EECS NEWS

Rock Chalk, Jayhawk, KU!

Virtual Environment created by EECS researchers

2009

UNIVERSITY OF KANSAS

CONTENTS

Cover Image
University of Kansas researchers have developed "A Virtual Environment for Teaching Social Skills" (AViSSS) to help middle school students with Asperger Syndrome learn how to better interact with others and practice real-world situations independently. EECS Associate Professor **Jim Miller** was a co-investigator on the project, and **Justin Ehrlich**, a doctoral student in computer science, was the lead developer. For more on AViSSS, please see page 20.

EECS Chair Glenn Prescott

I n September, we lost a dear colleague and friend, **Jim Roberts,** to cancer. Jim loved teaching and research and served as a great mentor to our younger faculty and students. Always quick with a smile and a warm hello, he is greatly missed.

Jim's death cast a shadow over the year for me. It was not until reviewing the Annual Report that I could acknowledge what a successful year it had been for EECS. The federal government designated KU as a national Center of Excellence in Information Assurance. Our education and research programs excel not only in cyber security but also in the availability and authenticity of digital information. EECS Professor **Perry Alexander** and Deane E. Akers Distinguished Professor of EECS **Joseph Evans** led the proposal effort for KU. **Jun "Luke" Huan** earned a NSF Faculty Early Career Development (CAREER) award, one of the most prestigious NSF awards offered to junior faculty members. It is our second CAREER Award winner—EECS Associate Professor **Xue-wen Chen** won in 2007—in bioinformatics. Using computer science to mine, analyze and store life-science data is a growing expertise for us. In contrast to bioinformatics, remote sensing is one of our most established and acclaimed focus areas. EECS Professor **Chris Allen** and EECS Assistant Professor **Carl Leuschen** led aerial surveys to collect data on the Antarctic polar ice sheets. The projects are part of a larger effort to better understand climate change. These multidisciplinary efforts occur at the edges of traditional disciplines and across subject boundaries in order to help solve complex problems.

Our students continually amaze me with their ability to juggle a challenging major and extracurricular activities. **Jackie Paschang** (BSEE '09) was Baby Jay. As a mascot, she took part in some of KU's biggest sporting events over the last few years. **Christa Curette**, a CoE senior, was elected to a regional position during the National Society of Black Engineers (NSBE) annual convention in March. She is helping plan the 2010 NSBE National Convention. This is in addition to her role as president of the KU Chapter of NSBE. Air Force Staff Sergeant **Jonathan Lanning** (BSCS '09), a married father of three young children, graduated in less than four years. Did I mention he did not know how to read or write code when he started at KU? In his free time, he taught himself. Lanning won the much deserved Ellermeier Memorial Award at our spring graduate reception.

We strive to arm our students with sound fundamentals, hands-on experience and critical thinking skills for the real world. Our alumni showcase our abilities and serve as our strongest advocates. Our featured alumnus, **Steve Unruh** (BSEE '03), is a perfect example. Now a senior engineer at Hasbro Toy Group, Steve says his KU education has proven to be impressive, even next to the big-time Boston engineering schools.

We always enjoy hearing from our alumni and friends. Please share news of a new job, promotion or such with us at *info@eecs.ku.edu*. Have a safe and happy 2010. ∎

Did You Know?

The National Institute of Standards and Technology (NIST) Construction Grant Program awarded $12.3 million for construction of a "green technologies" research facility at the School of Engineering. Expected to be completed in 2012, the building will be located west of Eaton Hall and south of Learned Hall. It will house a number of EECS projects, including EECS Assistant Professor Sarah Seguin's electromagnetic compatibility research.

Roberts Will be Remembered for Love of Teaching, Research

Longtime KU administrator and EECS faculty member **James Roberts** died in September. After a successful career in industry, Roberts returned to KU, his alma mater, in 1990 to become professor and chairman of the Department of Electrical and Computer Engineering. In 1993, he became the first chairman of the combined EECS Department.

Roberts also served as associate vice chancellor for research and public service and later as associate vice provost. He was the vice provost for research and the president and chief operating officer of the KU Center for Research from 2003-2007. In 2007, Roberts returned to teaching and research as a full-time professor.

James Roberts

"To the very end, he loved teaching and research," says EECS Chair **Glenn Prescott**. "Several of us wanted him to retire last year when he was first diagnosed [with colorectal cancer], but he wanted to press on as he genuinely enjoyed what he was doing. His students and his scholarship were much, much more to him than just a profession."

"While he was good at everything he did, I felt that what he enjoyed most was teaching and research," says AT&T Distinguished Professor of EECS **K. Sam Shanmugan**, who was instrumental in recruiting Roberts to return to KU as chairman. "We will all miss him and his optimism."

EE junior **Angela Oguna** was assigned Roberts as her advisor when she transferred to KU. After proving herself that first semester, Oguna says Roberts was constantly on the lookout for professional development opportunities for her. His open-door policy was integral in cementing the mentor-mentee relationship.

"Simply put, Dr. Roberts was instrumental in laying a firm foundation for my start at the School of Engineering, and for that, I am forever grateful," says Oguna.

> **While he [Prof. Roberts] was good at everything he did, I felt that what he enjoyed most was teaching and research. We will all miss him and his optimism.**
>
> — *K. Sam Shanmugan, AT&T distinguished professor of EECS*

When EECS Professor **Gary Minden** was leading the development of an interstate fiber optic network, he and EECS faculty were discussing the best way to send large numbers of bits. Minden asked whimsically what the weight of a bit was. A few days later, Roberts sent Minden a detailed answer that incorporated the theories of Albert Einstein and Claude Shannon among others. Fifteen years later, Minden still has the paper.

"I'll miss his enthusiasm for KU, his smiling face, his love for Kansas and Kansas history, his precision in engineering, his friendliness…," Minden says.

Roberts earned a bachelor's degree in electrical engineering from KU in 1966. He then earned a master's degree from the Massachusetts Institute of Technology, and later a doctorate from Santa Clara University in California, both in electrical engineering.

Starting in 1969, Roberts held management positions with a Silicon Valley start-up company that became a subsidiary of TRW, now Northrop Grumman. He developed some of the first interactive communications system design tools on the Arpanet, the forerunner of the Internet, and performed some of the early research into the use of low-altitude satellite packet radio networks. His early work focused on communications applications, but his research had turned to electric energy, including its use in vehicles. In collaboration with the KU Transportation Research Institute, Roberts had been developing an electric bus. ■

"The hard work and strategic vision of numerous KU faculty members and staff led to the University being accepted into this elite group."

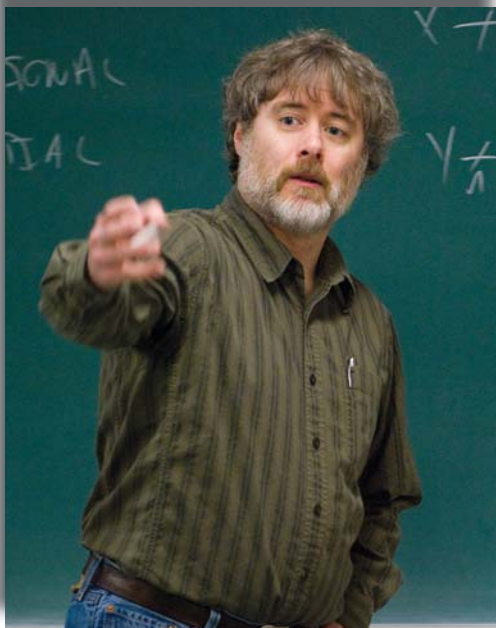# EECS Leads KU Effort to Become National Center of Excellence

The federal government has honored KU for its research and educational programs devoted to cyber security and information assurance. IA protects systems from unauthorized access to information and denial-of-service attacks that prevent authorized users from accessing information.

This spring the National Security Agency and Department of Homeland Security designated KU a National Center for Academic Excellence in Information Assurance Education. By educating the next generation of practitioners, performing fundamental research and reaching out to the community, KU serves as a center of expertise in IA.

EECS Professor Perry Alexander responds to a question during class. Alexander led the proposal to gain federal designation as a Center of Excellence in IA.

Photo by Jill Hummels

"Keeping a free flow of digital information is a national priority that also affects individual peace of mind," said **Steve Warren**, vice provost for research and graduate studies. "KU is working to enhance both. This announcement reflects that fact and is a tremendous recognition of the strong collaboration that came together to submit the successful proposal."

Deane E. Akers Distinguished Professor of EECS **Joseph Evans** and EECS Professor **Perry Alexander** led the proposal effort. They worked with faculty from KU's Information and Telecommunication Technology Center (ITTC) and the School of Business and staff from Information Services.

EECS offers a master's degree in information technology with a focus on information security. The Department's computer science and computer engineering graduate programs include strong security components as well. Complementing these efforts, the School of Business offers information systems and accounting courses that emphasize information security.

"This is a testament to our national prominence in information assurance and cyber security education," said Alexander. "The hard work and strategic vision of numerous KU faculty members and staff led to the University being accepted into this elite group."

In working toward center of excellence designation, ITTC developed the Information Assurance Lab. The Lab, which is directed by Alexander, serves as a University-wide focal point for information assurance education, research and implementation. The new interdisciplinary lab includes researchers from EECS, Mathematics and the Business School as well as KU's IT Security Office, which is responsible for implementing information security on campus.

"In establishing the IA Lab, Professor Alexander brought together diverse IA research expertise and the rich academic resources of KU," Evans said. "The Lab is the centerpiece of a holistic approach to securing the national information infrastructure." ∎

Kong Becomes New Associate Chair for Graduate Studies

In June, Associate Professor **Man Kong** was appointed the new associate chair for EECS graduate studies. He replaces Professor **Arvin Agah**, who spent nearly five years in the position. Agah will focus on teaching and research.

"I have enjoyed working with and mentoring graduate students, but I am ready for new challenges," says Agah. "Professor Kong will be a wonderful new associate chair."

Kong joined the KU faculty in 1986. His honors include a School of Engineering Sharp Professorship in 2006 and an Excellence in Teaching Award from the KU Center for Teaching Excellence in 2004. He has developed and revised various core EECS courses and chaired thesis and Ph.D. committees.

Man Kong

"This is an exciting opportunity; it gives me a platform to interact with more students," says Kong. ▪

Lawrence Retires After 30 Years with Engineering Department

"I'm one of the lucky ones who got up every day and wanted to come to work."

After more than three decades with electrical engineering, EECS Electronics Technologist **Norm Lawrence** retired this spring. Initially hired as an electrician, Lawrence assisted with numerous electrical engineering power courses. He notes the Department did not have a single computer and he had a full head of jet black hair when he started. When the Department shifted to electronics, the jack-of-all-trades adjusted his skill set. Lawrence became a certified Dell technician, who was responsible for 500 EECS computers.

In March, faculty and staff filled the EECS conference room to honor Norm Lawrence for his 30 years with electrical engineering. EECS Lab Director Aaron Blanchard presented Lawrence with retirement gifts from coworkers.

"I'm one of the lucky ones who got up every day and wanted to come in to work," said Lawrence.

Tom Colwell, EECS electronics technologist, calls Lawrence a walking history of the Department. He points out that the last line of Lawrence's job description was to fulfill the needs of the Department. In addition to helping faculty and students, Lawrence would fix a wobbly chair, remove a problem nail and do other odd jobs for the Department.

"He was the person who had the biggest impact on my day-to-day activities," said EECS Chair **Glenn Prescott,** who taught a senior design course for a number of years. Prescott is the 10th Department Chair Lawrence worked for at KU.

Faculty and staff gathered on March 5 to honor Lawrence and wish him well. During the retirement party, Prescott honored Lawrence's mother, Rosemary. Each week Rosemary made cookies and other goodies that Lawrence brought for his coworkers to enjoy. EECS Lab Director **Aaron Blanchard** presented Lawrence with presents from faculty and staff. ▪

Prominent Alumni Return to Speak at University

Google's Vice President of Engineering **Brian McClendon** (BSEE '86) presented "Google Earth and Google's Cloud Computing" at KU in November. The co-creator of Google Earth discussed the trend of storing data remotely, known as cloud computing. Documents, spreadsheets and other data can then be accessed anywhere by authorized users.

McClendon encouraged KU students to learn parallel processing and to develop Web-based applications for mobile phones, which will be

Google's Vice President of Engineering Brian McClendon discussed cloud computing during a talk at Nichols Hall.

Photo by Jill Hummels

key for Internet growth. Dividing instructions among multiple processors will enable programs to run more efficiently.

In October, the National Society of Black Engineers Distinguished Lecture Series sponsored a talk by **Andrew Williams** (PhDEE '99). Williams, who grew up in Junction City, became the first African American to graduate with a Ph.D. in electrical engineering at KU. He is now Chair of the Department of Computer and Information Sciences at Spelman College. He discussed the founding of the Spelman College SpelBots RoboCup team, the first all-women, African American team to compete in the international RoboCup of Artificial Intelligence and Robotics. His new book, *Out of the Box: Building Robots, Transforming Lives*, chronicles his journey.

"His message was that no matter where you are from, your cultural background, ethnicity or level of education, thinking outside the box is important. Because you never know where life may take you," says **Christa Curette**, KU chapter president of NSBE. "He has proven that hard work pays off and there is nothing better than pursuing your passion. Professor Williams has done so much to give back to the minority population." ∎

New, Transfer Students Learn About EECS During *Plugged In*

In August, the Department hosted a pizza party for EECS freshmen, undecided engineering and transfer students. *Plugged In* allows students to learn about the Department and connect with faculty and other new students. More than 70 students mingled with professors and learned about student research projects in the atrium of Eaton Hall. The group then moved into Spahr Engineering Classroom where students received an overview of the Department and heard from recent alumni.

"Incoming EECS students may not have a good picture of the good things in store for them as students and as graduates of KU," says EECS Professor **Dave Petr**, associate chair for undergraduate studies. "*Plugged In* is an opportunity to show students what we are about, the success of our alumni and the variety of interesting careers available to them."

EECS Alumni **Brian Anderson** (BSCS '01), **Marina Burton** (BSCoE '05) and **Bharath Parthasarathy** (MSEE '06) told students about their jobs with Tradebot, Ericsson and Garmin, respectively. Anderson recalled the support he received from EECS faculty.

Parthasarathy talked about the importance of the senior design class and how it enabled him to put everything he had learned into an actual project.

"EECS challenged me to think critically," said Burton, now a network engineer for Ericsson. "There was never a

At *Plugged In*, EECS Associate Professor Jim Miller shows students computer graphics he and his student researchers developed.

straightforward answer. When you get out in the real world, you have to find solutions to problems that often may not have an easy answer. EECS prepares you to think outside the box and not settle for a cookie cutter answer." ∎

Professor, Student Earn National Science Foundation Awards

Jun "**Luke**" **Huan**, EECS assistant professor, and his doctoral student **Brian Quanz** each received a National Science Foundation Award.

In July, Huan received a $500,000 Faculty Early Career Development (CAREER) award. One of the most prestigious NSF awards offered to junior faculty members, CAREER honorees are selected for their innovative integration of education and research.

Since coming to KU in 2006, Huan has taught Data Structures and Introduction to Database Systems. His graduate courses include Pattern Discovery from Data and Introduction to Bioinformatics.
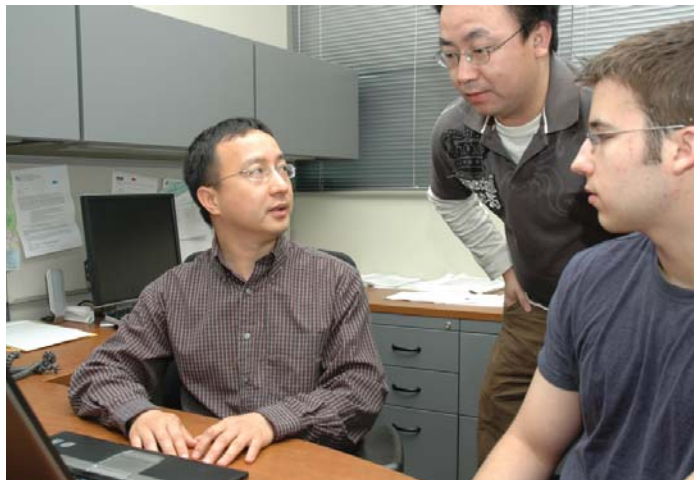
Huan's computational tools will enable better analysis of interactions between chemical structures and biological systems, accelerating drug discovery and improving chemical toxicity monitoring. Through computational modeling, Huan will be able to describe and then predict the effects of the interactions.

"When we look at chemical genomics—the complete set of genomic response to chemical compounds—we begin by dealing with highly complex raw data," Huan says. "These data can often have thousands of dimensions as they relate to each other, and they are often incomplete and distorted. In addition, there is simply a staggering amount of data collected."

Quanz, one of Huan's graduate research assistants, received an NSF Graduate Research Fellowship this spring. The award provides a $30,000 annual stipend plus tuition and discretionary funds for up to three years. Both Huan and Quanz conduct research at KU's Information and Telecommunication Technology Center (ITTC).

"The NSF GRF is a great achievement for Brian. It also reflects the strong graduate program that we have at KU," says Huan.

Quanz is devising artificial intelligence (AI) tools to process data collected from various sources in sensor networks. Objects can then help determine their own safety along the supply chain.

EECS Assistant Professor Jun "Luke" Huan (left) meets with doctoral students Jintao Zhang and Brain Quanz (right) in his office. Huan's research team is developing computational tools to better analyze interactions between chemical structures and biological systems. His bioinformatics research will accelerate drug discovery and improve chemical toxicity monitoring.

Photo by Jill Hummels

This data analysis is the foundation for a threat detection system used in the collaborative Transportation Security SensorNet (TSSN) project, led by **Victor Frost**, Dan F. Servey Distinguished Professor of EECS. Before TSSN, 'black holes,' or information vacuums, occurred en route. ITTC researchers, in collaboration with KU's Transportation Research Institute (TRI), are providing stakeholders with greater visibility, security and accountability along the supply chain.

Quanz' algorithms also have applications in bioinformatics research. Genes, in effect, have "on/off" switches. Quanz is attempting to expose the role that diet, stress and other environmental factors have in flipping those switches, such as the expression of cancer genes.

"The fellowship, which I am honored to receive, gives me the freedom to pursue different research avenues," Quanz said. ∎

EECS Faculty Earn U.S. Patents for Innovations

EECS professors value the synergy between research and teaching. Continued scholarship and collaboration with industry advance the state of the art and enrich the classroom experience for students. Four EECS faculty innovations earned U.S. patents in 2009.

Xue-wen Chen, associate professor of EECS, earned a patent for "Method of Classifying Data Using Shallow Feature Selection." The algorithm performs better than most existing methods in gene discovery, cancer classification and diagnosis and drug discovery. The method can aid any type of feature selection including identifying faces from images or video for surveillance.

Coherent Anti-Stokes Raman Spectroscopy (CARS) imaging provides high-quality 3D images of living cells. The imaging tool requires two expensive laser sources to be synchronized and maintained. To enable greater accessibility

Daniel Deavours, ITTC research assistant professor, displays a radio frequency identification (RFID) tag he developed. He received a U.S. patent for enabling more efficient manufacturing of RFID tags.
Photo by University Relations

of the imaging tool, EECS Professor **Ron Hui** developed an affordable, compact and wavelength-tunable laser system. "Laser System for Photonic Excitation Investigation" can be easily transported and used with current biological imaging microscopes. This marks Hui's 14th patent.

ITTC Research Associate Professor **Daniel Deavours** and EECS alumnus **Karthik Ramakrishnan** (MSEE '06) received a patent for "Virtual Short Circuit for Providing Reference Signal in RFID Tag." The innovation enables more efficient and inexpensive manufacturing of RFID tags for asset tracking. Deavours' tag provides better performance than competing technologies. It is one of several novel ideas being pursued to creatively expand the utility of RFID tags.

Separating items of interest (namely detectable targets) from noise and interference in radar transmissions earned EECS Assistant Professor **Shannon Blunt** and doctoral student **Tom Higgins** a U.S. patent this fall. "Computationally Efficient Adaptive Radar Pulse Compression System" increases sensitivity to smaller targets. Pulse compression enables a radar to achieve high range resolution without using high peak transmit power by matched filtering upon reception. However, matched filtering of large target returns produces sidelobes, or interference, that can mask the presence of smaller nearby targets. For example in land mine detection by ground-penetrating radar, the ground can mask a mine. By adapting the filter to the received signal, sidelobes resulting from large targets can be suppressed. ∎

Did You Know?

EECS faculty and student researchers are measuring global climate change, developing the future Internet and investigating other complex global problems. Under faculty direction, students conduct hands-on research on these real-world problems and interact with industry and government collaborators. The **Center for the Remote Sensing of Ice Sheets** (CReSIS), a NSF Science and Technology Center, and the **Information and Telecommunication Technology Center** (ITTC) support these multi-million dollar interdisciplinary research efforts.

Faculty Notes

Frost Begins NSF Appointment

Dan F. Servey Distinguished Professor of EECS **Victor Frost** was appointed a program director in Networking Technology and Systems (NeTS) within the National Science Foundation (NSF).

The NeTS program supports the development of future generation, high performance networks. These include everything from personal area and home networks to wireless networks and peer-to-peer, application-level networks. NeTS research supports the development of pervasive networks, available anytime and anywhere.

Victor Frost

Frost is the sixth EECS faculty member to serve within a federal agency. For more than a decade, ITTC faculty have helped set the nation's research agenda in computing, communications and sensors. ∎

Chen Gives Keynote, Co-Chairs Conferences

In August, **Xue-wen Chen**, EECS associate professor, gave the keynote speech at the 2009 IEEE International Conference on Granular Computing – Computational Models in Systems Biology. He also served as the co-chair for the IEEE Conference on Bioinformatics and Biomedicine in November. Additionally, Chen is co-editor-in-chief of the *International Journal of Data Mining and Bioinformatics*. ∎

Blunt Helps Organize Waveform Conference

EECS Assistant Professor **Shannon Blunt** was general co-chair for 4th International Waveform Diversity & Design Conference in February. He continues to serve as an associate editor for *IEEE Transactions on Aerospace & Electronic Systems*. ∎

Agah, Kinnersley Receive Miller Awards

In May, EECS Professor **Arvin Agah** and EECS Associate Professor **Nancy Kinnersley** were honored with the Miller Scholar Award and Miller Award for Service, respectively, from the School of Engineering. ∎

Sterbenz Presents Networking Research

In October, EECS Associate Professor **James P.G**. **Sterbenz** presented the keynote address at the International Conference on Ultra Modern Telecommunications in St. Petersburg, Russia. Later that same month, Sterbenz gave a tutorial on resilient and survivable networking at the International Workshop on the Design of Reliable Communication Networks (DRCN) in Washington, D.C. Security and dependability are key aspects of Sterbenz' resilient networking research. ∎

Ercal-Ozkaya Speaks at Project Discovery

EECS Assistant Professor **Gunes Ercal-Ozkaya** was a guest speaker at Project Discovery, a weeklong summer camp for high school girls interested in engineering. The School of Engineering Office of Diversity and Women's Engineering Programs organizes the annual camp at KU. ∎

Luo Serves as Program Committee Member

Bo Luo, an EECS assistant professor, was a program committee member for the18th ACM Conference on Information and Knowledge Management and the 11th ACM International Workshop on Web Information and Data Management. ∎

Rowland Evaluates NSF Program

This spring EECS Professor **James Rowland** served on a panel that reviewed 12 laboratory improvement proposals for the Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (TUES) program. The National Science Foundation program seeks to improve the quality of science, technology, engineering and mathematics (STEM) education for undergraduate students. ∎

Newcomer Earns Harry Talley Excellence in Teaching Award

The Scotsman has made quite an impression at KU. In only his first year, Assistant Professor **Andy Gill** received the Harry Talley Excellence in Teaching Award at the spring graduation banquet in May. Graduating seniors honor an EECS professor who has contributed significantly to their education and development with the Talley Award.

"I am very honored," says Gill. "I come from a family of teachers—my mother was vice-principal in a school for children with special needs—and I have two principals and an architecture professor in the family. I do feel teaching is in my blood, and I am passionate about it."

Eta Kappa Nu president Matthew Cook (left) presents EECS Assistant Professor Andy Gill with the Harry Talley Excellence in Teaching Award at the spring graduation banquet. Graduating seniors pick the winner.

A belief that fundamental changes are needed within software and hardware design led Gill back into academia. Gill says developers are, in effect, using hammers and chisels to design hardware and software. The smashmouth approach results in inflexible systems that must be extensively updated when redeployed or extended. Gill is helping bridge the gap between specifications, what a system would ideally do, and actual implementations, which involve many compromises. This will help make systems more efficient and adaptable.

At KU, Gill has developed courses in Functional Programming and Implementing Functional Languages. Functional programming, such as Haskell, enables the creation of reusable, easy to write and debug software. Gill teaches how to solve engineering problems efficiently via modern functional languages. The second course covers major techniques used in real functional language compilers to optimize programs.

"The first thing that stands out is his knowledge and experience in the area," says doctoral student **Megan Peck** (BSCoE '06). "Beyond that, he really focuses on presenting the material in a way that everyone will understand and developing relevant homework and projects to help students get involved and let the material really sink in. He's a very dynamic teacher, who is constantly adapting his plans to figure out how to most effectively communicate to ensure that people understand."

"He takes time to really explain things and uses terminology and concepts that students can understand. He cares about the success of his students," says graduate student **Tristan Bull** (BSCoE '08). Bull has taken Functional Programming and Implementing Functional Languages from Gill, who is also his advisor. "Whether I am struggling in research or a class, I talk to Professor Gill, and he always has a solution. He is very supportive."

Gill chaired the 2009 International Conference on Functional Programming (ICFP) Contest held at KU in June. More than 850 teams of computer scientists, including those from Google and NASA, took part in the marathon computing contest. Faculty, students and staff at the Information and Telecommunication Technology Center spent several months creating the computer program that represents how mythical satellites would work and function. Participants were charged with moving these satellites around in space.

"When we hired Andy we knew we were getting one of the top young investigators in systems and languages," says ITTC Acting Director **Perry Alexander**. "His energy and passion have proven infectious at ITTC and CSDL [Computer Systems Design Lab], and we are truly privileged to have him here."

Born and raised in the United Kingdom, Gill received his Ph.D. from the University of Glasgow in 1996. Gill has lived in the United States ever since, working with industry giants Microsoft, Hewlett Packard and others. Before coming to KU, he spent eight years with Galois, a company he co-founded, that specializes in developing secure and safe software. ∎

Student Success » »

Ryan Challacombe (BSEE '09)
Topeka, Kansas

Challacombe is a hardware design engineer at Relm Wireless Corp. in Lawrence. He designs two-way radios for the public safety industry, including police and military personnel.

At the spring graduation ceremony, Challacombe won an Everitt Award. The award is reserved for EECS seniors in the top 10 percent of their class who are interested in communications and computers and participate in outside activities. The Topeka native received both Garmin and Department scholarships.
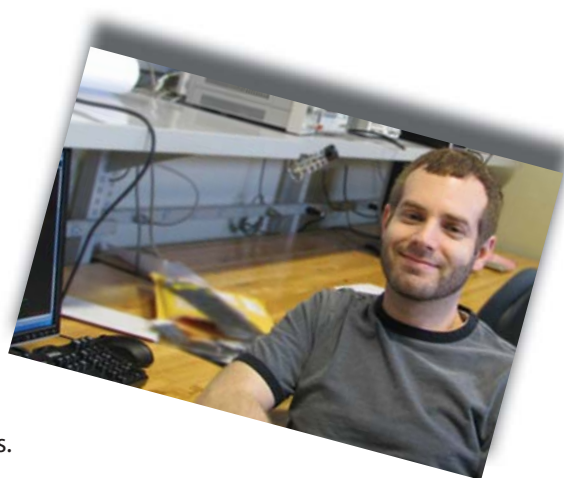
Why EE and KU?

I was in a band and started becoming more interested in how amplifiers worked. At the same time, I was tutoring someone in math and realized I was pretty good at it. I was in a dead-end job and wanted a better one. It led me back to school. I could commute to KU.

How has your time at KU changed you?

I have learned to keep things in perspective. I may be extremely busy right now, but in six months, I will not be as busy. It is good to remember you will not have to maintain this pace. Also, I have become really good at prioritizing.

What have been some of your favorite experiences at KU?

I have enjoyed my senior design class. You take a project from the design phase to a final product. It is hands-on, which I like. We were able to send music through a transmitter to a receiver. Our group built both the transmitter and receiver.

What was your biggest challenge?

Commuting eats up a lot of time. I also have a part-time job. Finding time to fit everything in can become a challenge. Balance can be hard to achieve. I try to remember that time spent with friends and other breaks help me keep my sanity.

What advice would you give to new students?

You need to have a long-term perspective. Right now, calculus and differential equations may be hard and not what you want to do. Remember the things you are learning now are important and will help you in future classes.

What is your favorite place to study?

Spahr Library is a great place for groups to study. As long as it stays on task, the group often benefits from synergy. People may have a solution you had not even considered. ∎

KU Students Conduct Experiments in Reduced Gravity

The KU Microgravity team completed a successful flight week at the Johnson Space Center in Houston this spring. NASA selected the Jayhawk team, which included EECS seniors **Bowe Neuenschwander** (CoE) and **Jackie Paschang** (EE), to conduct experiments in reduced gravity on the modified docking mechanism they developed for the International Space Station.

"It was a once-in-a-lifetime experience. It feels like nothing else. A roller coaster doesn't even come close," said Neuenschwander of his reduced gravity experience. The NASA research aircraft flies in parabolic motion—a series of steep climbs and dives—to create multiple periods of weightlessness.

The KU team designed joints to replace the more rigid truss built into the original SMART HAWKER. The truss was intended to reach out and connect to the Space Shuttle, retract and safely dock the spacecraft to the Station. The joints, made of silicone tubes that contain shape memory alloy (SMA) wires, give SMART HAWKER2 greater flexibility and fluidity in movement.

The KU team participated in a Test Readiness Review (TRR) at Johnson Space Center. A panel of NASA scientists and engineers quizzed students on their design and safety features. The group received feedback and continued working on their experiment until flight day. The team used three lasers perpendicular to one another and mounted to the bottom of the arm. Graph paper allowed the team to record the original position of the lasers and then their position when the SMA wires were actuated. This allowed the team to measure the movement of the joints during microgravity, said Paschang. The second experiment included the addition of a force meter to measure the amount of force with which the joints pulled or to measure the amount of pull of the arm.

"The TRR went really well," said Paschang. "We explained the basic principles and ideas behind our experiment as well as what we were actually going to test in the microgravity environment. We also had to explain the safety features of our experiment."

EECS partially subsidized the KU team's travel and project costs for NASA's Reduced Gravity Student Flight Opportunities program. Neuenschwander, Paschang, Stephen Hinton (ME), Andrew Lake Wooten (Aerospace) and team leader Karen Ohmes (Geology) were members of SMART HAWKER2. ∎

▲ EECS senior Jackie Paschang floats in a microgravity environment with Joe O'Rourke, a student from Yale University.

▲▲ EECS seniors Jackie Paschang (left) and Bowe Neuenschwander tweaked the SMART HAWKER 2, a docking mechanism developed for the International Space Station. It was intended to reach out and connect to a space shuttle, retract and safely dock the spacecraft to the Station.

▲▲▲ (l to r) Team leader Karen Ohmes (Geology), Andrew Lake Wooten (Aerospace), Jackie Paschang, Stephen Hinton (ME) and Bowe Neuenschwander stand in front of the ZeroG plane.

Pictures Courtesy of Jackie Paschang

Pair Wins Big in Vegas

EECS students **Christa Curette**, a CoE senior, and **Angela Oguna**, an EE junior, were elected regional Finance Chair and Academic Excellence Chair during the National Society of Black Engineers (NSBE) annual convention in March. The two represent Region V, which is made up of colleges from 10 Midwestern states. With their wins, Curette and Oguna joined the national board and are helping plan the 2010 NSBE convention.

"The election process was scary and exciting at the same time. I was nervous to present my platform to my peers as well as others from across Region V," says Curette, a Johnson Scholarship recipient and Diversity Scholar. "When I found out that I was elected, I was overjoyed. I really wanted the position and knew that I was qualified."

Oguna was recognized as "one of the outstanding scholars in America" at the NSBE convention. The Tau Beta Pi inductee is a Diversity Scholar and EECS Departmental Scholarship recipient.

As a designated senator, **Jerome Mitchell**, a doctoral student in CS, voted on behalf of the KU chapter in regional and national NSBE elections. This was his first time as part of the NSBE electorate. Mitchell said that he was honored to represent the KU chapter during an exciting, stressful experience. His favorite part of the conference though was interacting with students from other universities as well as representatives from the nearly 200 top tier companies at the event.

In addition to the EECS trio, 12 other KU engineering students attended the 35th Annual National Convention in Las Vegas. The convention gives participants opportunities to network with thousands of students and engineers and enhance their technical skills. With more than 31,000 members, NSBE is one of the largest student-governed organizations in the country.

This spring the KU chapter elected Curette, Mitchell and Oguna president, vice president and secretary, respectively. ∎

▲ EE junior Angela Oguna (left) and CoE senior Christa Curette celebrate their elections to regional positions at the National Society of Black Engineers (NSBE) annual convention in March.

▲▲ Curette and doctoral student Jerome Mitchell have a little fun while at NSBE in Las Vegas.

▲▲▲ KU students Taneasha Roberts, a senior in Architectural Engineering, Mitchell, Oguna and Gerime Smith, a senior in Architectural Engineering pose for a picture at the conference.

Did You Know?

Seventy-eight EECS students, who are listed below, received Department scholarships for 2009-2010.

Awards totaled $272,500!

Michael Albert, Joshua Allford, Austin Arnett, Cameron Atwill, Joshua Baden, David Barbosa, Hilary Barbour, Bradley Bell, Nicholas Bergmann, Manas Bhatnagar, Thomas Boettcher, Thomas Carr, Alexa Clements, Jeremiah Cooley, Kurtis Copley, Adam Crifasi, Mark Davenport, Emily Dellwig, Patrick Dermyer, Robert Devine, Abderrahmane Elandaloussi, Justin Epp, Stephanie Estrin, Jasenthuliyanaavindr Fernando, Gordon Fry, Danielle Fuller, Chris Greinke, Morgan Grissum, Brigid Halling, Jacob Hamilton,

# CReSIS Graduate Student Spends Semester at 'MIT of India'

Viewing it as an extraordinary opportunity, EE graduate student **Kevin Player** applied to study abroad this spring at the "MIT of India." The Indian Institute of Technology (IIT)-Kanpur, which is more selective in admission than the Ivy League, serves as an international partner of the Center for Remote Sensing of Ice Sheets (CReSIS). Player received a CReSIS fellowship to go to India.

"IIT is one of the best engineering schools in the world, and it was an honor to be the first KU engineering student to study at IIT-K," says Player. "Hopefully, this will open the door to a more active foreign exchange program in the future."

His work at IIT-K has given him a new perspective on problem solving. Player dealt with theoretical reasoning more than his usual hands-on learning. He also gained experience working with antennas and antenna simulation software.
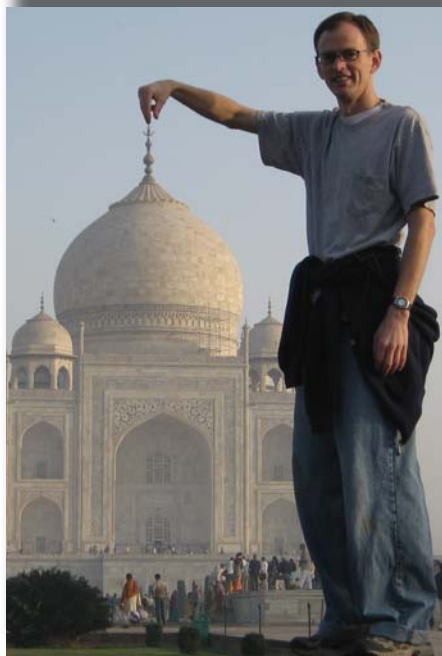
Graduate student Kevin Player poses for a traditional tourist photo at the Taj Mahal in Agra, India. Player did some sightseeing during his semester in India.

Photo Courtesy of Kevin Player

A.R. Harish, assistant professor of electrical engineering at IIT-K, mentored Player. The duo improved linear power amplifiers for CReSIS radars and designed more efficient antenna arrays. These will assist in gathering snow accumulation data over the Greenland and Antarctic ice sheets.

CReSIS researchers are developing new technologies and computer models to measure and predict the response of sea level change to the mass balance of ice sheets. Established as a National Science Foundation Science and Technology Center in 2005, CReSIS supports the collaborative research necessary to respond to global problems.

"I am very pleased that Kevin availed himself of the opportunity made possible by CReSIS to study for a semester at IIT, Kanpur. The collaboration with IIT, in particular with Prof. Harish, has been very productive. I hope that Kevin's visit will spawn long- and short-term student exchanges between KU and IIT-K," says CReSIS Director **Prasad Gogineni**.

While the poverty and beauty of India are well documented, Player says you cannot prepare for the intensity of conditions. There were nearly 6 million people living in an area just three times the size of Lawrence. The heat reached 120 degrees Fahrenheit, and air conditioners were rare. IIT served as a serene oasis complete with peacocks and monkeys on the outskirts of a very crowded, noisy city.

"It really was an once-in-a-lifetime experience. We feel incredibly fortunate to have experienced one of the oldest civilizations in history," says Player. ∎

Noah Hendrix, Adam Hinkhouse, Christopher Hudson, Andrew Irwin, John Jakabosky, Marianne Jantz, Philip Jennings, Monte Jones, Jordan Kalal, Ryan Kanoknukulchai, Karina Kervin, Robert Knight, Alec Kohl, Sean Leach, Branton Lynn, Levi Lyons, Andrew Manderfeld, Jared Mar, David Mattione, Philip Morlan, Mitchell Morrow, Bowe Neuenschwander, Angela Oguna, Masayuki Pak, Nathan Peckham, Sam Riss, Aaron Roeckers, Parker Roth, Keeler Russell, Lane Ryan, Garrett Scarlett, Joel Schmelzle, Kyle Seneker, Nathaniel Snyder, Sameer Surampalli, David Tai, Zachary Taylor, Christopher Teters, Andrea Valdivia, William Venohr, Gianpierre Villagomez, Jantzen Ward, Matthew Werner, David Wolfe, Meizong Wu, Zihaduz Zaman, Alexander Ziegler and Jeffrey Zila ∎
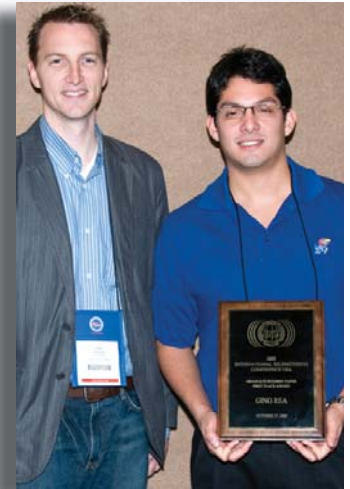
Rea Wins Best Paper at International Telemetering Conference

Gino Rea won the Graduate Student Paper award from the International Telemetering Conference (ITC). The master's student in EE received $1,000 and a plaque at the opening ceremony of ITC in October. EECS Assistant Professor **Erik Perrins** mentored Rea on "A System-Level Description of a SOQPSK-TG Demodulator for FEC Applications." Doctoral students **Justin Rohrer** and **Egemen Cetinkaya** also presented papers at the conference. The research was conducted at the Information and Telecommunication Technology Center. ■

Robb Award Funds Graduate Student Travel for Research

The goal of the David D. and Mildred H. Robb fund is to expose EECS graduate students to new, innovative ideas on the KU campus and elsewhere, with preference given to paper presentation, symposia and seminar participation. The Robb fund recipients presented papers at the conferences they attended.

◊ CS doctoral student **Mark Snyder**, *Composition 2009*
◊ EE doctoral student **Matthew Cook**, *2009 IEEE Radar Conference*
◊ CS doctoral student **Serhiy Morozov**, *2009 International Conference on Software Engineering Research and Practice* (SERP '09)
◊ CS doctoral student **Andy Kannenberg**, *SERP '09*
◊ CS doctoral student **Aaron Smalter**, *2009 IEEE International Conference on Bioinformatics & Biomedicine*
◊ CS doctoral student **Sarvesh Varatharajan**, International Conference on Networks & Communications (NetCoM-2009) ■

Gino Rea holds his plaque for best Graduate Student Paper at the International Telemetering Conference. EECS Assistant Professor Erik Perrins, his advisor, stands beside him.

Photo Courtesy of Erik Perrins

Trio Receives NSF Travel Grants for GENI Conference

Doctoral students **Justin Rohrer**, **Abdul Jabbar** and **Egemen Cetinkaya** received NSF travel grants to demonstrate GpENI (Great Plains Environment for Network Innovation - www.gpeni.net) at the 6th GENI Engineering Conference in November. Lead by EECS Associate Professor **James P.G**. **Sterbenz**, GpENI is a programmable future Internet testbed centered around an optical backbone. It is being extended to 40 institutions in 20 nations worldwide. ■
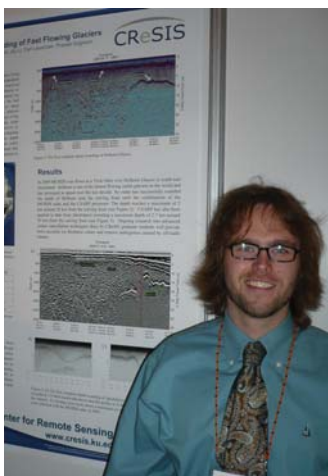
CReSIS Students Participate in International Geoscience and Remote Sensing Symposium

In July, EECS doctoral students presented their research at the International Geoscience and Remote Sensing Symposium (IGARSS) conference in Cape Town, South Africa. **William Blake**, **Cameron Lewis**, **Jerome Mitchell** and **Logan Smith** discussed the technologies they are helping develop through their work at the Center for Remote Sensing of Ice Sheets (CReSIS). CReSIS, an NSF Science and Technology Center based at KU, conducts multidisciplinary research to better understand the mass balance of the polar ice sheets and their contributions to sea level change.

Lewis led a technical program based on his paper, "A Radar Suite for Ice Sheet Accumulation Measurements and Near-Surface Internal Layer Mapping." Blake, Mitchell and Smith presented research posters at IGARSS. ■

Doctoral student Logan Smith presents his research at IGARSS.

Photo Courtesy of Cameron Lewis

The following students were honored at the Spring Graduation Reception on May 16.

Ellermeier Memorial Award
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.

Jonathan Lanning

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.

Ryan Challacombe and **Kevin Matlage**

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.

Joseph Makarewicz, **Adam Smith** and **Mark Snyder**

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.

Aaron Smalter (thesis) and **Garrin Kimmell** (dissertation)

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

Kevin Matlage (CS), **Cory Chermok** (CoE) and **Michael Cribbs** (EE)

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.

Mark Davenport, **Jacob Olson** and **Mohammed Al-Enazi** (CoE)
Christopher Bubeck, **Paul Pansing**, **Eric Meyer** and **Aleksabdr Lupandin** (EE)

▲ Ellermeier Memorial Award winner Jonathan Lanning (left) and EECS Professor and Associate Chair for Graduate Studies Man Kong attended the Graduate Banquet on May 16.

▲▲ (l to r) Joseph Makarewicz, Adam Smith and Mark Snyder won Huebner Memorial Awards.

▲▲▲ (l to r) Michael Cribbs (EE), Cory Chermok (CoE) and Kevin Matlage (CS) were named Outstanding Seniors.

Graduates » »

Spring 2009

Qi Chen; "Wideband Channel Sounding Techniques for the Dynamic Spectrum Access Networks," PhD EE, Advisor: Prof. Gary Minden

Sandhya Gabbur; "Reputation- Based Buyer Strategies for Seller Selection in Multi-Agent Electronic Markets," PhD CS, Advisor: Prof. Arvin Agah

David Johnson; "Human Robot Interaction Through Semantic Integration of Multiple Modalities, Dialog Management, and Contexts," PhD CS, Advisor: Prof. Arvin Agah

Pradeep Mani; "A Framework for Service Differentiation and Optimization in Multi-hop Wireless Networks," PhD EE, Advisor: Prof. David Petr

Christopher Taylor; "A Multi-Tiered Genetic Algorithm for Data Mining and Hypothesis Refinement," PhD CS, Advisor: Prof. Arvin Agah

Back Row (l tor): Ryan Challacombe, Kyle Byers, Eric Meyer, Christopher Holub and Thomas Northup
Front Row: Jackie Paschang, Ronald Davis and Tanner Polzen

Photo by Jill Hummels

MS/BS Degrees
Earl Amerine, BSEE
Scott Andrews, BSEE
Namrata Barve, MSCS
Henry Brown, BSEE
Christopher Bubeck, BSEE
Kyle Byers, BSEE
Yucem Cagdar, BSCS
Ryan Challacombe, BSEE
Leung Chan, BSEE
Michael Chatman, BSCoE
Cory Chermok, BSCoE
Michael Cribbs, BSEE
Gavin Davis, BSCS
Ronald Davis, BSEE
Lindsey Demaree, BSEE
Adam Doyle, MSCS
Jordan Ehrlich, MSCS
Paul Fast, BSCS
Ryan Hartel, BSCS
John Heideman, BSCS
Christopher Holub, BSEE
Ashok Kachana, MSCoE
Sang Kyo Kum, BSEE
Jonathan Lanning, BSCS
Kyle Laubner, BSEE
Kristin Lynch, BSCS

Joseph Littich, BSEE
Rabat Mahmood, MSEE
Joseph Makarewicz, MSEE
Kevin Matlage, BSCS
Trevor Mitchell, BSEE
Kristin Moody, BSCS
Truc Anh Nguyen, BSCS
Thomas Northup, BSEE
Esnath Ochweri, BSEE
Jacob Olson, BSCoE
Paul Pansing, BSEE
Jacquelyn Paschang, BSEE
Aqsa Patel, MSEE
Thanima Pilantanakitti, BSEE
Tanner Polzen, BSEE
Victor Prechtel, BSCS
Stephen C. Prokopiak, BSCS
Kyle Putnam, BSCS
Arturo Ramos II, BSCS
Matthew Reineman, BSCoE
Thomas Rhein, BSEE
Matthew Schwind, BSEE
Jeffrey Shafferman, BSCS
Kunjan Shah, BSCoE
Ryan Slack, BSCS
Peter Speer, MSEE
Dennis Stanley, MSEE
Christopher Stewart, BSEE
Bryan Swallow, BSCoE
♦ Satyanarayana Telikepalli, BSEE
Samuel Thompson, BSEE
Marc Tinio, BSEE
Piyush Upadhyay, MSEE
James Vallandingham, MSCS
♦ Gideon van de Liefvoort, BSCoE

Jonathan Versino, BSCoE
Alison Womack, BSEE
Lin Yi, MSCS

Summer 2009

♦ **James Jenshak**; "Transmit Signal Design for Multistatic Radar," PhD EE, Advisor: Assoc. Prof. Jim Stiles

Mei Liu; "Discovering Domain-Domain Interactions Toward Genome-wide Protein Interaction and Function Predictions," PhD CS, Advisor: Assoc. Prof. Xue-wen Chen

MS/BS Degrees
Casey Biggs, MSEE
Leung Chan, BSEE
Patrick Clark, MSCS
Sean Garrison, MSEE
Surinder Hari, MSEE
♦ Martin Kuehnhausen, MSCS
Abijith Kumar, MSEE
Yaling Liu, MSCS
Rabat Mahmood, MSEE
Eric Meyer, BSEE
Richard Peasah, MSIT
Benjamin Simonett, BSEE
Adam Smith, MSCoE
♦ Michael Wasikowski, MSCS

♦ *Departmental Honors*

Winter 2009

♦ **Geoffrey Akers**; "An Approach to Ground Moving Target Indication Using Multiple Resolutions of Mutlilook Synthetic Aperture Radar Images," PhD EE, Advisor: Assoc. Prof. Jim Stiles

Christopher Gifford; " Collective Machine Learning: Team Learning and Classification in Multi-Agent Systems," PhD CS, Advisor: Prof. Arvin Agah

Jilu Li; " Mapping of Ice Sheet Deep Layers and Fast Outlet Glaciers with Multi-Channel High-Sensitivity Radar," PhD EE, Advisor: Prof. Prasad Gogineni

Jorge Ortiz; " Synthesis Techniques for Semi-Custom Dynamically Reconfigurable Superscalar Processors," PhD EE, Advisor: Prof. Perry Alexander

Elena Popel, " Motion Analysis in Magnetic Resonance Elastography," PhD EE, Advisor: Prof. Glenn Prescott

MS/BS Degrees

♦ Mohammed Alenazi, BSCoE
Ashok Amaran, BSCS
Nishitha Ayyalapu, MSEE
Sridhar Balijepalli, MSCS
Matthew Beattie, BSCS
Kyle Begole, BSCS
Sayak Bose, MSEE
J. Scott Coston, MSCS
Reid Crowe, BSEE
Mark Davenport, BSCoE
Christopher Gerstenkorn, BSEE
Sujatha Gunapalan, MSIT
Brian Hughes, MSIT
Karina Kervin, BSCS
Kyle Laubner, BSEE
Ethan Levers, BSCS
Matthew Milliard, BSCoE
Adam Nagle, BSCS
♦ Manjiri Namjoshi, MSCoE
Aaron Natalie, BSEE

Andrew Ozor, MSCS
Victor Prechtel, BSCS
Rakesh Purumandla, MSEE
Ruru Rai, MSIT
Mukund Sarangapani, MSEE
Matthew Schwind, BSEE
Nathan Spears, BSCS
Xiaohong Wang, MSCS
♦ Gabriel Wishnie, MSCS
Meizong Wu, BSCS
Michael Wu, BSCS/BSEE
Zihaduz Zaman, BSEE

♦ *Departmental Honors*

Baby Jay Walks Among EECS Graduates

Being Baby Jay is a little like being a superhero—secret identities, heroic performances and public adoration. During her year and a half as Baby Jay, **Jackie Paschang** (EE '09) didn't reveal her alter ego to most of her friends. A packed schedule, including games, alumni events, charity benefits and a KU Rock Chalk Ball, made it difficult to keep her mascot status a secret.

"Sometimes I'd joke around with my friends and be like, 'Oh, I'll be there. You just won't know that I'll be there,'" says Paschang. "Honestly, it was a great feeling and an amazing honor to be Baby Jay. The smiles were the best. Kids would be super excited to meet you."

Paschang suited up in the spring of 2008 and 2009. She played to a packed Allen Fieldhouse last spring as the women played for the WNIT Championship and when the men won the National Championship in 2008. While the game was played in San Antonio, a raucous crowd of nearly 10,000 gathered at the Fieldhouse to watch the championship on the jumbotron. These moments along with "meeting" her Professor Steven Hawley and his wife as her alter ego are among her favorite Baby Jay memories. (Hawley, a former astronaut, is now a physics and astronomy professor at KU.)

A gifted musician, Paschang played bass drum for three years, baritone for one year and sousaphone for one in the KU Marching Band. Through the band, she met the captain of the mascot squad and asked about trying out for Baby Jay. One of the Baby Jays was participating in study abroad during spring 2008, which left a spot open. Paschang tried out and made the squad. She was an alternate Baby Jay during the fall, which allowed her to participate in marching band.

After graduating this spring, Paschang spent the summer traveling the country with Colts Drum & Bugle Corps as tour assistant. She is now working as an Electrical Engineer at JT3 in Las Vegas. ∎

Jackie Paschang's true identity was revealed at graduation when she wore the Baby Jay shoes.
Photo by Jill Hummels

Research » »

Allen Leads CReSIS Team in NASA Survey of Polar Regions

Researchers with the Center for the Remote Sensing of Ice Sheets (CReSIS) performed extensive field work over Antarctica this fall. Beginning in October, EECS Professor **Christopher Allen** and EECS doctoral students **William Blake**, **Victor Jara-Olivares**, **Benjamin Panzer** and **Lei Shi** studied changes to Antarctic land and sea ice as part of NASA's Operation Ice Bridge, the largest airborne survey of ice at Earth's polar regions.

During 21 flights each lasting about 11 hours, Allen and his team measured characteristics of the polar ice sheets and sea ice. These measurements help forecast how the ice sheets will respond to the changing climate, especially how they might contribute to sea-level rise.

"There are points in time during the flight that you experience turbulence," says Panzer who designed, built, tested and fielded the Snow radar. "The plane becomes a huge lever arm, and I am sitting at the back of the plane, furthest from the pivot point. I would get slung around quite a bit, which tested my intestinal fortitude. I just got on the plane knowing I'd be in the saddle for the next 11 hours and tried to make the best of it."

Radar antennas were mounted beneath the fuselage of NASA's DC-8 and flown over high risk areas. The Multi Channel Radar Depth Sounder (MCoRDs) measured the thickness of ice sheets and in some cases could detect if water exists between the ice sheet and bedrock. The Snow radar measures snow thickness on sea ice, and the Ku-band radar provides precise altitude data. All three systems operate at low altitudes (1,500 to 2,000 feet above the surface). The Snow and Ku-band radars collect about 400 GB of raw data for each flight, resulting in nearly 8 TB of raw data.

"The data should enable the development of better models leading to more accurate predictions of ice dynamics," says Allen, who stayed for the entire mission from Oct. 12-Nov. 23. Lei and Panzer were there for the entire mission as well. Blake and Jara-Olivares rotated during the field work.

Depending upon which part of the continent was being surveyed, there would be at least three hours spent in transit. Flights started from Punta Arenas, Chile. Panzer said he would
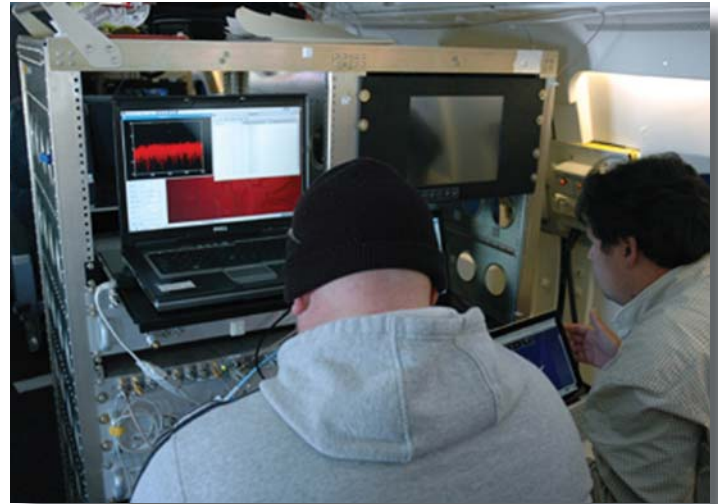
Ph.D. students Benjamin Panzer (left) and Victor Jara-Olivares monitor data being collected by CReSIS radar. The Center for Remote Sensing of Ice Sheets researchers, led by EECS Professor Christopher Allen, were studying changes to Antarctic land and sea ice as part of NASA's Operation Ice Bridge.

Photo by Jill Hummels

typically try to sleep a couple hours because the next four to six were spent watching an a-scope update every second. After that, CReSIS researchers would need to process GPS data and wrap up any loose ends before the next day's flight.

Researchers performed "quick" processing in the field. This analysis, which typically takes four hours for the entire Snow radar data set, is done for quality control purposes. If measurements look suspect, researchers fine tune the radar settings for the next flight.

"We're constantly processing data and providing new data products to the science community," Panzer says. "Even when we have ran all the data through the processing code, we'll come up with a newer, slicker algorithm and reprocess the data again. We're always looking for new methods to improve the output of the processing."

Over a five-month period, EECS students, staff and faculty built two complete copies of MCoRDS and improved the Snow radar and Ku-band radar before deployment. They also developed a master robust signal processing program to help process the collected data from the depth sounding radars. ∎

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.

CReSIS Researchers Spend Christmas at the Other Pole

In November, EECS Assistant Professor **Carl Leuschen**, EECS doctoral students **Cameron Lewis** and **Logan Smith** and CReSIS Assistant Research Professor **Fernando Rodriguez-Morales** conducted airborne radar measurements to assess Antarctic ice sheets. CReSIS researchers collected data on a number of flights over Thwaites Glacier and Pine Island Glacier and performed the first aerial survey of the remote Marie Byrd Land. Additionally, a survey flight was performed over the Antarctic Geological Drilling (ANDRILL) site. The ANDRILL projects aims to recover past glacial changes in the Antarctica region. Data from the CReSIS survey will help relocate the ANDRILL drill rig next season.

"CReSIS scientists are developing systems capable of unparalleled measurements of ice thickness, layering, basal conditions and other properties that are key to modelers and scientists," Leuschen says. "We are responsible for helping gather data that will lead to a better understanding of climate change."

The CReSIS team used a Twin Otter plane that carried a 150MHz depth sounder, an accumulation radar and radio altimeter. The depth sounder measures the total ice thickness and collects coarse layering information while the accumulation radar provides fine resolution layering within 300m of ice. The newly developed altimeter measures the distance between the plane and the surface as well as centimeter resolution layering information within the first 5m of ice.

"For the five weeks we were at camp, we slept in tents, showered maybe once a week and used outhouses, which were not pleasant when windy," says Lewis. "We flew every day the weather would allow. Most days were 10 hours in the air and then more time on the ground processing data."

Flights included a trip to a fuel cache, four hours of surveying, a refuel and return flight to McMurdo Station. Camp at McMurdo was a one-half mile by one-half mile in the middle of Antarctica. McMurdo was similar to a military base with dorm housing, one large cafeteria, scheduled meal times and different office and laboratory buildings, says Lewis.

Most of the researchers time at McMurdo Station was devoted to installation, testing and processing code development. In their precious free time, Lewis and Smith spent time working on homework and projects for classes. ∎

(Top Photo) Doctoral student Logan Smith (left) and CReSIS Assistant Research Professor Fernando Rodriguez-Morales unpack equipment in Antarctica.

Smith, PolarTrec teacher Gary Wesche, EECS Assistant Professor Carl Leuschen, doctoral student Cameron Lewis and Rodriguez-Morales pose in front of the Twin Otter.

Photos Courtesy of Cameron Lewis

KU-Developed Virtual Environment Helps Teach Social Skills

Soap operas have nothing on middle school. Surging hormones, shifting alliances and increasing peer pressure create high drama. As social interactions grow more complex, students with Asperger Syndrome (AS)—a high functioning form of autism—become more isolated. University of Kansas researchers developed " A Virtual Environment for Teaching Social Skills" (AViSSS) to help students with AS learn how to better interact with others and practice real-world situations independently.

Students with Asperger Syndrome, a high functioning form of autism, struggle with communication and social skills. A virtual environment developed through interdisciplinary KU research allows students to learn social skills and practice real-world situations.

AViSSS primary investigator **Sean Smith**, associate professor in special education, and co-investigator **Jim Miller**, associate professor of EECS, collaborated on the design and development of the virtual environment. **Justin Ehrlich**, a doctoral student in computer science, was the lead developer on the project.

"I've learned so much about Autism Spectrum Disorders (ASDs) and how technology is a viable solution for not only the increasing number of people who have ASDs but also people with all kinds of educational challenges. This really adds meaning to my work and motivation in my pursuit of computer science as an academic career," says Ehrlich.

Students with AS are often visual learners and can learn social skills through computer-based exercises. Using AViSSS, students learn social skills and safely practice them in various situations.

For example, students practice how to react if someone accidently bumps into them in the hall or sits in their favorite seat on the bus. Each scene has multiple scenarios. If they choose the best response, they move forward. If not, an "inner voice" explains why the choice is incorrect and encourages the student to try again.

Scenarios are basically decision trees encoding social narratives. When the user makes the correct decision, the application selects the next node. This continues until the application reaches the path's end. At the end, AViSSS displays the student's score and provides verbal feedback. Each scenario deals with a specific problem area for adolescents with AS. AViSSS lets the administrator, usually a teacher or parent, run the applications that address problem categories. The system records every response to give the administrator feedback on the student's progress.

AS researchers, visualization experts, adolescents with AS and their parents recently evaluated AViSSS. They were asked to rate its functionality, content and effectiveness. The evaluation has been very positive, stating AViSSS addresses most problematic areas for adolescents with AS. Feedback has led to changes to better accommodate users.

"This not only let us gain insight from AViSSS's intended target audience but also helped the users better understand our direction and goals," according to an article in the July/August issue of *IEEE Computer Graphics and Applications*.

Its scripting language was designed to allow plug-ins that provide new content and functionality. Although AViSSS scripting is needed to guide subjects through the paths in an ordered fashion, researchers are exploring ways to give users greater freedom within AViSSS. Future development may also include alternative input devices (such as a Wii controller). In addition, eye tracking would help teach individuals with AS how to make and keep good eye contact, which is often a challenge. ∎

High Speed, Covert Communication to Help Soldiers

American soldiers in hostile territory generally find it difficult to maintain communications with friendly forces, especially when they do not want to betray their location. Radio frequency (RF) emissions can be detected by devices "sniffing" the RF spectrum. Eavesdroppers then intercept messages. There is a great need for a reliable covert communication system.

When transmitted radio signals come into contact with an object, they are scattered in many directions. Radar systems then collect the reflected signals along with interference, which can mask hidden messages. EECS Assistant Professor **Shannon Blunt** is developing technology that will enable soldiers' transmissions to "piggyback" on existing signals. The covert communication method exploits high power emissions from friendly and/or hostile radar systems.

At KU's Information and Telecommunication Technology Center (ITTC), Blunt and his students are developing intrapulse radar-embedded communication technology. Current covert communication requires hundreds of radar pulses to convey just one communication symbol resulting in a very low data rate. In contrast, Blunt embeds a communication symbol into each individual radar pulse. Preliminary results suggest the potential for operation at data rates 1,000 times faster than current radar-embedded communication systems while offering at least the same level of security.

In March, Commanding Officer 3rd Battalion, 8th Marine Regiment Lt. Col. David Odom, U.S. Marine Corps, and Abdul Majid, an Afghan National Police officer, discuss increased security measures in Delaram. EECS Assistant Professor Shannon Blunt is developing technology that will give Odom and other soldiers a new way to communicate covertly with friendly forces while in hostile territory.

Photo by Chief Warrant Officer Philippe Chasse, U.S. Marine Corps

"This is exciting research that could dramatically help soldiers in the field as well as fundamentally alter the way in which radars operate," says Blunt. A U.S. Air Force Young Investigator Award is supporting the research.

While interference helps enable covert communication, it also hampers reception, especially in dense urban areas. Buildings, bridges and other structures make it extremely difficult to correctly reconstruct transmissions. As combat moves more into urban environments, it becomes critical to maintain communication contact among friendly forces and to sense the locations of hostile forces, Blunt says. ∎

Donors » »

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 2009 (July 1, 2008 to June 30, 2009) contributions.

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* George R. Jones & Martha M. Jones
Robert A. Kleist & Barbara L. Kleist

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Alumni Spotlight » »

Steve Unruh (BSEE '03), Senior Electronics Engineer at Hasbro Toy Group

Why would you say KU is the place to earn an excellent engineering and computer science education?

I work with people who have degrees from some very high-profile and elite engineering schools, and I've consistently found my skills to be on par with theirs. Using my performance over the past seven years on the job (including a fairly quick promotion to senior level) as evidence, I think my education at KU has proven to be impressive, even next to the big-time Boston engineering schools.

What are your favorite KU/EECS memories?

I was a non-traditional student at KU. I switched careers from teaching to electronic engineering when I was 27 years old. Everyone at KU was welcoming, and I felt right at home in EECS. My favorite memory is how after taking a five-year break from the sciences I jumped back into the deep end of the science pool. And found to my great relief and happiness, I fit in! I think credit is due to the EECS administrative assistants, my professors and fellow students for that wonderful experience.
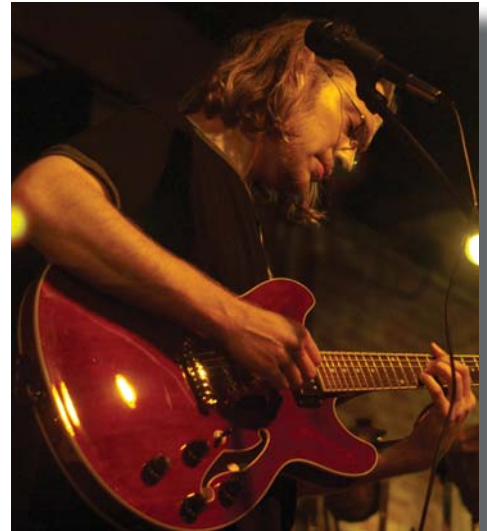
I also enjoyed academically pushing myself, and being academically pushed by professors. The high expectations of my professors wound up giving me pride and confidence in my engineering skills. The old adage is true; my professors cared enough to be tough, and I appreciate them for it.

Steve Unruh never stopped making music. He has formed a rock band (Resistor) with three co-workers. At Hasbro, he combines his love of music and engineering.

Photo by Sixten Abbot

Aside from Engineering, I loved the art scene in Lawrence. I became friends with Jeremy Osbern and Chris Blunk, who have since formed the Lawrence-based production company "Through A Glass Productions." Even after I moved to Providence, I've continued to work with them, providing music for their films. Some great bands played the local scene in Lawrence. While at KU, I formed my own band with a fellow Engineering student (Esteban Meyer) and a former student of mine who attended KU. We had a great time blasting our quirky music at weekly rehearsals.

What does a typical work day look like for you?

Fortunately, I can't describe a typical work day! For me, the constant variety is one of best features of this job. But here are a few things that usually appear somewhere in my week:
* *Brainstorming electronic features with designers*
* *Discussing cost trade-offs with marketers*
* *Communicating with manufacturing vendors and production engineers*
* *Problem-solving with the other electronic engineers in my group (we often work together to help each other solve problems quickly)*
* *Designing and drafting electronic schematics and building/soldering prototypes*
* *Programming ASIC codes*
* *Participating in product review meetings*
* *Pretending to be 7 years old and playing with prototype toys, to see how much fun they are and figure out how to improve them*
* *Training co-ops (College students who do cooperative work programs with us)*
* *Creating and editing product content (writing music, recording character voices, creating sound effects, etc.)*
* *Researching new IC chips and various components*

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

The biggest challenge at my job is managing multiple projects simultaneously. I'm responsible for the electronic design of approximately 30 products per year. This high product count provides a fantastic amount of variety. It can also cause a lot of stress when a dozen things are due at the same time, and there is zero tolerance for error. To cope, I had to develop good organizational skills (specifically, I manage a spreadsheet of my projects' expected workload hours and milestone due dates) to avoid stress and late work nights.

What are your top tips for students nearing graduation?

I'll bet the first thing on most students' minds as they near graduation is finding a job. Here are a few tips that I'd suggest from my experiences:

• *Job hunting can take a long time, and it can be a soul-crushing experience! So, start early and pace yourself. Don't try to cram it all into a short period of time a month before you graduate; that'll drive you nuts.*

"Fortunately, I can't describe a typical work day! For me, the constant variety is one of best features of this job."

• *Don't waste time applying for positions you don't want, or positions for which you're completely not suited.*

• *Do apply for positions for which you're a good fit, or which you're passionate about, even if you're under-qualified. (e.g., an employer wants three years of experience and you have zero.) If that employer has been unsuccessful at finding the right employee for a while, they might interview you and find out you're the perfect personality for the job despite your lack of experience.*

• *Try to convey your personality in your application in whatever tasteful way you can, because in truth, most job interviews are more about personality than technical skill. (You managed to graduate with an engineering degree, so the employer probably assumes you're competent.) (Although as a side note, I did mess up a job interview once by getting so nervous I couldn't even perform a simple circuit analysis when they were double-checking my abilities… That was eight years ago, and I still get embarrassed thinking about it. Oh well, live and learn.)*

• *If you meet your prospective co-workers during your job interview, and you like them and they can sense it, they'll be your advocates if the director asks their opinion about which candidate they should hire.*

Once you're on the job, learn to focus while at work and then leave the workplace mentally behind when you go home at night. Do the best, most efficient job you can during the day. But don't forget to stay true to your personality, your hobbies and dreams. It's important to enjoy life as the years go by. I never stopped making music, and in fact, I formed a rock band (Resistor) with three of my co-workers. It has been tremendously rewarding. It's a rock band with three Electronics Engineers and an Electrician!

Be good to your co-workers. Developing a good rapport with your colleagues will help you have a good time at work, plus it'll help you be successful at your job. Your colleagues will be your friends and your greatest technical resource.

Communication skills are a big part of most jobs. So, if your communication skills (written and spoken) aren't in excellent shape, do whatever it takes to continually improve them. Never stop trying to learn. ∎

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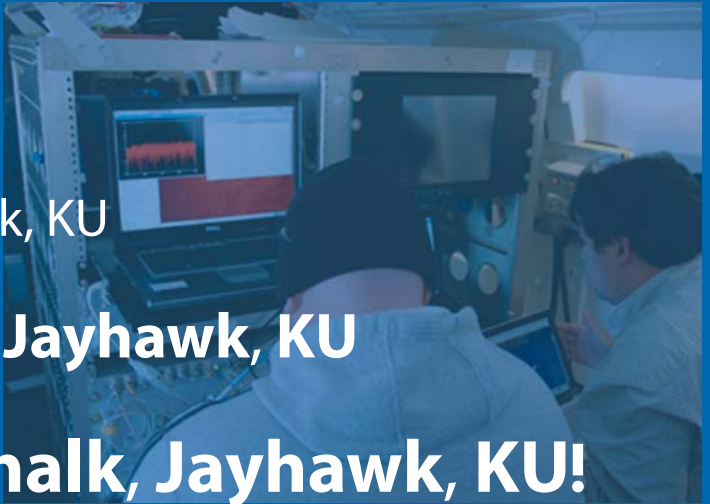1520 West 15th Street
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