Electrical Engineering and Computer Science

EECS News

University of Kansas

2013

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Professor Perry Alexander received the Outstanding Adviser Award from the KU Honors Program.

NASA FELLOWSHIP

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ALUMNI PROFILE

After a distinguished career with AT&T Bell Labs, Margaret Burd (MSCS '83) opened her own software development company.

FRONT COVER

Deane E. Ackers Distinguished Professor Joseph Evans, right, looks at code that Dane Mitchell, center, and Matthew Werner developed for their team's autonomous drone. The project was for their Computer Systems Design Laboratory (EECS 542).

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Perspective

Chair Glenn Prescott

Over the last six years as chair of EECS, I have had the opportunity to work closely with dedicated faculty and staff, exemplary students, and loyal alumni. It has been an honor to collaborate with each of you on efforts to move the department forward. Your willingness to lend your time and talents is the reason for our success, and I am proud of all that we accomplished. However, it is time for me to return to full time teaching and research. I will be stepping down as chair this summer and I am confident that our hard work has positioned the department for future success.

We have increased undergraduate and graduate enrollment, created new degree programs in Interdisciplinary Computing and Information Technology, hired talented faculty, and realigned research focus areas. We launched a distance learning graduate program for working engineers in Kansas City. Student feedback led us to develop a computer science capstone course, create a new student seminar, and add power systems courses supported by a first-class power lab.

Each of these initiatives required committed faculty and staff to oversee them. I am grateful to all for their hard work. I would like to mention a few by name for their tireless work on behalf of the department.

Associate Chair for Undergraduate Studies **David Petr** teaches the New Student Seminar, which connects first-year students with fellow students, faculty, and departmental resources. While many in his position would have handed it off to a junior faculty member, Dave volunteered to create the semester-long course. It is among the countless efforts he has led to improve our undergraduate program, which has recorded double-digit percentage growth each of the last two years.

In 2011, Professor **Victor Frost** took over as Associate Chair for Graduate Studies. He had a clear vision on how to revamp our areas of focus and corresponding programs of study. Victor has been instrumental in guiding our graduate program and extending courses into Kansas City via our distance learning program.

I would like to extend my thanks to Professor **Arvin Agah** and Associate Professor **Man Kong** for their service as Associate Chair for Graduate Studies during my tenure as chair as well. The hard work of our associate chairs has led to increased enrollment and stepped up recruitment of talented graduate students. For each of the past three years, one of our students has earned a highly competitive Self Graduate Fellowship. We have not had three straight winners in the 24-year history of the award. We hope to keep the streak going in 2014.

In addition to his work as associate chair, Arvin developed the undergraduate interdisciplinary computing degree program and led it though the Board of Regents approval process in 2011. Currently, we have 12 students enrolled as IC majors, and a great deal of student interest in the new program.

Our new undergraduate degree program in information technology is due to the efforts of Associate Chair for Edwards Campus Programs **Hossein Saiedian**. He has done a phenomenal job of building successful undergraduate and graduate programs in IT at the Edwards Campus. The undergraduate IT program – a collaborative effort between KU and Johnson County Community College – was launched in the fall of 2012. We anticipate great things from these growing programs.

I would like to thank our Advisory Board members for their guidance and support in the above initiatives. Their insight and experience helped us develop innovative strategies for recruitment and retention. The generous support of board member **Brian McClendon** (BSEE '86) and his wife, Beth Ellyn, provided freshmen with Android tablets in 2011. Brian's ongoing help in giving students additional experince with mobile computing will give them a competitive edge after graduation.

It has been a tremendous experience to serve as chair. Our department has a great future, and I'm looking forward to being a part of it. ▪

Department News » »

Growing BSIT Program Marks Strong First Year

Declared majors for the new Bachelor of Science in Information Technology (BSIT) degree at the Edwards Campus have grown by nearly 550 percent since last fall.

Thirteen students selected BSIT as their major in the fall of 2013, according to **Lauren McEnaney**, BSIT undergraduate adviser. The program, which started in 2012, recorded two majors in its first semester.

EECS Associate Chair for the Edwards Campus **Hossein Saiedian** attributes the growth to a variety of factors.

"One is obviously the awareness of the program. It is a KU degree and KU's credibility and prestige has a lot of weight in the KC metro area," said Dr. Saiedian. **"**The location is also important — the BSIT program is located at the heart of the Johnson County business community. But most importantly, it is the demand for the IT expertise and competency, and this reflects the need at the national level."

The success of the BSIT program will lead to the hiring of a third professor of practice in the spring of 2014. Twenty-four students have enrolled for classes, and there have been 433 inquiries to date.

BSIT is a collaboration between Johnson County Community College and KU Edwards Campus. Students can first obtain an associate's degree in IT at JCCC before coming to the Edwards Campus for upper-level courses. ▪

App Helps Students Plan Schedules

EECS has unveiled a new student-built app designed to help students create a personalized graduation schedule. The Graduation Planner allows students to map out a semester-by-semester plan to complete their degree, avoiding common pitfalls such as pre-requisite violations and planning to take a class in the spring when it is only offered in the fall.

EECS sophomore Derrick Harms updates the Graduation Planner. He built the app to help students create personalized plans to degree.

"We see a fair number of cases where students take only a semester-by-semester view of their enrollment choices and end up with graduation problems later on because they did not take the long view," said Associate Chair for Undergraduate Studies **David Petr**, who oversaw the development of the app for the New Student Seminar (EECS 101). "Even though a student could always manually map out a graduation plan, few chose to make the effort, and even if they did, there was no guarantee that their plan was valid."

In building the Graduation Planner, EECS sophomore **Derrick Harms** combed through the EECS Handbook to ensure he had the proper prerequisites and sequencing for each major before moving to functionality. A drag and drop feature allows students to move courses easily from the course bank to semesters. A course changes color when a potential problem arises, and an information box gives details. Students can save schedules and make changes to them.

"It has been an incredible learning experience that has allowed me to apply my knowledge and develop new skills in the creation of an app used by EECS students," said Harms. "We wanted to build an app that allowed students to explore their options, whether that is adding a minor, studying abroad, or planning for a difficult semester."

Ryan Feehan was among the nearly 250 EECS 101 students to use the app this fall. An interdisciplinary computing major on a pre-med track, Feehan compared 10 different schedules for his complicated degree plan.

"I'm positive that I would have never found this schedule without the Graduation Planner. It is an awesome tool for EECS students," said Feehan. "It is helpful for students to be able to create a customized graduation plan." ▪

The power industry needs electronics and computer engineers and computer scientists who understand power systems to plan and operate tomorrow's electric energy infrastructure.

Dunwoodie Gift Energizes Power Systems Focus

The Department's growing focus in power systems received a significant boost with a $200,000 gift from the family of the late Duane Dunwoodie (BSEE '52). The Dunwoodie gift helped purchase new laboratory and demonstration equipment that highlight energy production and storage systems, using both renewable and traditional power sources.

EECS created six new student workstations to support hands-on projects, such as the construction of small-scale electric machines and power devices, such as switches, inverters, and controllers. Additionally, display equipment will provide greater understanding of the operational and economic characteristics of power systems.

"The Dunwoodie donation provides EECS and the KU School of Engineering with the opportunity to provide a unique educational experience for undergraduate students interested in careers in electric energy production, transmission, distribution, and utilization," said EECS Chair **Glenn Prescott**.

Dunwoodie and his wife, Marlene, established an endowment in 1992 for the Dunwoodie Microwave Laboratory, which is in 3003 Eaton Hall.

Expanding the Dunwoodie Lab comes as student interest is growing in power engineering, says Associate Professor **Tom Glavinich**. He credits increased environmental awareness and renewable energy production with the surge in enrollment.

"While these EECS labs are focused on electric power systems, they will benefit all EECS students," said Dr. Glavinich.

"The power industry needs electronics engineers, computer engineers, and computer scientists who understand electric power systems in order to plan, design, and operate tomorrow's electric energy infrastructure."

Currently, six courses use the multidisciplinary lab. EECS students along with those in Architectural Engineering, Mechanical Engineering and Engineering Physics will benefit from the new workstations.

Dr. Glavinich says that the Dunwoodie donation "will benefit KU engineering students for years to come because it provides the foundation needed for an interdisciplinary education in electric energy systems." ▪

Interactive Google Display Takes Users Around the World

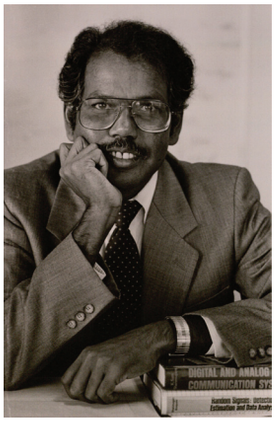
EECS sophomore **Jackson Montgomery** explores Athens with the Google Liquid Galaxy interactive display in the Computing Commons of Eaton Hall. Google donated the seven-screen installation that highlights the power of Google Earth to the university in 2013.

Users step inside the chamber and are surrounded on three sides by 55-inch displays. They can select from pre-loaded destinations, type in a location, or inspect Mars. The touch screen allows users to navigate the 3D-rendered environments. ▪

'Putting KU on the Map'

Shanmugan, founder of KU's telecommunications program, to retire

A distinguished scholar whose reputation extends well beyond the United States, **Sam Shanmugan** leveraged his expertise in telecommunications to build successful graduate and research programs at the University of Kansas.



Distinguished Professor Sam Shanmugan poses with two of his books in 1986.
Courtesy of University Archives

The AT&T Distinguished Professor of EECS will retire this summer after 33 years at the university. He has been responsible for educating hundreds of graduate students, bringing in millions of dollars in research grants, and recruiting talented faculty in telecommunications and networking to the university.

One of the world's leading telecommunications experts, Dr. Shanmugan has made significant contributions in education and research. A generation of engineering students worldwide has learned the fundamentals of telecommunications through his textbooks. His simulation software, a breakthrough in evaluating complex communication systems, is regarded as a transformative technology.

"I take great pride in putting KU on the map for telecommunications," said Dr. Shanmugan, a Fellow of IEEE. "My second source of great pride is my writing. All of my books were the first to be written in their particular field and have been translated into multiple languages."

With the success of his first book, "Digital and Analog Communication Systems," and his research at Bell Laboratories, Dr. Shanmugan was a rising star in the rapidly growing field of telecommunications when he arrived at KU, said Dan F. Servey Distinguished Professor of EECS **Victor Frost**.

"Sam established the foundation of KU's international reputation in communications systems, and he set the stage for the department's growth of academic and research programs," said Dr. Frost.

Early Years

Dr. Shanmugan taught the first communication networks course at KU in 1980. The first few years were a particularly exciting time, he says, as he defined the program, taught most all the courses, and secured funding.

From the beginning, student interest was strong and continued to grow. The program's mix of theory and application showed students the possibilities within the field. They would take nine graduate hours each semester their first year, conduct a summer internship in industry, and write their thesis on work they conducted over the summer. The internships often led to careers after graduation for students and additional industry contacts for KU.

Dr. Shanmugan enjoyed taking graduate students through a series of courses, Random Signals and Noise, Principles of Digital Communication Systems, and Wireless Communication Systems. Each course built on the previous one, and he said it was exciting to see how much they had learned by the end of the third course.

He did the same thing for undergrads, taking them through Signal and System Analysis, Probability and Statistics, and Introduction to Communication Systems. Students from this series nominated him for a H.O.P.E. Award, the Honor for the Outstanding Progressive Educator Award, which recognizes one KU professor annually for outstanding teaching and concern for students.

In addition to being a H.O.P.E. award finalist, he won the Burlington Northern Outstanding Teaching Award, Henry E. Gould Award for Distinguished Service to Undergraduate Engineering Education, and the Amoco Foundation Outstanding Teacher Award.

With a smile, he recalls that Random Signals and Noise had a reputation of being one of the hardest classes at KU. Students would often ask him if they could bring in notes for their exams. In the days before PowerPoint

"Sam established the foundation of KU's international reputation in communications systems"

–Dan F. Servey Distinguished Professor of EECS Victor Frost

presentations, Dr. Shanmugan would give lectures without notes. He told students that whatever he needed to lookup they could bring in for their exam. They never had the chance to bring a single formula.

BOSS

Dr. Shanmugan formed the Telecommunications and Information Sciences Laboratory (TISL) to house state-of-the-art telecommunications and information sciences research. The first three research projects were small grants under $25,000, Dr. Shanmugan says, as organizations wanted to test this new research group. All three would be the start of long-term collaborations that generated millions of dollars in research grants.

They landed their first industry and military contracts with nearby organizations. The Kansas City company United Telecom, which would become Sprint, asked KU researchers to measure and characterize cable. He still marvels that the millions of dollars in networking research that KU did with Sprint, under the leadership of Dr. Frost, EECS Professor **Gary Minden**, and Deane E. Ackers Distinguished Professor of EECS **Joseph Evans**, started with such a simple project. A small communications project with Ft. Leavenworth would lead to work with Ft. Monmouth and the Air Force.

Dr. Shanmugan then pitched a new simulation tool that would organize and coordinate all the capabilities of a powerful workstation with advanced graphics to assist TRW communications engineers in designing communication systems. In addition, the data would be organized so that multiple engineers could share models and other information.

The Block-Oriented Systems Simulator (BOSS) put KU on the map. KU spun out the technology, and Dr. Shanmugan held numerous leadership positions in industry as BOSS was commercialized. He wanted to return to teaching and research and came back to KU in 1995.

J. Keith Townsend, the Alumni Distinguished Professor at North Carolina State University, worked on BOSS as a Ph.D. student. He remembers his adviser, Dr. Shanmugan, as someone who understood the balance between family and work.

"Sam insisted we address him on a first name basis, and although it's not very common where I currently teach, I feel strongly enough that it enhances the relationship between student and teacher that I adopted this in my career as a professor. In fact, I have tried to emulate many of the techniques and characteristics of Sam's approach in my own career," said Dr. Townsend.

Dr. Shanmugan's oldest son, Kannon, thinks his dad did a great job of balancing family and work. As the father of two young sons and a partner in the law firm of Williams & Connolly, Kannon understands how difficult it is to achieve that balance. He looks to his dad for advice and support.

Dr. Shanmugan and his wife, Radha, look forward to spending more time with their grandchildren in Washington, D.C., after his retirement from KU.

"Dad was always there for us when we were growing up. When he had to work weekends, he would take me to his office so that he could keep an eye on me as I was doing my homework. Now that I'm a dad myself, he is very much my role model," says Kannon.

Retirement

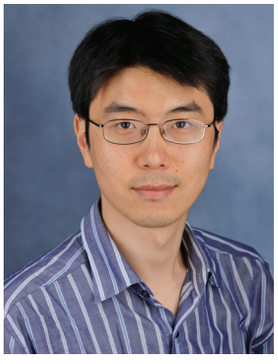
Dr. Shanmugan started phased retirement five years ago, which has given him and his wife, Radha, time to adjust to retirement. They have traveled extensively, and he has been marking things off his bucket list. At 70, he completed his first Olympic triathlon, climbed one of the tallest peaks in Colorado, and scuba dived off the Great Barrier Reef. He does not plan on staying home in retirement but continuing his travels and spending time with his children and grandchildren. He is thankful for all that KU has given him and his family, but he is ready to move on to the next chapter. ▪

Faculty News » »

EECS Adds Embedded Systems Expert

Heechul Yun, an expert in real-time embedded systems, joined the department as an assistant professor this fall.

"Embedded systems are everywhere: from everyday smartphones and tablets, to cars and airplanes, to factory automation systems and power plant control systems. They are providing vital infrastructure for our society," said Dr. Yun, who earned his Ph.D. in computer science from the University of Illinois at Urbana-Champaign this summer.



His dissertation focused on operating system-level resource management for real-time systems, with an emphasis on performance isolation and energy saving.

"My research is to build a software foundation that will make these systems more predictable, reliable, and efficient," said Dr. Yun. "For example, I am working to improve real-time performance of the Linux operating system, which powers millions of embedded systems. Successful research, therefore, could make huge real-world impacts."

To illustrate the complexity of today's embedded systems, Dr. Yun compares a military jet built in the 1960s that used 50,000 lines of code to the new F-35 Joint Strike Fighter with 9.5 million lines of code, which is running on top of complex microprocessors.

Dr. Yun says it is critical to improve the real-time performance of complex software running on embedded microprocessors—especially multi-core processors. He is developing system-level techniques to minimize interference and ensure predictability of multi-core based embedded systems.

"While many industries have moved toward multicore-based computers, such as those in the F-35 built by Lockheed Martin, a sponsor of my research, others are just beginning to incorporate multi-core computers. They are seeking solutions to make multi-core computers more predictable and ultimately certifiable for commercial use in products," said Dr. Yun.

His second research area is in energy-efficient computing. He points to the short battery life of smartphones and the huge power cost of cloud computing systems. He will save power by identifying and controlling components that can be modified. For example, when a CPU-intensive workload is running, the speed of its main memory can be reduced, hence saving power without affecting performance.

After receiving his bachelor's and master's degrees in computer science from Korea Advanced Institute of Science & Technology, he spent five years as a system software engineer at Samsung Electronics. ▪

Agah Edits Book on AI Systems in Health Care

EECS Professor **Arvin Agah** has edited a new book on advanced artificial intelligence (AI) systems that can improve the accuracy, affordability and accessibility of health care.

Dr. Agah, who is also the associate dean for research and graduate programs in the School of Engineering, brought together over 80 experts with 50 unique affiliations from 17 different countries for "Medical Applications of Artificial Intelligence," which was published in November 2013 by CRC Press. The book provides an overview of AI concepts and techniques before delving into innovative research and continued challenges in integrating AI into medicine.

"As AI techniques are being further developed, their applications to medicine are expanding, and this book is an attempt to capture the breadth and depth of medical applications of AI," said Dr. Agah.

AI concepts, techniques, and tools have been utilized in medical applications for over four decades with the goal to benefit health care by assisting health care professionals. Improvements in accuracy and efficiency of AI techniques have steadily increased AI's viability as a choice for tackling problems in medicine, says Dr. Agah. ▪

"Everything Dr. Alexander says and does is authentic and caring. It is clear he wants the best for his students and wants to see them succeed."

–KU student Stacie Burnett

Alexander Receives Adviser Award from Honors Program

EECS Professor **Perry Alexander** is the first recipient of the new Outstanding Adviser Award from the KU Honors Program. The award recognizes a faculty advisor who demonstrates support and challenges students.

Chancellor Bernadette Gray-Little presented Dr. Alexander with the award at the Teaching and Advising Awards Ceremony on Nov. 14.

Stacie Burnett, a sophomore in architecture, nominated Dr. Alexander for the award. As an honors student, Burnett can select her advisor from faculty across the university. She chose Dr. Alexander for his affable, supportive nature.

"I think what makes him such a great adviser is how genuine he is in his interactions with students," says Burnett. "Everything Dr. Alexander says and does is authentic and caring. It is clear he wants the best for his students and wants to see them succeed."

Dr. Alexander has advised **Evan Austin**, a Ph.D. student in computer science, since he was an undergraduate. Austin says Dr. Alexander does a remarkable job of tailoring his interactions with each student.

Once when Austin and his lab mates were discussing their typical meetings with Dr. Alexander, they realized he used a different advising technique with each of them. Dr. Alexander found what each of them needed to be inspired, said Austin.

Chancellor Bernadette Gray-Little presents Dr. Alexander with the Outstanding Advisor Award.

Photo Courtesy of the Honors Program

"Whenever I go to Perry's office to talk about work, we end up talking about music, sports, or politics instead. Yet in the middle of these conversations, he always finds some way to sneak in perfectly apt pieces of advice, such that I tend to leave his office with my problem solved and a new piece of KU basketball trivia," says Austin. ▪

Liu Participated in Prestigious Air Force Summer Program

EECS Assistant Professor **Lingjia Liu** received a highly competitive summer fellowship with the United States Air Force. Only 20 faculty members from across the nation were selected as Faculty Fellows for the 2013 Air Force Summer Faculty Fellow Program (AF SFFP).

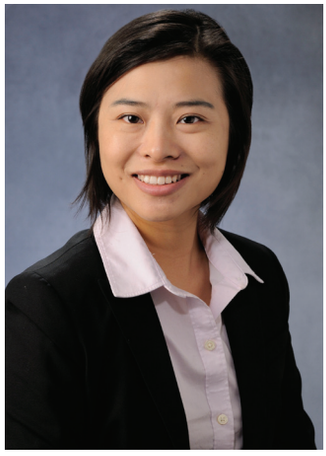
Working with research engineers in the Air Force Research Laboratory, Dr. Liu conducted research on dynamic spectrum access networks, such as cognitive radio and software-defined radio networks. These adaptive wireless networks will enable greater efficiency of and access to the radio frequency (RF) spectrum, which billions of devices—from smartphones and computer tablets to Blu-ray players and e-book readers—are devouring.

"This was indeed a great honor and opportunity for me to have the chance to interact with professors around the nation and collaborate with top-notch researchers in the Air Force Research Laboratory," said Dr. Liu. "This also provided a fantastic opportunity to showcase sample research capabilities available at KU."

Dr. Liu joined KU in 2011, after conducting extensive research with Samsung Research America on the standardization of 3GPP LTE/LTE-Advanced systems. His research is funded by the National Science Foundation, Air Force Office of Scientific Research, and Samsung Research America. ▪

Faculty Spotlight

Meet Assistant Professor Fengjun Li



Fengjun Li joined EECS as assistant professor in 2011. She has taught Software Engineering (448), Security Management and Audit (711), and Network Security and its Application (712). Her research on secure data aggregation is one of the first approaches to address problems in smart grid communications and has been cited widely. Dr. Li earned her Ph.D. in Information Sciences and Technology from Pennsylvania State University in 2010.

Please explain your research.

My research focuses on security and privacy issues in large-scale distributed systems, such as health information exchange systems. I am working on an information-sharing framework to support secure and confidential data access for doctors, pharmacists, and other authorized personnel.

My current research projects are focused on the analysis and defense of "astroturfing" attacks in social media. Astroturfing, which takes its name from the artificial grass, refers to fake grass-roots support on policies, products, or people. New software can disguise an array of efforts to sway public opinion. I am focusing on astroturfing attacks that abuse existing social collaborative systems, such as crowdsourcing or customer review systems. In studying spam detection, we examine relationships among the reviewers. By developing a computational model to incorporate content and structure features, we can better detect spam. This research will increase the trustworthiness of social collaborative systems, which are critical to Internet marketing, e-commerce, and peer-production networks.

Another focus of my research deals with security in the emerging smart grids. Specifically, I focus on securing data communication in the neighborhood area networks. I have designed a series of lightweight protocols for efficient, secure, and privacy-preserving data aggregation and the detection of false data.

What do you see as your biggest opportunities and challenges?

From a security point of view, our biggest challenge is how exposed new information and communication technologies are to adversaries. Take the smart grid as an example: smart meters equipped with computing and communication capabilities are connected to the utility companies and distribution centers. This allows meters to transfer real-time usage and pricing. Unlike the conventional grid, which is only vulnerable to physical attacks, the embedded intelligence and the two-way communication of the smart grid expand the attack surface to the cyber world. Now, the attackers could go from penetrating neighborhood smart meters to large-scale terrorism attacks. As a security researcher, I am designing models and mechanisms to defend against such new (potential) attacks.

What's one thing that would surprise people about your work?

In our study on privacy threats, we wanted to see how easily we could gather an individual's personal information. By collecting information from five online data sources, we successfully constructed a surprisingly complete profile, including full name, age, sex, address, cell and landline numbers, e-mail accounts, etc. It is important to note this was NOT a young guy who voluntarily posted all his personal information online. However, after some digging, we were able to collect this free, public information from various sources. The information we discovered was so rich that we took measures to protect his identity in our paper. ▪

"What attracted us to working with Dr. Gill is that he is brilliant enough not only to develop ideas with us but also to get them out into the real world."

–Professor Neil Ghani

Gill is Awarded Distinguished Visiting Fellowship

EECS Assistant Professor **Andy Gill** received a Distinguished Visiting Fellowship from the Scottish Informatics and Computer Science Alliance (SICSA). He gave a series of lectures at five leading Scottish universities from Oct. 25–Nov. 6.

SICSA is one of the largest research clusters in informatics and computer science in Europe. Its Distinguished Visitor Fellowship invites outstanding researchers to lead workshops and seminars at affiliated institutions.

"What attracted us to working with Dr. Gill is that he is brilliant enough not only to develop ideas with us but also to get them out into the real world. This visit will lead to fundamental theoretical and practical progress in the area of domain specific languages," said Neil Ghani, a professor in computer and information sciences at the University of Strathclyde, who sponsored Dr. Gill's fellowship application.

In addition to Strathclyde, Dr. Gill spoke at the University of Edinburgh, Heriot-Watt University, University of Glasgow, and St. Andrews University. The talks and guest lectures were intended to help Scottish Ph.D. students and other researchers understand external research programs, as well as initiate research collaborations.

EECS Assistant Professor Andy Gill leads students through a basic programming exercise in Introduction to Engineering (ENGR 108).

Dr. Gill leads KU's Functional Programming Group, which is developing technology to make it easier and cheaper to build highly secure and dependable software. ▪

Professors Honored at School of Engineering Graduation

Associate Chair for Undergraduate Studies **David Petr** won the Gould Award for Outstanding Adviser, and Professor **Jim Rowland** received the 2013 John E. and Winifred E. Sharp Professorship at the School of Engineering Recognition Ceremony in May.

Engineering Student Council president and EECS junior **Zach Garber** presented Dr. Petr with the Gould Award. Engineering students select the winner, who receives a plaque and $4,000 monetary award.

For Garber, a highlight of Introduction to Communication Systems (EECS 562) was the "What I Wish I Knew When I Was 20" list, created by Tina Seelig. Dr. Petr would include personal examples during his weekly tips to students.

"I've never had a professor do anything close to that before, and it was great to hear from someone who has been in our shoes," said Garber.

A School of Engineering faculty committee selected Dr. Rowland for the Sharp Professorship. The three-year honor includes an annual personal award of $5,000 and access to an additional $5,000 annually for instructional development.

Reba Liggett (BSEE '13) had four courses with Dr. Rowland. In her letter of support, she wrote that "material, which seems daunting at first, is brought to a level of understanding that is easily digested by his students."

"When I encounter a problem with a control system on a project at work, I know I'll be able to handle it because of what I've learned from Dr. Rowland," wrote Liggett. ▪

Class Scheduling Software Wins Niehaus Design Award

Seniors **Aaron Donnell**, **Ronald Henderson**, **Lonnie Jackson**, and **George Li** earned the first Douglas Niehaus Computer Science Capstone Design Award for their easy-to-use online scheduling app. The Class Schedule Generator incorporates user preferences, such as time of day and days of the week, to create a schedule for the upcoming semester.

(L to R) Aaron Donnell, Ronald Henderson, Lonnie Jackson, and George Li received the Niehaus Design Award for their Class Schedule Generator.

The Niehaus Design Award, which is voted on by students in the course, recognizes outstanding workmanship and innovation. The award is given in memory of EECS Associate Professor Douglas Niehaus, who passed away in 2012.

"We are a grateful to be the winners of the first Niehaus Award," said Jackson. "Dr. Niehaus was great at not only teaching the technical stuff but also sharing anecdotes about life in the corporate world as a software engineer."

Li said Dr. Niehaus provided him with many enduring lessons such as "just because you can doesn't mean you should." The late professor's advice helped the team stay focused on the true goals of the project, and not become sidetracked on non-vital features.

For Li, it is one of the many lessons learned while working on his capstone project in the new Computer Science Design course, which centers on the creation and implementation of a large-scale software system.

"I know this is the first year that CS students had an opportunity to work on these capstone projects, and I think we are all fortunate to have this experience," said Li. "I'm glad our department introduced the senior design projects and hope to see great things from future students."

During a brainstorming session, Henderson proposed a class schedule generator. The group liked the idea for its mix of fun and usefulness. The students began researching and evaluating current scheduling tools, often finding poorly constructed systems that did not work. They had found their project.

"We decided we were going to make one that actually worked. Our program is designed to take the difficulty and tedium out of creating the perfect schedule," said Donnell.

The students used online KU class schedules to build the database. Li and Donnell prepared data from 7,500 classes for the website. Since class times did not have a.m. or p.m. listed, they had to develop an algorithm to identify the correct start and end times. With preferences allowing students to select morning, afternoon, or evening classes, the scheduler must determine, for example, whether a class starts at 7 a.m. or p.m.

In addition to cleaning the data, the team had to deal with clashing preferences, such as "most days off" and "Monday, Wednesday, and Friday classes." A user must rank her preferences, and the generator assigns a value to each based on the order. If "most days off" is the most important, she most likely will have Tuesday/Thursday classes in some of her possible schedules. The site returns the top 20 schedules.

"It took a lot of fine tuning to get the preferences to return schedules that I envisioned. The time gap is the most complicated and a big highlight for us. It looks through every section in every class in every schedule, and yet is still very fast and produces accurate results," said Donnell, who added the average response time was within 10 seconds. ▪

"Every day I would encounter these beautiful, exotic situations, but at the same time, I would be reminded that India, particularly the region I was staying in, was a developing nation."

–EECS student Aleksander Eskilson

Eskilson Spends Summer Studying Language in India

Aleksander Eskilson spent nine weeks this summer in India, learning advanced Hindi and exploring one of the oldest civilizations in the world.

The EECS sophomore attended an intensive language study program through the American Institute of Indian Studies. More than 30 students would spend each weekday in class, receiving specialized instruction and one-on-one tutoring. After classes, students would practice their new language skills among the 3 million people of Jaipur.

The soft-spoken Kansan tested his Hindi in interesting ways. He found he enjoyed haggling, and in his favorite bazaar, housed in an old underground train tunnel, he participated in spirited negotiations for such goods as leather sandals and antique clocks—his most prized finds. Over dinners with his host family, Eskilson would have broad-ranging conversations in everything from computer science research to ancient Indian mythology.

A desire to be in India and experience the culture helped him quickly adapt to a lack of hot water and stable Internet connection. Unregulated traffic, flooding from monsoon rains, and other more significant challenges had a profound effect on the future engineer.

"Every day I would encounter these beautiful, exotic situations, but at the same time, I would be reminded that India, particularly the region I was staying in, was a developing nation."

His summer in India reinforced his belief in the importance of engineering.

"Engineering is not limited to the United States, and not just limited to English. When you develop a global sense for engineering, I think it gives you not only an appreciation for all of the infrastructure we have here in the United States but also an awareness of the scope of engineering problems around the world."

After learning he would need to take a foreign language for his linguistics minor, Eskilson turned to the KU course catalog. When he saw Hindi was offered, he jumped at the chance to learn more about a language that fascinated him. His dad's Ravi Shankar albums helped create an early interest in India and Asiatic languages.

He made an appointment with the Office of Study Abroad before the end of his first semester. He thought the summer after his freshman year would be ideal for study abroad, since he hoped the following summers would be filled with internships. His growing interest and experience in Hindi made India a natural choice for him. ▪

The Department awarded the following students more than $305,000 in scholarships for the 2013-14 academic year.

Ryan Ahlgren, Daniel Anderson, Austin Bailey, Noah Benham, Shannon Bisges, Nicholas Boyles, Roxanne Calderon, William Carey, Brandon Caudell, Alvin Cheung, Daniel Collins, Isaac Cook, Austin Cosner, Jason Curry, Koosha Daneshi, Bridget Davis, Austin Davis, Dylan Dreiling, John Dziadura, David Easley, Eric Ferguson, Allena Flamme, Zachary Flies, Brian Fosselman, David Freeman, Timothy Frese, Zachary Garber, Tamara Gaynes, Brandon Givens, Kristopher Goering, Jacob Gould, Joseph Greenbaum, Eric Groves, Christopher Hale, Cody James, Hayden Kaustinen, Jackson Keller, Jared Kenton, William Kolega, David Krall, Peter Lesslie, George Li, Thomas Lippoli, Gabriel Magnuson, Nicole Maneth, Stacy Mar, Joshua Marple, Brian McClannahan, Elise McEllhiney, Jordan Miller, Devin Mitchell, Charles Mohr, Keith Monaghan, Devin Mullins, Jay Offerdahl, Ali Oguz, Jonathan Owen, Amanda Parks, Christine Perinchery, Paul Plotkin, Seth Polsley, Bryce Presko, Gerald Ravenscroft, Eugene Raygorodetskiy, Preston Robertson, Derek Scalzi, Chandler Schmidt, Ryan Scott, Nicholas Shaheed, Patrick Shields, Brett Siegrist, Michael Smalley, Benjamin Soukup, Jordan Sprick, Andrew Taylor, Megan Teahan, Daniel Theisen, Michael Tubbs, Chad Uhl, John Ward, Joseph Werle, Lee Wu, Sikai Xiao, and Jesse Yang. Graduate Award: Brian Cordill

Undergraduate Spotlight

Meet Jalashree Mehta (BSEE '13)

As president of KU IEEE, Jalashree Mehta reenergized the student professional organization. Under her leadership, the KU branch participated for the first time in the team competition at the IEEE Regional Conference. She and **Luke Ezell** (BSEE '13) won first place in the Student Ethics competition.

A native of Mumbai, India, Mehta was selected for the competitive KU University Scholars program and Eta Kappa Nu. After graduating with honors in May, Mehta joined Exxon Mobile as an instrumentation engineer.

Jalashree Mehta works on her senior design project. Her team designed and built a remote controlled car able to drive around a track autonomously.

What has been your overall experience?

It has been a great overall experience! EECS gives you a foundation in engineering and problem solving that allows you to tackle complex problems. The professors take the time to get to know you, and I have enjoyed my interactions with them. The department also gives us opportunities to take classes—both in engineering and non-engineering—that help us become well rounded. I think all of that makes EECS a special place.

What are some of your favorite memories at KU?

❖*One of my favorite memories is my first day at KU. It was a nerve-wracking experience.*

❖*Another favorite memory is my first basketball game at Allen Fieldhouse. It was really, really special. I have become a huge KU basketball fan.*

❖*As far as engineering goes, Expo is a great time. You get to hang out with so many kids. The little ones are fascinated by what we do. It is great opportunity to show them more about engineering, and a fun time to spend with friends.*

What have been some challenges/highlights?

I think my biggest challenge would be dealing with the culture shock I had when I came to the U.S. It hit me hard because it was not anything like India. It was difficult getting used to a different lifestyle and being surrounded by people from different countries around the world. I had to get used to a different teaching style in the U.S. Then like most freshmen, I had to deal with homesickness as well.

The highlight would be overcoming that challenge, being able to adapt to a new situation. Other highlights include the interactions I have had with my professors. They really want to get to know you, and I have enjoyed getting to know them. Being elected president of IEEE was special as well as being selected for the University Scholars program. It is open to all majors and 15 students are selected annually for the scholars program. I was part of a special class. ▪

"I am looking forward to exploring the challenges and opportunities within this changing industry."
–EECS student Brett Siegrist

Siegrist Receives IEEE Renewable Power Scholarship

Sophomore **Brett Siegrist** has been awarded a prestigious Power and Energy Systems (PES) Scholarship from the Institute of Electrical and Electronics Engineers (IEEE). These multi-year awards are aimed at attracting talented engineers interested in advancing alternative energies, developing smart grid technology, and transforming energy generation and distribution.

Siegrist, an electrical engineering major with minors in business and economics, was among 228 undergraduate students from 116 universities across the United States and Canada to participate in the IEEE PES Scholarship Plus Initiative. The program provides up to three years of financial support—$2,000 the first and second years and $3,000 the final year—and opportunities to work with hundreds of participating companies in the PES Careers Program.

"I am honored to be selected for the PES Scholarship. The program will provide me with greater exposure to the power industry and available career paths. I am looking forward to exploring the challenges and opportunities within this changing industry," said Siegrist, who is a member of IEEE, Engineers without Borders, and the Engineering Student Council.

EECS Professor **James Rowland,** who teaches Siegrist in the Circuits I class, has been impressed by Siegrist's abilities and willingness to learn.

"My heartiest congratulations go to Brett on receiving this well-deserved honor," said Dr. Rowland. "Brett's interest and enthusiasm in PES at this early stage of his career can carry him to new levels in the power industry now and after graduation. This is a high honor for him and for our department."

A group of industry and academic representatives selected recipients based on their academic preparation, extracurricular activities, and leadership skills. They also assessed students' interest in power and energy engineering and their potential for a successful career within the field. ▪

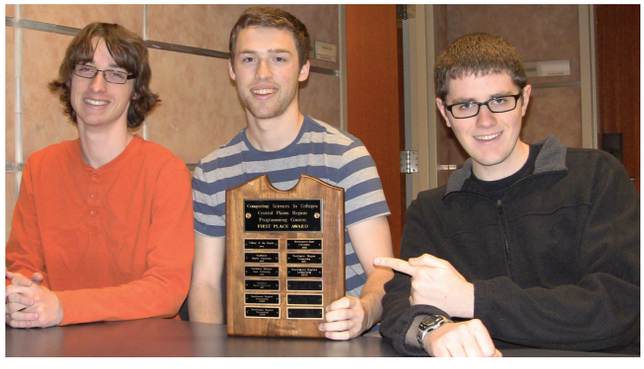
Students Win Regional Programming Competition

Participating in their first team programming competition, three EECS students bested 30 teams from four states to win KU's first regional programming title in April.

Sophomores **Ryan Scott** and **Alec White** and freshman **Parker Riley** solved all five problems—the only team to do so—during the four-hour Central Plains programming competition held at Avila University, in Kansas City, Mo.

They credit a divide-and-conquer strategy for their success. After reading through the problems, each started working on a particular problem. For example, Riley worked to determine the average number of moves to unlock a combination lock. They regrouped periodically to assess progress and help one another.

Each member of the winning team received $100 cash prize, and they received a traveling plaque for KU's Association for Computing Machinery (ACM) group to display for the next year.



(L to R) Parker Riley, Alec White, and Ryan Scott show the plaque they received for winning the Central Plains programming competition. They are the first KU team to win the regional title.

"I did not know what to expect," said Scott, a sophomore, about his first programming competition. "I thought we did really well. KU ACM is full of talented people who do well on their own and collaborate well with each other." ▪

Stees Earns Self Graduate Fellowship

Michael Stees, a Ph.D. student in computer science, is one of just six University of Kansas students to receive a Madison & Lila Self Graduate Fellowship for 2013-14.

New or first-year Ph.D. students are eligible for the fellowship, which aims to identify and recruit exceptional students to KU. The four-year awards cover full tuition and fees, provide a $29,500 annual stipend, and include a unique development program.

The development program provides Fellows with training in communication and management for future leadership roles. They learn from a broad array of leaders—CEOs of Fortune 500 Companies to prominent experts in public policy.

"I am very fortunate to be the recipient of this fellowship. I suspect that the opportunities for personal and professional growth and enrichment provided by the Fellow Development Program will be invaluable in my time at KU, and even more so in my professional life after KU," said Stees, who is from Plainfield, Ill. "Aside from the obvious monetary benefits, my biggest attraction to it was the Fellow Development Program, which helps you develop your leadership potential and other skills you will need in the future."

Under the direction of EECS Assistant Professor **Andy Gill**, Stees will conduct research in parallelism and functional programming. The former makes programs faster by breaking down and performing several computations simultaneously, while the latter is used to improve assurance arguments about software artifacts. Pharmaceutical design, economic and climate modeling, and other data-intensive applications are already using early versions of these techniques, said Dr. Gill, whose research group is developing more advanced versions.

Stees comes to KU from Monmouth College, a small private university in Monmouth, Ill. Before his senior year, the computer science standout began researching graduate schools. An online search led him to Dr. Gill's research in functional programming and his first visit to the University of Kansas. He was impressed with Dr. Gill and his research group and liked EECS and Lawrence. He is looking forward to riding the bike trails around town and exploring downtown.

Just as KU charmed him, Stees captured the attention of the EECS graduate committee, which nominated him for the Self Fellowship. Stees is the sixth EECS student to receive the highly competitive award since its inception in 1989. ▪

Hosseini Receives Best Graduate Paper Award

Ph.D. student **Ehsan Hosseini** won the Best Graduate Student Paper Award at the International Telemetering Conference (ITC) in October. He received a $1,000 monetary award for his research on synchronizing data transfers between base stations and aircraft traveling at Mach speeds over thousands of miles.

"The most important aspect of winning this award is the recognition of my work by researchers outside of KU. The conference has a large number of attendees from industry," said Hosseini.

ITC is an annual forum and technical exhibition attended by industry and academic leaders. EECS students have won the best paper award three of the last five years at ITC.

"KU has established itself as a leader in wireless communications," said Hosseini's adviser, EECS Associate Professor **Erik Perrins**.

Dr. Perrins is leading a Department of Defense (DoD) project to help build a new communication framework. The integrated Network-Enhanced Telemetry (iNET) system will support advanced testing of airborne vehicles, including DoD and NASA systems.

iNET will transmit data in bursts, rather than being continuously streamed. This allows time-sensitive information to be sent immediately, giving evaluators a more efficient, flexible communication network. Dr. Perrins' group is working to synchronize transmissions between ground stations and airborne vehicles. ▪

"They [NASA] recognize the University of Kansas, here in the heart of the country, as a true leader in ice sheet research...."

–EECS Ph.D. student **Theresa Stumpf**

Stumpf Wins Prestigious NASA Earth Science Fellowship

By Cody Howard

A three-year, $90,000 NASA fellowship will allow **Theresa Stumpf**, a doctoral student in electrical engineering, to design tools that will help more precisely predict future sea level rise based on the impact of climate change on the polar ice sheets.

Stumpf, who conducts research at KU's Center for Remote Sensing of Ice Sheets (CReSIS), was awarded a fellowship from NASA's Earth and Space Science Program. She will be working on a new type of ice penetrating radar designed to gather data from a much wider area and provide a much clearer picture of the conditions where the ice meets bedrock.

Much of the data used by the scientific community, particularly Greenland data, are gathered with radars developed by CReSIS and flown on aircraft over the ice sheets in Greenland and Antarctica. These data represent images and information from the surface of the ice sheet to the bedrock.

The formal name of Stumpf's NASA fellowship application is "Ultra-Wideband, Wide-Swath Radar Imaging of the Ice-Bed Interface for Generating Fine Resolution Bed Topography and Quantifying Basal Conditions."

"That essentially means that the ice sheets are mapped out over a very wide swath, providing more accurate and abundant data about the conditions at the bedrock. Current information on that is very sparse," Stumpf said.

EECS Ph.D. student Theresa Stumpf stands at the top of Observation Hill that overlooks McMurdo Station in Antarctica.

Photo by Bethany Burton/ U.S. Geological Survey

The conditions where the ice meets rock at the bottom of the ice sheet – whether it's solid ice, melting ice or water – have a major influence on the speed of the ice flow to the oceans. The faster the ice flows, the more it affects sea level rise.

"Another important aspect of wide-swath imaging is that you can collect this data in a single pass from the aircraft," Stumpf said. "You don't have to fly multiple lines over the same area and then piece the data together to get fine resolution. You're getting it in just one pass, and that's the objective."

Data used by CReSIS have traditionally been gathered solely from the area directly beneath the aircraft. Stumpf's research will analyze data from three separate antennas that gather information from a much wider patch of ground. While it can be more challenging to filter out interference and convert data to an accurate map, once Stumpf interprets all the information, the result can provide a more thorough and revealing picture of the conditions beneath the surface.

"Detailed descriptions of hydrological channels below the ice allow scientists to make more accurate predictions about future sea levels," Stumpf said.

She says the outstanding work done on ice sheet research at KU over the years certainly helped earn her the NASA fellowship.

"They recognize the University of Kansas, here in the heart of the country, as a true leader in ice sheet research, and our track record and reputation definitely put me in a position to do research that I think a lot of other graduate students wouldn't have the opportunity to do. I'm excited to see what we can do," Stumpf said. ▪

Graduate Spotlight

Meet Ph.D. student Brian Cordill

Brian Cordill, of Olathe, recently won the department's Paul F. Heubner Memorial Award, which honors teaching assistants who best exemplify the role of a teacher. He has taught the Introduction to Communication Systems lab (EECS 562) and Electromagnetics II lab (420) for multiple semesters.

His research is looking at ways to reduce radar interference with communication systems. The widespread deployment of 4G cellular systems has the potential to cause widespread interference with existing radar, such as weather and military systems. By developing techniques to improve model accuracy and performance evaluation, Cordill is making wireless communication safer and more dependable.

What have been some challenges/highlights?

It's actually really cool to take a journal publication from idea and concept all the way to publication. It is geeky, but it's kind of thrilling to see your idea and your hard work published. I have eight conference publications, and I have been able to present my papers twice at the EMC World conference. The department helped with funding both times I went to EMC, which was key in me going to the them.

"The Department does a lot of good work, but it is small enough that you get to know most of — if not all — the professors."

But there is a baseline level of work that you have to stay on top of. For my lab, we like to publish in three conferences, EMC, IEEE Radar Conference, and I2MC. You have three publications a year and a teaching load that you have to stay on top of before you can even touch your dissertation. That can be challenging.

What has been your overall experience as an EECS student?

You have to want to be a graduate student. It can be quite a significant chunk of your life. It's really important to find a program that fits you. I really like the EECS department, the School of Engineering, and Lawrence in general. The Department does a lot of good work, but it is small enough that you get to know most of — if not all — the professors.

I feel like the school really cares about its students. For example, I was on a student input committee for the newest building under construction. It left me feeling that they aren't just interested in what the professors want or the administrators want; they really care about what the students need as well.

Tell us more about your research.

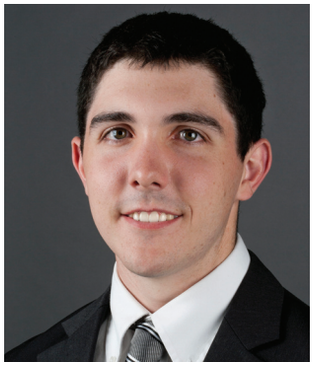
My research mainly deals with antenna model mismatch. We can do a lot of really cool things with arrays these days. All of these depend on having an accurate model of your array, which is really easy to do on paper, but kind of difficult to do in the real world. ▪

"Working at Microsoft with a team of very bright and experienced engineers on cutting-edge technology reminded me how much I love electrical engineering."

– EECS graduate student **Nahal Niakan**

Hornberger Spends Year in Japan

Ph.D. student **Erik Hornberger** began a 14-month study abroad program in Japan this past August. He is gaining fluency in Japanese scientific terminology and building research connections with global leaders in brain imaging.



Hornberger received a prestigious Critical Language Scholarship (CLS) from the U.S. Department of State. The scholarship provides summer language institutes for American college students in 13 critical-need foreign languages. CLS students receive a minimum of 20 hours per week of classroom instruction and participate in community activities and service projects.

Hornberger said the accelerated language program was great preparation for his two semesters at Sophia University in Tokyo. His second scholarship, the Foreign Language Area Studies Fellowship (FLAS) sponsored by KU and the U.S. Department of Education, is providing tuition and a stipend for Hornberger at Sophia.

This fall, he met Shoji Tanaka, a professor in the Department of Information and Communication Sciences at Sophia. Dr. Tanaka is an expert in brain imaging, an area Hornberger is conducting research under EECS Associate Professor **Shannon Blunt**. Dr. Tanaka agreed to let Hornberger join his research team. A retired faculty member is mentoring Hornberger to bring him up to speed with the lab's work.

Recently, Hornberger collected MRI and EEG data on volunteers. Researchers asked people to complete various cognitive tasks, including thinking about nothing for an extended period, while they gathered brain imaging and other data.

"We will remove artifacts from eye and throat movement during data processing. That's precisely what I was about to start working on at KU, and now I have somebody to show me the ropes, which I'm really excited about," says Hornberger.

Dr. Tanaka introduced Hornberger to various colleagues including the organizers of this year's national conference on brain imaging. He plans on going to the conference this spring as well as taking advanced courses in signal processing and continuing his research with Dr. Tanaka.

"Engineering is universal. Math doesn't change," said Hornberger. "I have this base set of skills that I can pick up and take anywhere, and having the language skills to facilitate that should open a myriad of opportunities down the road."

Hornberger will resume classes and research at KU and his Self Graduate Fellowship in August 2014. ▪

Niakan Selected for Microsoft Internship

Graduate student **Nahal Niakan** completed an internship this fall with Microsoft at its headquarters in Redmond, Wash.

She worked with the systems engineering group on electromagnetic interference (EMI) issues with the new Surface tablet. Niakan also collaborated with the antenna and design verification groups to ensure the safe, efficient, and reliable performance of Surface tablets.

"I was fortunate to have this opportunity. Working at Microsoft with a team of very bright and experienced engineers on cutting-edge technology reminded me how much I love electrical engineering," said Niakan.

She first met Microsoft representatives at the Engineering and Computer Career Fair. They showed immediate interest in her resume, especially her research with EECS Professor **Christopher Allen**. Dr. Allen is leading a NASA project on collision-avoidance technology for unmanned aerial vehicles (UAVs). Niakan worked on sense-and-avoid radar that will allow UAVs to fly autonomously while steering clear of obstacles.

This spring, Niakan will finish her thesis under EECS Assistant Professor **Sarah Seguin**. Niakan's research focuses on improving the performance of closely spaced antennas used in wireless communications. By reducing coupling, the unwanted transfer of energy to nearby antennas, Niakan aims to increase the efficiency of multiple-input multiple-output (MIMO) technology. ▪

Graduation » »

More than 160 people packed Alton Ballroom at Pachamama's for the EECS Graduation Dinner and Awards Ceremony on May 2. Graduating EECS students and their invited guests, along with EECS Advisory Board members, faculty, and staff, enjoyed a buffet dinner before the awards presentation.

In addition to the awards, Eta Kappa Nu Social Chair **Edirin Aghoghovbia** introduced a roast video put together by seniors. The movie, which spoofed a number of EECS professors, was the hit of the evening.

The evening ended with a presentation by former IEEE president and senior **Jalashree Mehta**. On behalf of the Class of 2013, she presented Chair **Glenn Prescott** with a plaque to thank EECS faculty and staff for their hard work.

Outstanding Senior Award

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

Dakota Henke, **Keeler Russell**, and **Michael Tabone**

(l to r) Dakota Henke, Keeler Russell, and Michael Tabone received the Outstanding Senior Award for EE, CoE, and CS, respectively.

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.

Rudy Christoper

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.

Annette Tetmeyer, Brian Cordill, and **Mahmood Hameed**

▲Annette Tetmeyer, Brian Cordill, and Mahmood Hameed earned Huebner Memorial Awards for their outstanding teaching.

Richard K. & Wilma S. Moore Thesis Award

The awards for best graduate thesis and doctoral dissertation are given in memory of Distinguished Professor Emeritus Richard Moore and his wife.

Cenk Sahin (thesis) and **Brian Quanz** (dissertation)

◄Cenk Sahin won the Moore Award for "Shaped Offset QPSK Capacity," which explores data transmission methods in aeronautical telemetry.

Graduated with Departmental Honors

Robert Knight, **Jalashree Mehta**, **Patrick Shields**, and **Michael Tabone** ▪

Graduating senior Jalashree Mehta and her fiancé, Craig Bell, attend the EECS Graduation Banquet. Mehta was recognized for graduating with departmental honors.

Spring

♦**Patrick Clark**, Ph.D. CS, "Firewall Policy Diagram: Novel Data Structures and Algorithms for Modeling, Analysis, and Comprehension of Network Firewalls," Adviser: Dr. Arvin Agah

Michael Paul Albert, BSCoE
Elizabeth Sue Alonzi, BSCS
Thomas Wayne Ashe, BSEE
Bradley Harrison Bell, BSEE
Patrick Bell Dane, BSEE
Paul Michael Bennett, BSCoE
Balaji Bhaskar, BSCS
Robert F. Blair, BSCS
Brandon Joseph Boyer, BSCoE
Jeffrey Kevin Cailteux, BSCoE
Brett Matthew Carriger, BSEE
Donovan Paul Carson, BSCS
Corbin Scott Charpentier, BSCS
Jerod Dale Davis, BSCoE
Alexander Troy Elting, BSCS
Luke Anthony Ezell, BSEE
Gabriel G. Feuerborn, BSEE
Patrick G. Flor, BSCS
Jose Florencio Neto, MSEE
Megha Gupta, MSCoE
Zane Michael Handley, BSCS
Peng Hao, BSCS
Eric Hartwell, MSIT
Tyler Kevin Hayden, BSCoE
Jonathan Ryan Henderson, BSCS
Dakota Lyn Henke, BSEE
Karel Joshua Hill, BSCS
Christopher Michael Hudson, BSCS
Grant W. Jamison, BSEE
Victor Jara-Olivares, MSEE
Matthew A. Jenkins, BSEE
David A. Jones, BSCS
Ashley Beth Jurgeson, BSCoE
Purity Kipkoech, MSCoE
♦Robert Terence Knight, BSEE
Chan Yang Lee, BSEE
Nolan Vincent Lem, BSEE
Paul Lenzen, MSEE
Zhi Li, MSCoE
Reba R. Liggett, BSEE
Jared Austin Mar, BSCS
Patrick M. McCormick, BSEE
Thomas Joseph McSweeney, BSEE
♦Jalashree Pratosh Mehta, BSEE
Andrew Ryan Mertz, BSEE
Lynsey Marie Metz, BSEE
Joseph Taylor Moss, BSEE
Jay Paul Mueller, BSCoE
Sergey Novoseltsev, BSCS
Timothy Jerome Nunnink, BSEE
Rebekah Anne Patterson, BSCoE
Robert I. Perez, BSEE
Thomas Alexander Peterman, BSCS
Joseph Michael Pince, BSCoE
Muthukumaran Pitchaimani, MSCS
Sam Gus Riss, BSCS
Parker Joseph Roth, BSCoE
Keeler Martino Russell, BSCoE
Todd Aaron Schuring, BSCoE
Nathan Michael Schwermann, BSCS
Kyle Allen Seneker, BSCS
Pradheesh Shanmugam, MSEE
Siddhant Sharma, BSCS
♦Patrick Scott Shields, BSCS
Brian James Smith, BSCS
Matthew Robert Snively, BSCS
Jonathan Wayne Stacy, BSCoE
Fengzhou Sun, BSEE
Yifei Sun, BSEE
♦Michael Joseph Tabone, BSCS
Christopher Elliott Teters, BSCS
♦Annette Tetmeyer, MSCS
Michael Tran, BSEE
Matthew Ryan Werner, BSCoE
Zengxin Zhang, BSEE

Summer

Kenneth Dewayne Brown, Ph.D. EE, "A Mobile Wireless Channel State Recognition Algorithm," Adviser: Dr. Glenn Prescott

Alexander David Brahl, BSEE
Adam Crifasi, MSEE
Reid Crowe, MSEE
William Dinkel, MSCS
♦Marianne Jantz, MSCS
Tianchen Li, MSEE
Yuanling Meng, MSCS
Goutham Selvakumar, MSCS
NiranjanSundararajan Sundararajan , MSEE
Sean Patrick Sweeney, BSEE
Srinivas Palghat Viswanath, MSCoE

Winter

Najla S. Ahmad, Ph.D. CS, "Intent Recognition in Multi-Agent Systems: Collective Box Pushing and Cow Herding," Adviser: Dr. Arvin Agah

Egemen Kemal Cetinkaya, Ph.D. EE, " Modelling and Design of Resilient Networks under Challenges," Adviser: Dr. James Sterbenz

♦**Seyed Mohammad Ehsan Hosseini,** Ph.D. EE, "Synchronization Techniques for Burst-Mode Continuous Phase Modulation," Adviser: Dr. Erik Perrins

Martin Kuehnhausen, Ph.D. CS, "A Framework for Knowledge Derivation Incorporating Trust and Quality of Data," Adviser: Dr. Victor Frost

Meeyoung Park, Ph.D. CS, "HealthTrust: Assessing the Trustworthiness of Healthcare Information on the Internet," Adviser: Dr. Bo Luo

Travis Cline, BSCS
Aaron Martin Donnell, BSCS
Ronald James Henderson, BSCS
Brad R. Kaufmann, MSIT
Taylor Christopher Kilkenny, BSCS
Andrew Michael Kochendorfer, BSCS
George Zhenqi Li, BSCS
Junyan Li, MSCS
Dane Christopher Mitchell, BSCoE
Joshua Joseph Nick, BSCS
Sahana B. Raghunandan, MSEE
Aaron Roeckers, BSCoE
Blake Anthony Rohde, BSCoE
Connar Evan Rosebraugh, BSCS
Charles Edward Thomas II, BSEE
Kyle Lee Van Buren, BSEE

♦ Graduated with Departmental Honors

Radar Data Help Build New Topographic Map of Antarctica

By Bill Daehler

The Center for Remote Sensing of Ice Sheets (CReSIS) helped collect data used for an updated topographic map of the bedrock beneath the Antarctic ice sheet. The map is critical in helping scientists make more accurate predictions about the role the ice sheet will play in the rising sea level.

The map, called Bedmap2, uses data from satellite, airborne, and surface-based platforms to model mountain ranges, ravines, channels, and gorges lying below the surface of the ice sheet.

"This matters because in some places, ice along the edges of Antarctica is being lost rapidly to the sea, driving up sea level. Knowing how much the sea will rise is of global importance, and these maps are a step towards that goal," said Hamish Pritchard, co-lead author of the study, in a press release.

The original BEDMAP project, completed in 2000, brought together an international group of scientists to produce the first comprehensive maps of the Antarctic landscape, which is hidden under ice sheets created over hundreds of thousands of years.

The British Antarctic Survey led the collection of data for the updated map. Researchers compiled surface elevation measurements, ice thickness, and bedrock topography from NASA's Ice, Cloud and Land Elevation Satellite and its Operation IceBridge, the largest survey of the polar ice sheets.

CReSIS instruments, placed on IceBridge aircraft, collect and store ice thickness measurements. Approximately 25 million ice-thickness data points were used for the map, most collected by CReSIS' Multichannel Coherent Radar Depth Sounder/Imager (MCoRDS/I).

The MCoRDS/I radar measures the thickness of the ice sheet, detects internal layering in the ice, and maps the bedrock below. It can be used to detect if liquid exists at the base of the ice sheet, which could accelerate greatly the movement of the ice sheets. The MCoRDS/I system collects about 2 terabytes (TB) per flight, resulting in over 40 TB of raw data for the whole 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," said EECS Associate Professor **Carl Leuschen**. "We are responsible for helping gather data that will lead to a better understanding of climate change."

. . . . . .

This fall, IceBridge based its Antarctic mission out of McMurdo Station, a change from the mission's previous campaigns based in Chile. By switching bases of operations, IceBridge was able to survey previously unknown areas. Having more time to collect data on each flight was particularly important for this season's mission because of the government shutdown, which delayed the IceBridge mission for three weeks.

After the delay, CReSIS field team lead **Bruno Camps-Raga**, KU research professor **Fernando Rodriguez-Morales**, CReSIS staff member **Bryan Townley**, and EECS Ph.D. student **Theresa Stumpf** installed and tested the CReSIS radar systems on NASA's P-3 aircraft at Wallops Flight Facility in late October and early November.

"That gave us a lot of freedom to fly more hours on survey flights instead of in transit…. and access areas that were not so accessible in parts of Antarctica," said Dr. Camps-Raga of basing the mission out of McMurdo Station.

Stumpf has begun analyzing data from CReSIS's radar sounder MCoRDS/I.

"After I process the data, I look through the images generated from MCoRDS/I data taken on the previous science flight. It's awe-inspiring. As I flip through jpegs showing these wild geological features at the bottom of the ice, like channels eroded by glaciers, subglacial mountain chains, and beautiful folds in the ice, it occurs to me that I may be the first person to see some of these images. It's a privilege, as a graduate student, to be able to take part in such an exciting and important subsurface geological exploration."

Background Image: Antarctic volcano Mount Erebus seen over the NASA P-3's right wing during the approach to McMurdo Station's sea ice airfield following an IceBridge survey of sea ice in the Ross Sea in November.
Credit: NASA / Jim Yungel

"The symposium is a rare opportunity to share technical findings and the latest knowledge with colleagues from many countries. "

– CReSIS Director Prasad Gogineni

CReSIS Hosts International Symposium on Radioglaciology

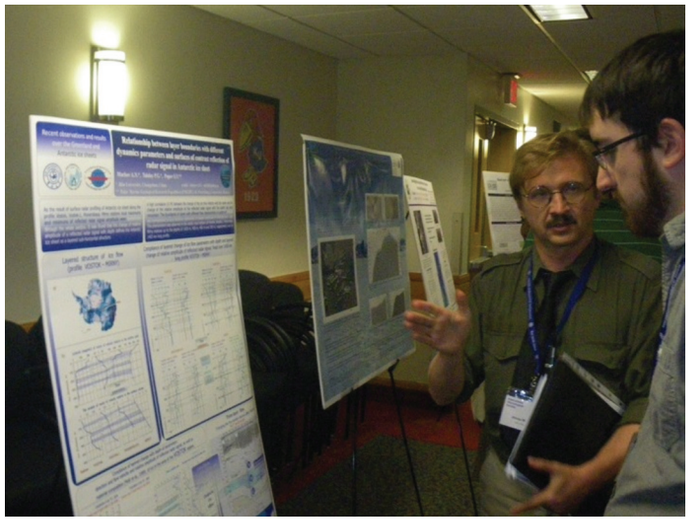
By Cody Howard

As the world's glaciers and polar ice sheets continue to vanish, advanced technology for the study of this global change – and the resulting rise in sea level – is more important and more sophisticated than ever before. The multi-partner Center for Remote Sensing of Ice Sheets (CReSIS), headquartered at KU, is a recognized world leader in this critical field of study.

For that reason, the International Glaciological Society selected KU as the site for its International Symposium on Radioglaciology, which took place Sept. 9-13. Nearly 100 researchers from more than 30 universities and research institutes around the world gathered to discuss the latest technological innovations in radar and signal processing techniques for investigating glaciers and polar ice sheets. The symposium was sponsored at KU by CReSIS, the School of Engineering, the Office of Research and Graduate Studies, the KU Center for Research Inc., NASA, and the National Science Foundation.

"This area of scientific research is becoming more urgent each year," said **Prasad Gogineni**, director of CReSIS and the Deane E. Ackers Distinguished Professor of EECS. "The symposium is a rare opportunity to share technical findings and the latest knowledge with colleagues from many countries. It's also a chance for researchers to explore potential collaborations in person, and it's a terrific showcase for CReSIS and KU."

Dr. Gogineni served as chair of the local organizing committee along with EECS Associate Professor **Carl Leuschen**, CReSIS Associate Research Professor **John Paden**, and CReSIS Assistant Research Professor **Stephen Yan**. Leigh Stearns, an assistant professor in geology, and Cornelis van der Veen, a professor in geography, rounded out the KU contingent.



Alexey Markov (left) discusses his research with CReSIS student Kyle Purdon. More than 30 research posters were also on display during the International Symposium on Radioglaciology this fall at KU.

Photo courtesy of Jenna Collins

Participants gave oral presentations throughout each day of the symposium. More than 30 research posters were also on display.

Ph.D. student **Aqsa Patel** presented her research on the Ku-band Radar Altimeter, which provides accurate surface elevation measurements and can resolve near-surface internal layers in the ice sheets.

"The conference had several international attendees, which speaks to the global nature of climate change and the prominence of the University of Kansas. I had the opportunity to meet researchers in my field, hear about their work, and discuss mine. It was an important networking opportunity for a young researcher," said Patel.

KU alumnus **Jerome Mitchell**, now a Ph.D. student in computer science at Indiana University, presented research on learning algorithms to automate the detection of layers in polar radar imagery.

"The International Symposium on Radioglaciology held in Lawrence was, in my opinion, attended by those considered to be a who's who in the field of glaciology. It was an honor to learn about others' work and present my work in an effort to receive viable feedback on how it could benefit the community," said Mitchell.

Patel, Mitchell, and other EECS students had an opportunity to attend a professional development forum during the symposium. Participants discussed career information and employment strategies, and learned about potential research collaborations. ▪

Seguin Receives Defense Department Equipment Grant

Streamlining communication and improving intelligence-gathering capabilities are the goals of a significant grant to EECS from the U.S. Department of Defense. Along with improving troop safety and military operations, KU researchers are developing technology that could pave the way for the next generation of high-speed wireless devices and services.

EECS Assistant Professor **Sarah Seguin** is the principal investigator on a $450,000 grant that will enable KU to purchase equipment to conduct research on increasing the availability on the currently usable portion of the electromagnetic spectrum. These federally regulated airwaves, which are licensed to cell phone companies as well as radio and TV stations, are in high demand.

As smartphones and tablets devour bandwidth, there is a growing need for additional space on the spectrum for high-speed mobile networks. Since regulators cannot create more of this finite resource, they must take it from another user, placing military bandwidth in the cross hairs of reallocation.

"Military organizations have been one of the largest users of spectrum, with radar in particular using a wide swath of frequencies. When that technology was first invented, there were not competing interests at these frequencies like there are today. Thus, the research focused more on increasing range and accuracy, rather than being spectrally efficient," said Dr. Seguin, who is an investigator in KU's Radar Systems and Remote Sensing Lab (RSL). "Our new equipment will help us test and refine concepts regarding spectral efficiency that will benefit both the military as well as private enterprises, such as companies focused on communications."

EECS Assistant Professor Sarah Seguin (seated) and her graduate students Nahal Niakan, Pradheesh Shanmugam, and Brian Cordill conduct research in the Radar Systems and Remote Sensing Lab.

Dr. Seguin is working with four co-principal investigators: EECS Associate Professors **Shannon Blunt** and **Erik Perrins** and EECS Professors **Christopher Allen** and **Ron Hui**.

KU researchers are attempting to exploit time, frequency, and other variables to maximize data transmission. Think of it as designing a well-packed delivery truck, says Dr. Seguin. Different types of independent signals can coexist if packed together just right. This allows the movements of trillions of bytes of data per day, ensuring that traffic flows smoothly with minimal delays.

In addition to maximizing efficiency, KU researchers are attempting to allow radar and wireless communications to share spectrum. Traditionally, the government has allocated swaths for a single purpose, but with advances in technology, many are calling for portions of military spectrum to be open for shared use. Wireless carriers would be able to use military frequencies, which cover congested urban areas, when vacant to provide Internet broadband or cellular service.

The grant is funded under the Defense University Research Instrumentation Program (DURIP), which supports university researchers in purchasing equipment to enhance or expand defense-related research capabilities. It will support the purchase of a high-speed oscilloscope and a spectrum/signal analyzer along with two arbitrary waveform generators — all of which will test newly developed signals that better utilize the finite spectrum that is available.

The RSL test facility, housed in Nichols Hall, along with the university's state-of-the-art anechoic chamber will allow researchers to test new technologies in isolation and with other devices. These efforts continue KU's long history of pioneering research in radar. ▪

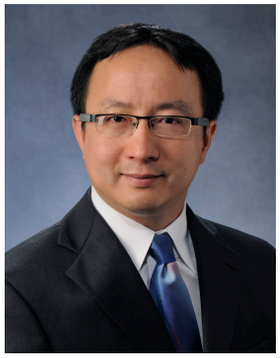
"We're proud of the interdisciplinary nature of the project. With computer science as the backbone, we'll be providing the computing power for research in a wide-range of fields..."

– Associate Professor Jun "Luke" Huan

NSF Grant to Boost KU's Life Sciences Computing Power

By Cody Howard

A three-year, $500,000 grant from the National Science Foundation will provide a boost to computational life science research at the University of Kansas and KU Medical Center. The award — which comes with $200,000 from KU, bringing the total to $700,000 — provides funds to purchase computer hardware that's expected to accelerate data analysis and computer modeling for researchers in fields such as genetics, chemistry, biophysics, ecology, evolutionary biology, materials research, and pharmaceutical sciences.



Jun "Luke" Huan, associate professor of EECS and director of the bioinformatics and computational life sciences laboratory at KU's Information and Telecommunication Technology Center (ITTC), is the principal investigator on the project. His team will oversee the installation of the new hardware and ensure the system functions smoothly.

"So much research in science and engineering is data-intensive. Enhanced data processing and storage capability enables researchers to run more elaborate experiments in a shorter amount of time, which means challenges are solved quicker," said Dr. Huan.

The hardware purchase will cover three areas: storage, computer servers and graphics processing units. It will be housed at KU's Advanced Computing Facility in Nichols Hall, which opened early in 2013 through a $4.7 million grant from the National Institutes of Health.

"We're fortunate to already have a wonderful facility in place that can immediately handle the addition of this new hardware," said Dr. Huan. "That means installation will be fast, and we should be up and running in just a few months."

Dr. Huan is working with four KU professors as co-principal investigators: Justin Blumenstiel, assistant professor in the Department of Ecology and Evolutionary Biology; Ilya Vakser, professor of bioinformatics and molecular biosciences and director of the Center for Bioinformatics; Krzysztof Kuczera, professor of chemistry and molecular biosciences; and A. Townsend Peterson, distinguished professor of ecology and evolutionary biology.

"We're proud of the interdisciplinary nature of the project. With computer science as the backbone, we'll be providing the computing power for research in a wide-range of fields such as biology, ecology, genetics, biochemistry, biophysics, chemistry, pharmaceutical science, and several others," said Dr. Huan.

KU Medical Center investigators are frequent users of ACF. Dr. Huan said the grant further strengthens the connection between KU and KU Medical Center by improving the computing facility to process big genomics data. The project also meets two key goals set out in the university strategic plan.

"This effort speaks to the goals of Harnessing Information, Multiplying Knowledge and Promoting Well-Being, Finding Cures. We're thrilled to undertake this interdisciplinary research effort and expect to see some exciting outcomes," said Dr. Huan. ▪

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"The students are amazing, all the new engineering buildings are great, and the staff whom I met were great people that I wanted to sit and talk with."

– alumna Margaret Burd

Alumni Spotlight

Meet Margaret Burd (MSCS '83), CEO, Magpie Software

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

My experience, which is from the 1980s in graduate school, was quite dated, and I had not been back to campus since graduation. However, in October, I was on campus to give a talk to the Self Fellows, received a great tour, and interacted with more than 100 School of Engineering students. The students are amazing, all the new engineering buildings are great, and the staff whom I met were great people that I wanted to sit and talk with. I think you put all that together and you have a great university from which to earn a degree or two!

Margaret Burd, left, came back to KU this fall to give an invited talk to students in the Madison A. and Lila Self Engineering Leadership Fellows Program. EECS junior Amanda Parks introduced the accomplished software developer and entrepreneur.

What are your favorite KU/EECS memories?

- *My friends! Several of whom are still my friends today. In fact, my best lab buddy, Toni Atkinson, and her husband come to our house for Thanksgiving most years.*
- *The kindness and helpfulness of my professors.*
- *All-night sessions in the lab to finish a project! (Really, I love that memory.)*

What does a typical work day look like for you?

I'm the CEO of a small software development company, Magpie Software, in Denver. So, my typical day is filled with meeting customers (current and potential ones), participating in strategy discussions, talking with my software and firmware engineers, working with the COO/CFO and finance staff, and meeting with the sales team on new deals. My evenings are filled with networking at a variety of events.

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

I started my career at AT&T Bell Labs and worked my way up the management chain to a director. My last job at Bell Labs was to layoff my department. That was the hardest thing I have ever done in my career, but I'm really proud of the way my managers and I completed that ugly task. We dealt with all the people as individuals and attempted to help anyone who wanted help in finding a new job. Then we had a great party to celebrate all we had done together and to launch our new careers. Out of that group, 10 of us started Magpie in 2001, and six of us are still there today.

What are your top tips for students?

- *Work hard, learn everything you can, and get great grades*
- *Be a sponge*
- *You are never too young*
- *Always be on the lookout for opportunities*
- *If you have a dream/vision, go for it*
- *Join us at Magpie Software*

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