoE), and Thomas **Boettcher** (CS)

A nontraditional student with outstanding scholastic achievement is the recipient of the Ellermeier award. It is given in honor of former EE Professor and Associate Dean of the Graduate School Robert Ellermeier.

Joseph Wachtel

Everitt Award

The International Engineering Consortium sponsors the Everitt Awards, which are reserved for EECS seniors in the top 10 percent of their class. Winners must be interested in communications and computers and involved in outside activities. Nicholas Bergmann and Gianpierre Villagomez

Paul F. Huebner Memorial Awards

Paul Huebner was a KU graduate with a BS in accounting, concentrating in CS, and a graduate degree in CS. The award is intended to reward good teaching and encourage students to consider teaching as a career.

Peter Adany, Evan Austin, Matthew Cook, Michael Jantz, and Christopher Redford

Richard K. & Wilma S. Moore Thesis Award

This award is given in honor of Distinguished Professor Emeritus Richard Moore. The best graduate thesis and doctoral dissertation are honored.

Martin Kuehnhausen and Christopher Gifford (dissertation)

Rummer Awards

Professor Emeritus Dale Rummer's dedication to engineering design was the impetus for the award. The awards are given for outstanding work done by seniors in CoE and EE capstone design courses.

David Barbosa, Christa Curette, Alan Dang, and Luke Turner (CoE)

Thomas Pittoors, Brandon Steigerwald, Christopher Willdermood, and Robert Wood

Gianpierre Villagomez and Nicholas Bergmann

Michael Jantz, Evan Austin, and Christopher Redford

David Barbosa and Alan Dang

 Christopher Willdermood, Thomas Pittoors, Robert Wood, and Brandon Steigerwald

www.eecs.ku.edu

GRADUATES

Spring 2010

Joshua Allford, BSCS Austin Arnett, BSEE* Olusegun Ayandele, BSCoE David Barbosa, BSCoE Luis Betancourt, BSEE Thomas Boettcher, BSCS Thomas Carr, BSEE Carla Castillo Rodriguez, MSEE Jacob Coble, BSCS Matthew Cook, MSEE◆ Adam Crifasi, BSEE Christa Curette, BSCoE Amit Dandekar, MSIT Alan Dang, BSCoE Devin Dougan, BSCoE Justin Epp, BSEE Jasenthu Fernando, BSCS Zachary Gardner, BSCS John Gibbons, MSCoE Morgan Grissum, BSEE Steven Haenchen, MSIT Adam Hinkhouse, BSCoE Jamie Hohman, MSCS Alexander lams, BSEE John Jakabosky, BSEE Philip Jennings, BSEE Ryan Kanoknukulchai, BSCoE* Jennifer Kaufman, MSIT Nolan Kellerman, BSEE Marouf Khan, BSEE Andrew Kolman, BSCoE Jason Kroge, MSCS Eric Kuch, BSCS Todd Lair, BSCoE Tyler Leiker, BSEE Michal Lichwa, BSCS Ka Ling, BSEE Shantan Reddy Marepally, MSCS Timothy Marshall, BSEE Pratima Mazumdar, MSIT Jerome Mitchell, MSCS Asifuddin Mohammad, MSCoE Ramya Naidu Muthyala, MSCoE Christopher Nance, BSCoE Bowe Neuenschwander, BSCoE Heather Owen, MSEE Thomas Pittoors, BSEE Kevin Player, MSEE Kevin Quillen, BSCoE Prashanth Ramani, MSCoE

Keith Reecs, BSCS Glen Reeves, BSCoE Michael Rink, MSCS Evan Rose, BSEE Lane Ryan, BSEE Jessica Scott, BSEE Ashwini Shikaripur Nadig, MSCoE Andrew Simons, BSCS Devin Sinha, BSCS Joshua Skelton, BSCS Brandon Steigerwald, BSEE Thomas Swanson, BSEE David Tai, BSCS Zachary Taylor, BSEE Bryan Tilson, BSEE Phuong Tran, MSCS Brian Tung, BSCS * Luke Turner, BSCoE Prabha Umamaheswaran, MSEE Vamsreedhar Vantaru, MSCoE Kannan Vetrivallalan, MSCoE Gianpierre Villagomez, BSCS* Christopher Willdermood, BSEE David Wolfe, BSCS* Robert Wood, BSEE Jeffrey Zila, BSCoE

Summer

Justin Ehrlich, "The Effect of Desktop Illumination Realism on Presence in a Virtual Learning Environment," Ph.D. CS Advisor: Dr. James Miller◆

Abdul Jabbar Mohammad, "A

Framework to Quantify Network Resilience and Survivability," Ph.D. EE Advisor: Dr. James P.G. Sterbenz◆

Nicholas Bergmann, BSEE Matthew Casper, MSEE Deepak Chellamani, MSEE Clinton Cohagan, MSCS John Drakey, MSIT Zaid Hayyeh, MSEE Michael Jantz, MSCS Arvind Madhavan, MSEE Naaser Ahmed Mohammed, MSEE David Mullins, BSCS Kevin Peters, MSCS Sasidhar Siddam, MSCoE Nathan Spears, BSCS Robert Thedinger, MSIT Brett Werling MSCoE◆

Fall

William Blake, "Interferometric Synthetic Aperture Radar (InSAR) for Fine-resolution Basal Ice Sheet Imaging," Ph.D.EE Advisor: Dr. Christopher Allen

Daniel Fokum, "Optimal Communications Systems and Network for Cargo Monitoring," Ph.D. CS Advisor: Dr. Victor Frost

Bhargav Adagarla, MSCoE Daniel Alam, MSEE Paul Anglin, MSEE Sukeerthi Bokka, MSCoE Jason Cradit, MSIT Jing Han, MSEE Ryan Horvath, MSIT Sandeep Kakarla, MSCS Cameron Lewis, MSEE Vijayananad Manickam, MSCoE Dayasager Nune, MSCoE Janaki Manohar Padathula, MSCS Purvi Patel, MSIT Mrudula Putcha, MSIT Michael Steve Stanley-Laine, MSCoE Tsam Kai Tsui, MSCS Sarvesh Varatharajan, MSCS Rui Wang, MSEE Matthew Zeets MSCS

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RESEARCH » »

Bioinformatics Computing Facility Receives \$4.6 Million NIH Grant

recisely understanding how genes work and interact will transform the diagnosis and treatment of diseases. To be able to sequence genomes and peer into molecules, researchers need vast computing power.

The Bioinformatics Computing Facility (BCF) at the Information Telecommunication Technology Center (ITTC) offers such power. It will receive a 20-fold boost in computing power thanks to a \$4.6 million grant from the National Institutes of Health. In addition, the new "green" design will utilize the heat generated from the computing hardware to supplement the building's heating infrastructure.

"This is a superb example of a win-win," said KU Chancellor **Bernadette Gray-Little**. "Investigators on the cutting edge of biological research will have much more robust computing at their command and see that their research is energy efficient and sustainable—a priority for our campus."

ITTC researchers will renovate more than 3,500 square feet of computing space and 2,400 square feet of support space. A sophisticated computer-rack cooling system will shuttle heat from computing equipment into the Nichols Hall boiler room, resulting in an expected 15 percent reduction in building natural gas use.

"We are confident that the renovated core facility will prove to be an exemplary centralized computational resource," said EECS Assistant Professor **Jun "Luke" Huan**, who spearheaded the project. "It is well-positioned to meet the ambitious data analysis needs of KU biomedical research and to dynamically respond to future computational challenges."

BCF projects include the prediction of the misfolding of proteins that contribute to Alzheimer's and other neurodegenerative diseases, sequencing of genomes, data mining of chemical genomics databases, and developing approaches to uncover interactions between genes and proteins. Such advanced biomedical research pushes computer systems to their limit.

EECS Assistant Professor Jun "Luke" Huan stands in front of the Bioinformatics Computing Facility. Dr. Huan spearheaded the \$4.6 million proposal to expand the Information and Telecommunication Technology Center facility. The renovations also will increase access to computational resources by improving network connectivity between the facility and the rest of the Lawrence campus, the KU Medical Center, and external organizations.

"The existing BCF is running at capacity and cannot be expanded further," said ITTC Director **Perry Alexander**, Sharp Professor of EECS. "It supports more than 50 research projects and 10 core service laboratories. Researchers from across KU participated in this proposal. It was a university-wide effort to increase high-performance computing capacity for an exceptionally diverse collection of researchers, ranging from life sciences to engineering, while focusing on sustainability and energy efficiency."

For researchers across KU, the renovations also will increase access to computational resources by improving network connectivity between the facility and the rest of the Lawrence campus, the KU Medical Center, and external organizations.

KU Researchers Develop Searchable Paleontology Database

ECS researchers are collaborating with the KU Paleontological Institute to develop a searchable online database and library that links more than 50 volumes of the "Treatise on Invertebrate Paleontology." This serves as important resource on climate change, evolution, and other biodiversity research. A \$1.5 million grant from the National Science Foundation is supporting the development of the Invertebrate Paleontology Knowledgebase (IPKbase).

"Treatise" classifies all known extinct and living invertebrates (creatures without backbones), which make up 95 percent of the animal species. Finding new ways to electronically extract, analyze, and store this authoritative compilation will lead to greater understanding of mass extinctions, evolutionary recoveries, and current environmental threats. IPKbase will transform data management.

"IPKbase will help researchers more easily connect the dots," said **Xue-wen Chen**, associate professor of EECS and principal investigator of IPKbase. "The amount of information is overwhelming, and we are developing tools to help them mine data. By developing a fast and flexible online information repository, we will enable greater access to critical information." KU researchers will develop a three-step process for IPKbase to handle the highly complex and immense "Treatise" data. Computational tools will extract and integrate images, text, and numerical data. For example, image-based searches would allow paleontologists to compare photographs of a newly discovered fossil with known images. New data analysis, modeling, and visualization techniques will discover patterns and provide meaningful interpretation. Finally, IPKbase would index information for easy retrieval and sharing.

EECS Associate Professor **James Miller** and EECS Assistant Professors **Jun "Luke" Han, Bo Luo**, and **Brian Potetz** will serve as co-investigators on the project. **Paul Selden**, the Gulf-Hedberg Distinguished Professor of Invertebrate Paleontology, director of KU's Paleontological Institute, and editor of the "Treatise" will be a co-investigator as well. They will conduct research at KU's Information and Telecommunication Technology Center.

"After half a century of scholars compiling and benefitting from this important repository of knowledge, today's researchers will have greater access to its knowledge through its digital presence and the incredible data mining techniques that our computer scientist colleagues are developing," Selden said. "This project will allow students of paleontology, young and old, and researchers in related industries to move forward on a variety of problems of concern to mankind."

CRESIS RESEARCH » »

CReSIS Receives NSF Renewal Award for Nearly \$18 Million

By Jill Hummels

he Center for Remote Sensing of Ice Sheets (CReSIS) will receive more than \$17.9 million from the National Science Foundation to continue its innovative research on the changing conditions of the world's polar ice.

"Researchers at CReSIS have done a remarkable job of creating new tools that provide unique data about the health of our planet," said Chancellor **Bernadette Gray-Little**. "This national grant is confirmation of the pioneering research taking place at KU. Our researchers' revolutionary work is providing a more complete picture of the potential impact that climate change may have on all of us."

The renewal award, which was granted in August, brings the total NSF award amount to \$36.9 million, which represents the largest grant ever awarded to support research at KU.

The multi-institutional CReSIS was created in 2005. The five-year renewal award acknowledges the continuing success the Center has had in its efforts to create new ice-penetrating radars, vehicles, and computer models that can measure the current state and changes in polar ice and then predict the impact on global climate change and sea-level rise. A recent report in *Scientific American* cites a British economist as saying that 200 million people currently live within 1 meter above sea level, including residents in eight of the 10 largest cities in the world. Using a multidisciplinary approach, CReSIS researchers combine expertise in electrical engineering, information technology, aerospace engineering, glaciology, and geophysics to develop, test, and utilize radars in the field. Measurements and data gathered during missions to Greenland and Antarctica are crucial to the accurate prediction of future sea level rise. The Center also has a strong commitment to developing devices that have commercial applications and appeal.

"The faculty, students and staff have developed sensors, Uninhabited Aerial Vehicles, and advanced concepts to obtain much needed data on the ice-bed interface at the ice-sheet margins and fast-flowing glaciers, and the renewal is a reflection of the excellent progress made by the center thus far," said **Prasad Gogineni**, CReSIS Director and Deane E. Ackers Distinguished Professor of EECS. "The technical and scientific skills represented here are among the best in the world."

CReSIS provides opportunities for undergraduate and graduate students to improve their technical and communication skills and participate in research that involves significant international collaboration. Fifty-five graduate students—38 at the master's degree level and 17 at the doctoral degree level—have earned their degrees while conducting research at the Center. ■

▲ EECS Ph.D. Cameron Lewis (glasses) and CReSIS Research Professor Fernando Rodriguez-Morales monitor radar during a fly over of the Jakobshavan Glacier in Greenland.

▲▲ Graduate student Jerome Mitchell (right) helps a research experience for undergraduate (REU) intern prepare a research poster. The summer REU program provides students research opportunities normally unavailable to undergraduates.

▲▲ Doctoral student Logan Smith unpacks equipment for testing of the Antarctica ice sheets.

The Center for the Remote Sensing of Ice Sheets (CReSIS) is working to better understand the dynamics of the world's ice sheets, their effect on sea level rise, and the subsequent impact on society.

By Jill Hummels

n the cover article of the January issue of the Journal of Glaciology, CReSIS researchers detail a new radar array that is capable of depicting a 3D view of bedrock hidden beneath ice sheets three kilometers thick.

Then-doctoral student **John Paden** (BSCoE '99, MSEE '03 with honors, Ph.D.EE '07) designed a Synthetic Aperture Radar system to provide a fine-resolution image of the bed over a wide geographic region, as well as ice thickness. Topographic characteristics below the glaciers and ice sheets are considered essential to develop computer models that can better predict the role of ice sheets in global climate change and sea level rise.

The radar system is a game-changing development for researchers in global climate change. Previously, glaciologists could only know the thickness of the ice and bed conditions along a single line from a sole pass of a radar or at a single point where ice core samples had been drilled.

To get these innovative 3D landscapes, KU engineers constructed a special sled with several radar transmitters and receivers. The sled was then hauled over an ice sheet in Greenland, following a precise grid. The radar used both left-looking and rightlooking beams. Researchers then used advanced signal-processing techniques to determine the directions of the echoing wavelengths. The team collected data through opaque ice as much as three kilometers thick that revealed the ground from multiple points.

Because the same spot on the ice bed is imaged by radar from several tracks, the elevation is independently measured multiple times. "While the 2D representations provide a consistent medium for comparison of point differences, a 3D representation provides better visualization and interpretation of surface features," Paden wrote.

To confirm accuracy, researchers compared their result with the Greenland Ice Core Project ice borehole and found their data to be within 10 meters at that site. The radar system is considered very accurate with an error of 0.3 percent in the index of refraction.

Paden worked with EECS Professor **Chris Allen**, Deane E. Ackers Distinguished Professor of EECS and CReSIS Director **Prasad Gogineni**, CReSIS engineer **Torry Akins** (BSEE '96, MSEE '99), and thengraduate student **David Dunson** (BSEE '99, MSEE '06).

Dr. Paden is now a Research Assistant Professor with CReSIS.

Then-doctoral student John Paden (inset picture) led a team of CReSIS researchers in the development of a special sled with several radar transmitters and receivers. The radar array is capable of depicting a 3D view of bedrock hidden beneath ice sheets three kilometers thick.

Photo Courtesy of CReSIS

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Thank you for your generous and continued support. Your donations enable student scholarships, special awards for faculty, laboratory upgrades, and other important EECS projects. Below are the FY 2010 (July 1, 2009 to June 30, 2010) contributions.

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Alumni Spotlight

Meet Ken Conklin (MSCS '03) Senior Vice President, Global Head of Business Development & Marketing, BATS Global Markets, Inc.

ncreasing revenue by more than 4,000 percent landed BATS Global Markets on top of Ingram's 2010 Corporate Report 100, a list of the fastest growing companies in the Kansas City area. It is the most recent honor for the Lenexabased company that has become the world's third largest securities exchange, with nearly \$40 billion in daily trading and offices in Lenexa, New York, and London.

Ken Conklin was among the 13 founding employees of BATS (Better Alternative Trading System) in 2005. Initially as a software developer, Mr. Conklin helped develop BATS high-speed stock exchange platform, which all of the major investment firms trade on daily. The BATS platform, built on opensource technology, handles hundreds of thousands of orders a second and can match a trade in less than 200 microseconds.

Why would you say KU is the place to earn an excellent engineering and computer science education? The professors, facilities, and curriculum are aligned to prepare students for careers, which is extremely important.

What are your favorite KU/EECS memories?

Many memories come to mind, including being a TA [teaching assistant] for several semesters for Dr. Kinnersley and becoming great friends with several individuals in the computer science graduate program, many of whom I still keep in touch with today. But my fondest memory is the faith and encouragement I was given by Dr. [James] Miller, who was my professor my first semester in Java programming and ended as my thesis advisor. Dr. Miller spent genuine time helping me grow and strengthen my technical skills, and to this day, I've appreciated his efforts and friendship.

What does a typical work day look like for you?

I spend less time today programming and working on technical products than I once did, but still very much love talking about algorithms, software design, and programming languages. I write some SQL [Structured Query Language] to access our database when I need information. Most of my time is ensuring our marketing team keeps consistent branding across all of our affiliates and looking for opportunities to grow organically or through acquisitions. I will say that the technical skills I learned at KU have benefited my entire career across several different roles and functions.

Can you describe a specific challenge that you encountered in the work force and how you overcame it?

Rest assured, regardless of whom you work for during your career, there are always major challenges to overcome. When our new stock exchange system went live, we had just a couple of firms using the technology to trade. We were an unknown start up in Kansas City, fighting to bring more customers from Wall Street and other major financial centers to BATS. I was a developer at that time, but BATS was a technology company that needed someone with technical skills to run sales. I had never been to any of the major financial centers, including Wall Street, and had to figure out a marketing strategy to sell BATS. Through focused networking, Midwestern service, and steady plodding, we were able to connect every major financial firm to our system in just a few years. Looking back, I realize this daunting task ended up being quite a learning experience in persistence, trust, and faith.

What are your top tips for students nearing graduation?

Embrace the time you have at KU and learn absolutely everything you can in your respective field. Do not take any class for granted because there is a good chance you'll need that knowledge at some point in your career. Also, when going through the interview process, I would encourage you to interview with as many companies, large and small, as you can. You may find an interesting place to work that was less obvious initially. Good luck, graduates!

THE UNIVERSITY OF KANSAS Department of Electrical Engineering & Computer Science (EECS) 2001 Eaton Hall 1520 West 15th Street Lawrence, KS 66045-7621

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