CURRENT TRANSMISSIONS

Electrical and Computer Engineering | Missouri S&T | Spring 2019

SAVING FUTURE FIREFIGHTERS

page 3

SENSOR-EMBEDDED 'SMART' HELMETS COULD DETECT TBIS

page 5

NIDEC MOTOR CORP. GIVES ECE LAB A $100K BOOST

Thanks to a $100,000 gift from St. Louis-based Nidec Motor Corp., the undergraduate power laboratory in Emerson Hall has relocated and expanded. The gift also supports lab equipment upgrades.

"We have an awesome power program, but our undergraduate lab has been sorely in need of an upgrade," says **Daryl Beetner**, chair of electrical and computer engineering. "Nidec's donation has allowed us to modernize and expand the lab equipment and to better prepare our students for jobs in industry."

The gift will allow the lab to be expanded by 25 percent with the relocation. New equipment will include digital power analyzers, multimeters, power supplies, connection panels, cables, oscilloscopes, probes and a motor drive.

The power lab is used by every undergraduate student in electrical engineering for required labs in electromechanics and power system design and analysis. Students use the lab to conduct experiments and tests on all aspects of electrical power including motor control, energy conversion, system integration and design optimization.

Nidec Motor Corp. is a manufacturer of industrial, commercial and residential motors. Nidec motors are used in everything from computers, home appliances and automobiles to large machinery in the mining, water treatment and power-generation industries.

A longtime S&T industry partner, Nidec has also provided funding for an endowed scholarship and the senior design lab in electric and computer engineering.

"Like Missouri S&T, Nidec has a long history of fostering discovery, creativity and innovation," says **John Hussey**, EE'81, Nidec's vice president of engineering. "We're proud of our past accomplishments, but we know that developing next-generation talent is essential for our future success. The benefits of this investment will be far-reaching as S&T students meet the world's challenges, demands and opportunities."

DEAR ALUMNI, COLLEAGUES AND FRIENDS,

One of the best parts of being a professor is watching your students "grow up."

I'll never forget the first time I had dinner with a large group of former students. It seemed like just the other day they were struggling to get a grip on their engineering classes, uncertain about what to do with their degree, and insecure about themselves and their capabilities. They had so much to learn.

But they were also creative, intelligent, enthusiastic and — maybe most important — willing to work hard to realize their goals. By that dinner, they were confident, capable, successful and rapidly growing into prominent leaders and mentors in their own right.

Seeing them made me appreciate what a great job I have. Not only do I get time and resources to work on some of the world's most interesting and important research, but I get to help others learn how to tackle similar problems and then watch them go out and use their skills to make the world a better place.

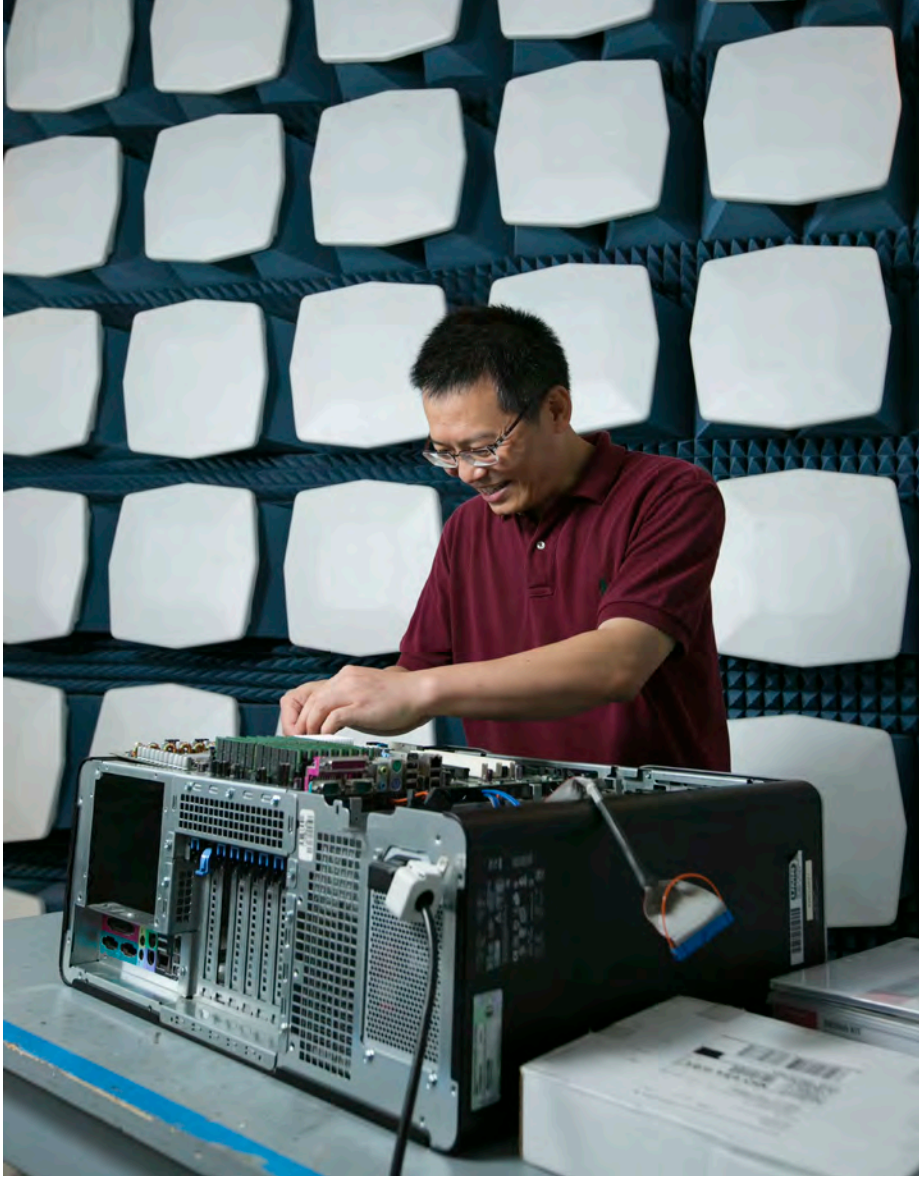
For me, these outcomes are core to being a professor. Helping to push the technology frontier, helping the next generation learn the skills they need to do the same, and building a better world in the process. The department shares this vision, and that will come out in the stories in this year's newsletter.

Our faculty are making a big impact through research and discovery — improving electricity markets, developing sensors to mitigate traumatic brain injuries, developing ultra-fast charging stations for next-generation electric vehicles and much, much more. Dr. Kelvin Erickson, long known as an outstanding instructor and advocate for students, was given one of the highest honors within the UM System when he was named a Curators' Distinguished Teaching Professor. We also hired a new faculty member whose mission will be to ensure every student gets a great advising experience and that ECE students build some of the best, most competitive senior design projects on campus and across the state — projects they can brag about when looking for their first job.

There's more, but you can read for yourself. As always, if you're driving through Rolla, please stop by. We'd love to see you!

Daryl Beetner, Ph.D.
Chair, Electrical and Computer Engineering

IN THIS ISSUE



EMC EXPERT NAMED TANG PROFESSOR OF COMPUTER ENGINEERING

ECE professor **Jun Fan**, director of the Center for Electromagnetic Compatibility, a National Science Foundation Industry-University Cooperative Research Center, became the Cynthia Tang Missouri Distinguished Professor of Computer Engineering at Missouri S&T on Oct. 1.

A member of the Missouri S&T faculty since 2007, Fan is an expert in signal integrity and electromagnetic interference (EMI) designs in high-speed digital systems, DC power-bus modeling, intra-system EMI and radio frequency interference, printed circuit board noise reduction, differential signaling, and cable and connector designs.

The professorship was established through a gift from software entrepreneur **Cynthia Tang**, Econ'85, founder of Insight Industries, a software consulting company based Platteville, Wis.

In 2016, Fan was named a Fellow of the Institute of Electrical and Electronics Engineers for his contributions to power delivery networks in printed circuit designs.

In his new role as the Tang Professor, Fan plans to leverage his strengths in EMC design and modeling, and the strengths of other S&T faculty in networking trustworthy hardware, software and other areas, to build a team of experts focused on hardware safety and security.

"Electronic devices will become increasingly connected and integrated into every aspect of modern life as we enter the era of the Internet of Things (IoT)," Fan says. "However, society's increasing reliance on the IoT comes with risk. Failure of hardware or communications links can impact national economies, homeland security, and could even result in human deaths.

"The risks will increase exponentially as more people, processes and businesses participate in the Internet of Things in the coming years," Fan says. "Given the cybersecurity axiom that hardware is the foundation for innovation and the root of trust, hardware security is essential to tomorrow's smart society."

ERICKSON NAMED CURATORS' DISTINGUISHED TEACHING PROFESSOR

Kelvin T. Erickson, EE'78, MS EE'79, has been named Curators' Distinguished Teaching Professor.

Erickson is largely responsible for ECE's program in factory automation and control and programmable logic controllers.

He has brought in over $1.3 million in grants with research in manufacturing automation, programmable logic controllers, plantwide process control, model-based predictive control and system identification.

Erickson served as a graduate research assistant in the Cloud Physics Research Center, then returned to S&T after earning his Ph.D. from Iowa State University.

Erickson has received 16 Outstanding Teaching Awards, three Faculty Excellence Awards, the Dean of Engineering Teaching Excellence Award, the IEEE Region 5 Outstanding Engineering Educator Award and an S&T Faculty Teaching Award. He developed a minor in automation engineering as well as six new courses and several software programs for student use. He has authored five textbooks on factory automation and controls, and numerous chapters, journal articles and conference presentations.

SAVING FUTURE FIREFIGHTERS

As a part of their senior design project, four ECE students devised a temperature-reading device that uses a sensory system to give firefighters live temperature data from individual rooms in a burning building — at a safe distance from the flames.

Joshua Gruver, EE'18; **Brennan Kennedy**, EE'18; **Akshay Patel**, CpE'18; and **Brad Risenhoover**, CpE'18, worked with the City of Rolla Fire and Rescue throughout the spring 2018 semester.

The small sensors, each powered by a 9-volt battery, transmit live temperature data through a Bluetooth wireless device using a student-designed software program called the First Response Emergency Alert System (FREAS). Firefighters can view the data on a hand-held tablet.

"This project aimed to eliminate or greatly reduce the amount of time it takes first responders to locate a fire once inside a building by displaying all corresponding information on a panel located near the building entrances," says Kennedy.

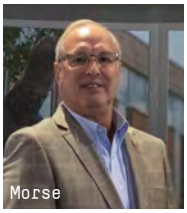
FREAS uses a Raspberry Pi as a central controller that communicates with each sensing module. The sensors use a thermal camera — measuring only heat signals and not actually "seeing" into a room — to measure ambient temperature data within its field-of-view. The sensors are held to the wall by a 3-D-printed casing the students designed and produced.

"The project is user-friendly and wouldn't cost too much to install in buildings," says **Kurt Kosbar**, associate professor of electrical and computer engineering and the team's advisor. "The sensors wouldn't need to be run through a wall or anything, which would cut costs. And the students tried to design an intuitive user-interface – they didn't want firefighters to be slowed down by a lot of options or complex user training."

During a live burn test at the Rolla Lions Club Fire Training Facility, FREAS successfully provided data to Rolla firefighters and helped them locate the fire's heat signatures.

ECE ALUMNI HONORED AT HOMECOMING


Leitterman


Morse

Two ECE alumni were honored during the Miner Alumni Association's Legend's Luncheon during Homecoming ceremonies in October.

Dennis Leitterman, EE'76, MS EE'77, of Sunnyvale, Calif., retired channel development manager at Hewlett-Packard Co., received the Frank H. Mackaman Alumni Volunteer Service Award. The award recognizes a graduate for his or her volunteer service to the Miner Alumni Association, the community and alumni sections.

Dale Morse, EE'79, of Milford, Mich., retired engineering group leader at General Motors, received the Robert V. Wolf Alumni Service Award. The award is presented in recognition of dedicated service by alumni to the university and the alumni association.

MEET ME IN AFGHANISTAN

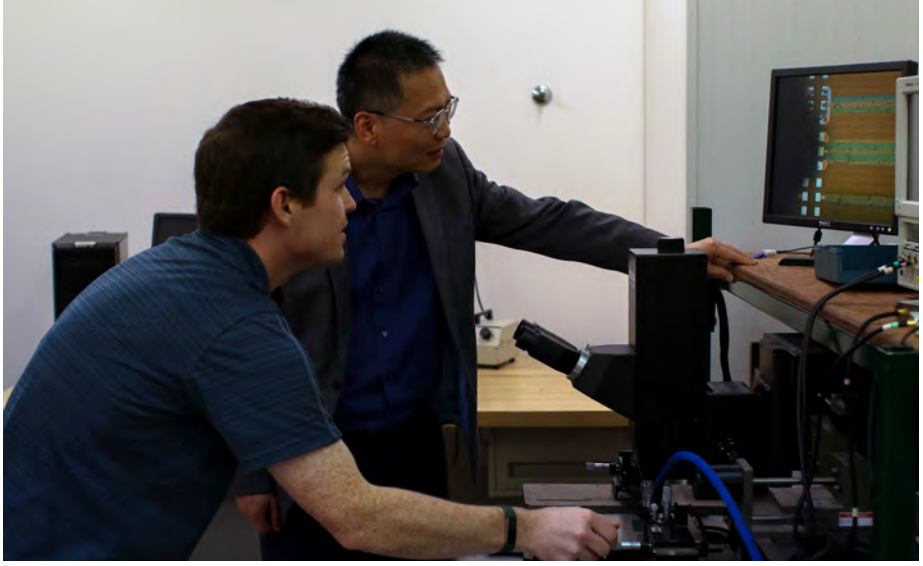
Brothers **Kevin Schaefer**, EE'96, and **Jeff Schaefer**, EE'98, met in Kabul, Afghanistan, in 2017 for the first time in five years. Both worked on separate ongoing projects to improve infrastructure and advance the country's sustainability. Kevin is a contracted electrical engineer for the International Security Assistance Force (ISAF), the NATO-led mission in Afghanistan from 2001 to 2015. Jeff, a Reserve Navy Officer on his second deployment to Afghanistan, is an electrical program manager.

GHASR AWARDED TECHNOLOGY ACCELERATION GRANT

Mohammad Tayeb Ghasr, associate research professor, was one of three S&T faculty awarded Technology Acceleration Grant funding through the office of technology transfer and economic development at S&T.

Ghasr received $25,000 to design and develop a prototype for a hand-held 1-D microwave imaging system for the inspection of nonmetallic pipes.

MOHAMMAD TAYEB GHASR
Associate research professor of electrical and computer engineering



RESEARCH IS THE REASON

The impetus for **Nick Erickson**'s first research project was an undergraduate advising meeting.

After expressing interest in research, his advisor directed him to an opportunity in S&T's Center for Electromagnetic Compatibility with **Jun Fan**, the center's director.

"Dr. Fan set me up with a project involving microprobing and network analyzer measurements on integrated circuits," says Erickson, CpE'12, MS CpE'13, a Ph.D. student in computer engineering and a recipient of the IEEE James C. Klouda Memorial Scholarship Award. "This is the project that got me hooked on research, because I was able to work with a lot of equipment that wasn't necessarily available to undergraduate students."

Now a graduate student, Erickson spends his days researching two topics: material characterization for ferrite sheets, which are used in wireless charging methods for phones, smart watches and even toothbrushes; and investigating the susceptibility of semiconductor components to electromagnetic interference using particle simulations.

These components can act unexpectedly when subject to electrical stress, like static discharge, so Erickson is working to design devices that can better withstand such strains.

"Pursuing a master's degree gave me the opportunity to expand my knowledge and also gave me more time to gain practical experience," Erickson says. "I stayed at S&T because I enjoyed the undergraduate research that I had started and, by that time, Rolla was pretty much home for me."

Once he graduates in 2019, Erickson plans to begin work for the Air Force Research Laboratory in Albuquerque, where he will continue his research into the susceptibility of semiconductor devices.

STUDENT NEWS

- The HKN student group won an Outstanding Chapter Award for the 16th consecutive year.
- The IEEE Student Branch won the St. Louis Section Outstanding Student Branch award.
- **Yansheng Wang** and **Abhishek Patnaik** were selected as two of the College of Engineering and Computing's eight Dean's Ph.D. Scholars in recognition of their scholarly productivity and teaching excellence.
- **Li Guan** received an Honorable Mention for the IEEE-HKN Outstanding Student Award.
- **Chen Zhu** won a $15,000 fellowship from the IEEE Instrumentation and Measurement Society.
- **Shubhankar Marathe** won the IEEE Electromagnetic Compatibility Society President's Memorial Award.
- **Kyle Anders**, **Sophia Calandro**, **Aimee Dietiker** and **Kevin McPherson** became IEEE Power Engineering Society Scholars.
- **Katie Brinker**, EE'17, CpE'17, was elected to the Board of Governors for IEEE-HKN and will help set the direction of HKN across the world.

A GREAT YEAR FOR RESEARCH

ECE faculty participated in over 130 externally sponsored research projects in 2018. A few projects of note, in addition to those mentioned on other pages, are:

Rui Bo and **Jonathan Kimball**, who are working with **Bruce McMillin**, interim chair and professor of computer science, on a $963,000 project from the National Science Foundation to improve the security of cyber physical systems

Donald Wunsch, who began a project with DARPA to find ways to make neural networks less dependent on human designers and more capable of learning on the fly from "real-world" data in much the same way humans do.

Rui Bo, who won the DARPA Young Faculty Award to develop methods that help regulation bodies in the power markets identify and prevent companies from gaming electricity markets for unfair financial gain.

WATKINS NAMED SPIE FELLOW

ECE professor **Steve E. Watkins**, EE'83, MS EE'85, is one of 73 new fellows of SPIE, the International Society for Optics and Photonics. He was recognized for his achievements in sensor research at the SPIE Smart Structures and Nondestructive Evaluation Conference held in March 2018 in Denver.

His S&T activities include curriculum development, public policy, pre-college outreach and pedagogical scholarship. He has participated in SPIE as a member of the membership committee and as an author and reviewer. He also serves as elected vice president for educational activities and awards for the IEEE Education Society.

STEVE E. WATKINS
Professor of electrical and computer engineering

Sensor-embedded 'SMART' HELMETS could detect TBIs

Traumatic brain injuries (TBIs) are unfortunate — but all too common — occurrences during military training and deployment.

Because mild TBIs often present no obvious signs of head trauma or facial lacerations, they are the most difficult type to diagnose at the time of the injury, and patients themselves may perceive the impact as mild or harmless. TBIs are cumulative, so treating a patient within the "golden hour" — the first 60 minutes after being injured — is crucial for improved long-term recovery.

Jie Huang, assistant professor of electrical and computer engineering, has found a solution.

Huang received a $2.3 million grant from the U.S. Army Research Laboratory through the Leonard Wood Institute to develop the technology to create a "smart helmet" that can recognize TBIs by autonomous collection and processing of data related to trauma-inducing actions in a reliable and "smart" manner for prompt identification.

By embedding military helmets with sensors and other data-transmission technologies, Huang aims to help accurately and immediately diagnose and administer aid to mild TBI victims.

"Our aim is to develop a fundamental understanding of acute TBIs through large-scale data acquisition of blast lab impact events in the newly established Missouri S&T Blast Lab," says Huang. "A wide range of impact events will be collected from pressure-sensor-equipped helmets and then processed through machine learning.

"Military-related TBIs come primarily from repeated exposure to explosive blasts during planned training activities," Huang explains. "Blast TBIs account for approximately 60 percent of all military-related TBIs, of which 80 percent are categorized as mild."

Huang's research places an emphasis on understanding the fundamental origins of acute and mild forms of TBIs. He does this by relaying data wirelessly in real time via the "smart helmets" and integrating machine learning based on a decision-making framework that can detect the severity of an impact level.

Huang and his research team are developing a football smart-helmet prototype, which will be equipped with fiber optic micro interferometer sensors. The sensors will be activated by blunt-force impacts that range from 3-15 on the Glasgow Coma Scale. Once the prototype is developed, Huang will correlate laboratory testing data with field data and improve the overall configuration of the helmets.

"Our research project will use advanced human-hair-like optical fiber sensors, embedded in smart helmets, to instantly warn soldiers of the severity of a concussive event in the field so that treatment can be sought immediately," says Huang. "Such a framework, with the ability to yield highly accurate predictions, will mitigate a soldier's suffering and save medical personnel's time."

WELCOME TO THE ACADEMY

This past April, the Academy of Electrical and Computer Engineering inducted six new members during an induction ceremony held at the Comfort Suites Conference Center.

Founded in 1980, the academy is composed of alumni and other electrical and computer engineers who have made outstanding contributions to their profession. It serves as an advisory group to our department. Help us welcome our new members:

Harry J. Auman, EE'70, of Chesterfield, Mo., director of electrical engineering for Casco Corp. He is a member of the St. Louis Electrical Board of Trade and a past member of IES, AIAS and IEE.

Arthur E. Curle, EE'75, of Belleville, Ill., former manager and director of distribution operating for Ameren Illinois. Curle received the Ameren President's Pinnacle Award in 2012. He is a member of IEEE.

Matt Doell, EE'85, of Eureka, Mo., preconstruction director at Alberici Constructors. He authored a textbook titled *Voice-Data-Video Applications and Installations* in 2017.

Timothy R. Hagan, EE'83, of Las Vegas, lead measurements engineer for JT3 LLC. Hagan is treasurer of the Libertarian National Committee and treasurer of the Libertarian Party of Nevada and served as regional alternate for the Libertarian National Committee from 2000-06.

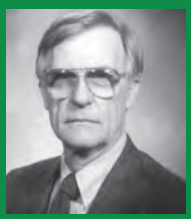
Ronald G. Kochanowicz, EE'94, of Smithville, Mo., owner and engineer for Bridge Embedded Systems Inc. and BridgeCom Systems Inc.

Clay Melugin, EE'84, of San Diego, CEO and co-founder of Water Pigeon. He held engineering and leadership positions at Motorola, Emerson Electronics, Sony Wireless and Intel, among others, before founding Water Pigeon.

IN MEMORIAM

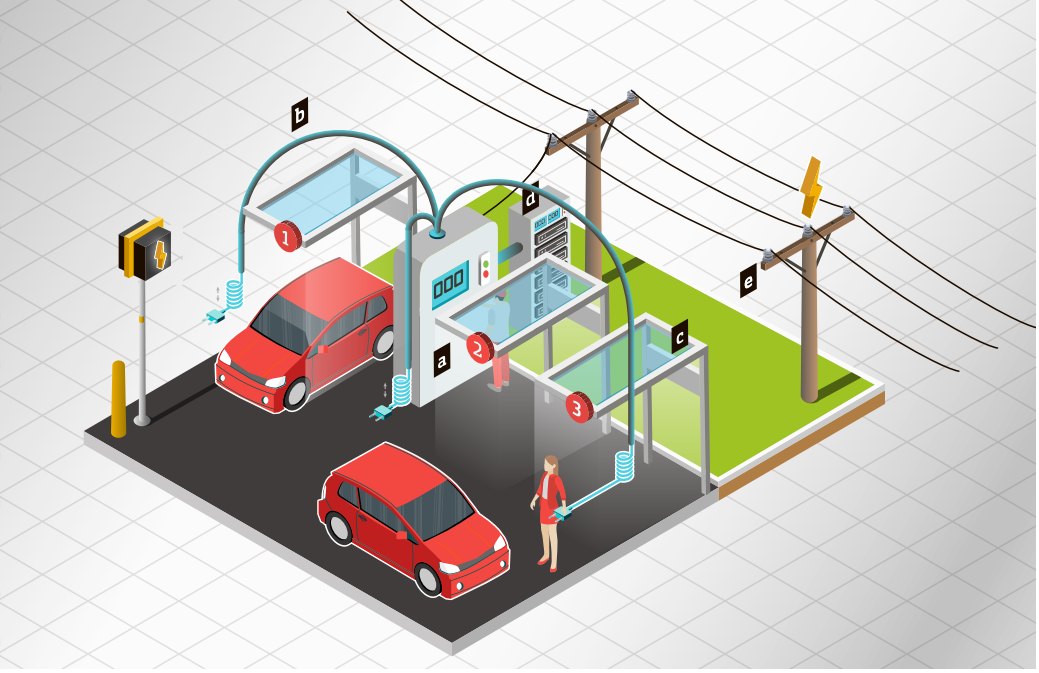
Frank J. Kern

Frank J. Kern, professor emeritus of electrical engineering at S&T, died July 26, 2018. He was 87. Kern served on the S&T faculty from 1966 to 1996. Prior to joining S&T, Kern served in the U.S. Air Force, and worked at the Oklahoma Gas and Electric Co. and the University of Oklahoma. He earned bachelor of science, master of science degrees and a Ph.D., all in electrical engineering from the University of Oklahoma, in 1958, 1963 and 1966, respectively. Kern was a member of Sigma Xi, Tau Beta Pi, Eta Kappa Nu, Pi Mu Epsilon and IEEE. His research interests included perturbation bounds study and computer-aided design techniques for control systems.



Earl Richards Jr.

Earl Richards Jr., MS EE'61, PhD EE'71, professor emeritus of electrical engineering at S&T, died Dec. 27, 2018. He was 95. Richards served overseas with the U.S. Army's Office of Strategic Service during World War II. He joined the S&T faculty in 1958 and retired in 2008. Richards served as faculty advisor to Theta Xi fraternity and was inducted into the Small Motor Manufacturers Hall of Fame in 1995. Richards taught rotating machinery classes to undergraduate and graduate students for five decades. He was a frequent lecturer at technical conferences and served as a consultant to the private sector and government agencies.



QUICK CHARGE: ELECTRIC VEHICLE CHARGING STATIONS THAT DO THE TRICK IN JUST 10 MINUTES

Most electric car chargers on the market today require hours to fully charge a vehicle. But what if you could charge your car in the same amount of time it takes to fill up a conventional car with gasoline?

"The big problem with electric vehicles is range, and it's not so much range as range anxiety. People are nervous about not being able to get where they're going," says ECE professor **Jonathan Kimball**. "With a conventional vehicle, you pull up, get gas, and in 10 minutes you're back on the road."

Kimball is leading a team that received a $2.9 million grant from the U.S. Department of Energy (DOE) to develop an extreme fast-charging system for electric cars over the next three years. S&T is partnering with Ameren, LG Chem Michigan and Bitrode on the project.

The group's first challenge is whether or not the batteries can withstand such speedy charges. Overcharging a lithium battery could cause overheating and fire. Even if that scenario is avoided, the battery could still be damaged and wear out faster.

Jonghyun Park, an S&T assistant professor of mechanical engineering, joined the team to help minimize the degradation to the lithium ion batteries. To address the challenge, the team will develop a model-based protocol to monitor the battery's charge and health.

Quickly pulling large amounts of electricity from the power grid is another challenge. Kimball estimates that charging a lithium ion car battery in 10 minutes will take about 300 to 400 kilowatts, and adding several cars charging simultaneously could add up to more than one megawatt in needed power. In the Midwest, that amount of energy can power hundreds of homes for an hour.

ECE assistant professor **Rui Bo** says the sudden high current needed for fast charging would affect power quality from the utility provider.

But Bo and Kimball hope to bypass that instant pull on the electric grid by first connecting to a charged battery and then ramping up to connecting directly to the 12-kilovolt distribution network.

In partnership with Ameren, Bo will analyze the power grid and use software simulations to model the stations' behavior and their interaction with the power grid.

The final challenge will be to connect directly to the medium-voltage distribution network and feed energy to the cars. Kimball says a medium-voltage connection can significantly reduce size and cost while increasing efficiency.

He believes the project will be successful because of the strength of the team.

"We have strong people on every aspect on this project, from power conversion to grid analysis — both faculty and the partners with the three companies," says Kimball.

The S&T team also includes ECE professor **Mehdi Ferdowsi**, ECE assistant professor **Pourya Shamsi** and **Robert Landers**, Curators' Distinguished Professor of mechanical and aerospace engineering.

SARANGAPANI NAMED TO NATIONAL ACADEMY OF INVENTORS

Jagannathan Sarangapani, Rutledge-Emerson Distinguished Professor of Electrical and Computer Engineering at S&T, has been named a Fellow of the National Academy of Inventors.

The award signifies the highest professional distinction accorded solely to academic inventors who have demonstrated a prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development and the welfare of society.

Sarangapani, who recently received the IEEE Control Systems Society Transition to Practice Award, holds 20 U.S. patents. Colleagues have cited his work more than 10,300 times, according to Google Scholar.

His research on intelligent control systems can be applied to aircraft control, engine control, autonomous systems and robotics, manufacturing systems, automotive and chemical process control, and more. Small businesses and large corporations such as Boeing and Caterpillar have benefitted from these technologies, and Sarangapani has nurtured the next generation of students to pursue their inventions.

AMEREN, HYPERION PARTNER WITH S&T TO IMPROVE ENERGY TECHNOLOGY

Ameren Corp. and Hyperion Inc. are working with ECE researchers to use fiber optics to monitor high-voltage power lines and equipment. The research could lead to decreased down times for consumers and cost savings for utilities.

The relationship started when Hyperion was selected to take part in the 2017 Ameren Accelerator program, which assesses, mentors and invests in energy-technology startup companies.

S&T faculty members serving as subject matter experts proposed the partnership for a new energy infrastructure technology.

At S&T, assistant professors **Jie Huang** and **Rui Bo** are studying how advanced sensor technology like fiber optics could improve the monitoring of high-voltage power lines, particularly when combined with Hyperion's technology expertise.

Hyperion's fiber optic products monitor components in a substation or related power infrastructure like underground cables to monitor the health and performance of power grids. S&T researchers are using fiber optics to monitor temperature and sagging in electric power lines to better assess the performance of these high-voltage lines.

Fiber optics may be a superior way to monitor electrical systems for a number of reasons, say the S&T researchers. Large transformers produce electromagnetic waves, and the pure silica glass in fiber optics makes them immune to electromagnetic interference, and their size and shape allow for more sensitive temperature measurements, says Huang.

"The fiber optic cable, which is as thin as a human hair, wraps around the winding metal of the transformer. In one millisecond, you can get thousands of temperature readings and the temperature distribution," he says.

Better temperature readings mean a better understanding of performance, as well as real-time operation analysis.

Huang and Bo have a patent pending for the system, and Hyperion has signed an option agreement to license the intellectual property.

GRAINGER HONORS RECENT GRADS

Eleven recent electrical engineering graduates received $6,000 Grainger Power Engineering Awards as a reward for academic excellence.

The awards are funded by a $1.3 million endowment from The Grainger Foundation of Chicago, which recognizes S&T for its ability to attract top students and educate quality engineers. S&T is one of only six universities in the nation chosen to receive such funding.

Each spring, the Grainger Power Engineering Award is presented to up to 12 graduate and undergraduate students who plan to pursue careers in power engineering. Selection of recipients is based on academic performance, exhibited interest in power engineering and extra-curricular activities.

Congratulations to:

- **Lucas Ambrecht**, EE'18
- **Wesley Blanton**, EE'17
- **Victoria Choflet**, EE'18
- **Maxwell Eastman**, EE'18
- **Trenton Ellis**, EE'18
- **Ashley Fox**, EE'17
- **Lafayette Gatewood**, EE'17
- **Nicholas Glover**, EE'18
- **Kathleen Reagan**, EE'17
- **Olivia Sanders**, EE'18
- **Ryan Vasquez**, EE'18
- **Brandon Windish**, EE'17, AE'17

FACULTY NEWS

- **Rohit Dua**, associate teaching professor, received the Faculty Achievement Award.
- **Jun Fan**, Cynthia Tang Missouri Distinguished Professor of Computer Engineering, and **Jonathan Kimball**, professor, received the Faculty Research Award.
- **Kristen Donnell**, assistant professor, received the Faculty Service Award.
- **Joe Stanley**, professor, received the Faculty Teaching Award.
- **Amardeep Kaur**, assistant teaching professor, received the Faculty Achievement Award and the IEEE St. Louis Branch Outstanding Educator Award.
- **Sahra Sedigh**, associate professor, received the Faculty Service Award.
- **Chulsoon Hwang**, assistant professor, received the IEEE Electromagnetic Compatibility Society Young Scientist Award.
- **Donald Wunsch**, received the Ada Lovelace Service Award from the International Neural Network Society.

WELCOME NEW FACULTY

Bob Woodley, EE'90, MS EE'97, PhD EE'04, an assistant teaching professor, returned to S&T after co-founding Triplet Tech Corp., which offers new technology and software solutions. He taught computer engineering and electrical engineering at S&T as an adjunct professor and previously served as principal scientist and director of scientific research for 21st Century Systems Inc. Woodley will focus on advising undergraduates, recruiting new students and on senior design.

Jiangfan Zhang, an assistant professor who came to S&T from Columbia University in New York City. He earned a Ph.D. in electrical engineering from Lehigh University in Bethlehem, Pa. He studies cyber-physical systems, the Internet of Things and sensor network systems with focus on cybersecurity and cyberattacks. Zhang's research interests also include signal processing for sensor networking, smart grid, energy-efficient distributed signal processing, target localization and sonar processing.

ECE SWIMMER SAVES A LIFE

Kevin McPherson, a senior in electrical engineering from Oakdale, Minn., and a member of the Miner swimming team, received an award from the S&T Police Department and City of Rolla Fire and Rescue this past November for his life-saving efforts while working as a lifeguard on campus.

On Oct. 30, McPherson pulled a student from the pool at the Gale Bullman Building and performed CPR until she regained consciousness. S&T Police Chief **Doug Roberts** says McPherson saved the woman's life, and he wanted to recognize McPherson's good deed.

Unknown to McPherson, the woman he pulled from the pool was another ECE student.

"We are proud of Kevin for responding quickly and resuscitating the drowning victim," Roberts says. "I know her husband and her family are grateful, too, that he was there and able to help."

Following Roberts' presentation, Rolla Fire Chief Ron Smith presented McPherson with a Rolla Fire and Rescue "challenge coin" in recognition of the rescue.

McPherson helps coach local swimmers through the Rolla Fins Swim Club. In the 2017-18 school year, McPherson earned All-American honors as part of the Miners' 400- and 800-yard freestyle relay teams, both of which finished among the top eight at the NCAA II Championships.

BEST PAPER HONORS

ECE faculty and students won an impressive eight best paper awards from international conferences or journals last year.

Perhaps the most impressive example of the past several years is from the Electromagnetic Compatibility Group, which was awarded both the Best Paper and the Honorable Mention for Best Paper awards from the IEEE Transactions on Electromagnetic Compatibility among articles published in the journal in 2017.

Jun Fan, director of the Center for Electromagnetic Compatibility and Cynthia Tang Missouri Distinguished Professor of Computer Engineering, and student **Yansheng Wang**, won the Best Transaction Paper for "Coupling Analysis for Wires in a Cable Tray Using Circuit Extraction Based on Mixed-Potential Integral Equation Formulation," published in June 2017.

ECE faculty and alumni **Ketan Shringarpure**, MS EE'10, PhD EE'15, **Siming Pan**, MS EE'10, PhD EE'15, **Jingook Kim**, **Fan**, **Bruce Archambeaul**t and **Jim Drewniak** received the Honorable Mention for "Sensitivity Analysis of a Circuit Model for Power Distribution Network in a Multilayered Printed Circuit Board, published in December 2017.

"The best transactions paper award is extraordinarily competitive and prestigious," says ECE chair and professor **Daryl Beetner**. "In all my years at S&T, I believe we have only won two best transaction paper awards. Winning both the Best Paper and the Honorable Mention is unheard of."

MISSOURI S&T

Electrical and Computer Engineering
301 W. 16th Street
Rolla, MO 65409

Make a scholarship gift and the Miner Match will double it

Have you heard about the Miner Match? It's a limited-time opportunity with a lifetime impact. Between now and June 30, 2019, every scholarship gift to electrical and computer engineering will be matched dollar for dollar by the University of Missouri System and Missouri S&T. With a total of $34 million in matching funds available, your scholarship gift will automatically double in size and impact — and that means making a bigger difference in the lives of students.

The Miner Match. It's Miner pride to the power of two.

For more information, contact **Jason Northern** at **northernj@mst.edu** or **573-341-4508**. Or make a scholarship gift online at **give.mst.edu**.