Greetings from the ECE department at K-State! In the midst of these interesting times, I am excited to present the 2020 edition of Uplink, our annual print newsletter from the Mike Wiegers Department of Electrical and Computer Engineering. The naming of our department after alum Mike Wiegers was certainly a highlight of the year, culminating with an unveiling during our advisory council meeting on Oct. 25. The department is very grateful for the generosity of Mike and Lynn Wiegers in making this a reality. Even with all of the challenges we are currently facing, it was another great year of accomplishments for our faculty, students and staff. I hope you enjoy a representation of these in this newsletter.

As with most educational institutions across the country, K-State switched to 100% remote learning in the middle of the spring semester. It was an abrupt change for everyone, but we did our best and excellent student learning still took place. Even though we did not have our on-campus spring commencement ceremony, we still managed a virtual celebration for our graduates that you can view from our Facebook account at facebook.com/KSUECE. There are many unknowns moving into the 2020-21 academic year, but K-State is committed to having a significant level of face-to-face learning. Almost all of our classes will become blended with both in-person and online experiences, while we are doing everything possible to ensure our on-campus teaching labs continue.

Two of our great faculty have retired to emeritus status. John Devore served as a faculty member since 1984 and was a foundation for our computer engineering program. William (Bill) Kuhn has been at K-State since 1996 and was our fundamental faculty member in communication circuits and electronics. Both will certainly be missed.

On the student side, one of the many exciting successes was having seniors Macey Elkinton and Sam Fruth win the college’s Saint Patricia and Saint Patrick awards. They are just two of our many student leaders who have been providing outstanding service to our department, college and university. We are also excited to have our third class of biomedical engineering students arrive this fall semester. The department is currently preparing plans to add an undergraduate teaching laboratory for the BME program that we anticipate will be under construction in 2021.

Research highlights in this issue include a solar power project sponsored by the Department of Energy and led by Bala Natarajan and his ECE colleagues. Another project is the Ebola transmission model work by Caterina Scoglio. She and her team have also been active in modeling the initial spread of COVID-19. In a joint teaching-research activity, Jungkwun Kim developed a workshop in early January for students and faculty from universities in South Korea to learn some of the newer technologies here at K-State.

We would love to hear of alumni accomplishments, so please let us know your recent news by sending a quick note to alumninews@ece.ksu.edu. As always, feel free to stop by the department the next time you are in Manhattan.

Go ’Cats!

Don M. Gruenbacher
Department Head
George J. and Alice D. Fiedler Distinguished Chair in Electrical and Computer Engineering

FROM THE DEPARTMENT HEAD

ELECTRICAL AND COMPUTER ENGINEERING SUMMER 2020 CARL R. ICE COLLEGE OF ENGINEERING

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Citing the long history of naming campus buildings after individuals and the newer trend of commercial facility naming, Mike Wiegers, EE ’82, found it “logical and inevitable” that universities would begin naming other components such as departments, centers and colleges.

“When my wife, Lynn, and I witnessed the incredible gifts of Dr. Min Kao, Carl and Mary Ice, and others, we were inspired by their generosity,” Wiegers said. “So when given the opportunity to support the ECE department with a naming investment, we wanted to participate.”

Thus came about the fourth named department in the Carl R. Ice College of Engineering — the Mike Wiegers Department of Electrical and Computer Engineering, whose official signage reveal was celebrated Oct. 25 in Engineering Hall.

“Industry and alumni contributions become more important to mitigate tuition and fee increases as state funding for higher education decreases,” Wiegers said. “This naming gift will help provide for what we think matters: a great engineering education that will benefit the citizens of Kansas via high-tech jobs.”

Wiegers is vice president, consumer engineering, at Garmin International Inc. in Olathe, where he directs day-to-day operations of its worldwide consumer engineering group. Joining the company in 1993 as lead engineer in marine product design, during his tenure he has served in a variety of technical and business leadership capacities in all Garmin consumer product segments.

“I remember my classes and particularly the ECE labs, which gave me hands-on experience that proved invaluable in the workplace,” he said. “We hope our naming gift provides productive services and experiences for today’s students as well.”

The couple established the Wiegers Family Scholarship nearly a decade ago because of their desire to help K-State students, but their interest in philanthropy is something that has developed over time.

“Thoughts of providing scholarships, let alone naming the ECE department, were not in my imagination while attending K-State. Like many, I had dreams more focused on personal success than philanthropy,” Wiegers said.

“But gifts like ours have benefited students, faculty and staff since KSU was founded in 1863,” he said, “and we are very excited to be one of the names behind the story.”

“Each named campus building or program represents a chronicle of success, generosity and a belief in the next generation,” he said. “We are humbled to be part of that legacy.”

by Mary Rankin

Keegan Odle, ECE ’03, Leawood, has been named one of Fortnightly Magazine’s “Fortnightly Under Forty” for 2020. He is a director of substation projects for Burns & McDonnell.

The magazine is published by Public Utilities Fortnightly, a forum for stakeholders in utility regulation and policy. Membership includes those in public utility commissions; investor-owned utilities; and public power, co-ops and other industry groups who debate the best course for the public interest of their clients.

Each year the membership nominates “rising stars” from its utility, commission or company who, while not yet 40 years of age, are deserving of being celebrated with the recognition of the “Fortnightly Under Forty.”

This year’s 64 awardees, the next generation of up-and-comers in the utilities industry, hail from 27 different industry organizations.

ECE ALUM HONORED AS UP AND COMER IN THE UTILITIES INDUSTRY

CLOCKWISE FROM LEFT, MIKE WIEGERS WITH DEPARTMENT HEAD, DON GRUENBACHER; THE WIEGERS FAMILY AND FRIENDS ATTEND THE NAMING CEREMONY; MIKE WIEGERS RELATES STORIES OF HIS K-State EDUCATION AND LIFE AS AN ENGINEER, HINT AND LYNN WIEGERS AT THE NAMED DEPARTMENT DISPLAY.
The research team includes co-investigators Hongyu Wu and Mohammad Shadmand, both assistant professors; Behrooz Mirafzal, associate professor, and Anil Pahwa, university distinguished professor, all from electrical and computer engineering at Kansas State University. Collaborating industries and organizations include Oracle America Inc., the National Renewable Energy Laboratory, Typhoon HIL Inc., Midwest Energy and Enphase Energy Inc.


by Mary Rankin

### RESEARCH TEAM AWARDED $2.8M DOE GRANT

Kansas State University announced it has received a three-year, $2.8 million research award from the U.S. Department of Energy Solar Energy Technologies Office to advance solar energy’s role in strengthening the resilience of the U.S. electricity grid. This project, led by Bala Natarajan, the Clair N. Palmer and Sara M. Palmer professor in the Mike Wiggers Department of Electrical and Computer Engineering, will enhance utility operators’ awareness of and resilience to cyberattacks.

The existing U.S. power grid was designed to deliver power to customers from a central generation. As more solar and other distributed energy resources are added to the grid, utility operators must develop new tools that will allow them to integrate diverse energy resources, detect and mitigate disturbances and provide strong protection against physical and cyber risks. However the need for data sharing and resilience, especially at critical infrastructure sites. Kansas State University strives to be an international leader in power and energy systems, and cybersecurity. This project is among the largest to date in the electrical and computer engineering department at the university and is the first project from the solar office to be awarded to a university in Kansas.

The project is one of 10 selected nationwide in the Advanced Systems Integration for Solar Technologies program to develop grid management tools and models that show how solar situational awareness will enhance power system resilience, especially at critical infrastructure sites.

KSU’s Electrical and Computer Engineering project, led by Bala Natarajan, Mike Wiegers Department of Electrical and Computer Engineering, will enhance utility operators’ awareness of and resilience to cyberattacks. The existing U.S. power grid was designed to deliver power to customers from a central generation. As more solar and other distributed energy resources are added to the grid, utility operators must develop new tools that will allow them to integrate diverse energy resources, detect and mitigate disturbances and provide strong protection against physical and cyber risks. However the need for data sharing and resilience, especially at critical infrastructure sites.

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K-State Electrical and Computer Engineering

### INAGURAL WINTER CAMP FOR RESEARCH EXPERIENCE

K-State Electrical and Computer Engineering

Winter Camp for Research Experience, hosted by the Mike Wiggers Department of Electrical and Computer Engineering, was successfully held during the 2020 winter break for a group of South Korean students, faculty and staff. It provided topics on recent advances in wearable sensors and devices in a lecture format covering theory and applications to the practicum of device and circuit fabrication.

The program was initiated by ECE faculty member, Jungkwun "JK" Kim, who submitted an educational proposal that was selected by sponsors from the Korea Institute for Advanced Technology and the Korea Display Industry Association. The sponsors chose nine Korean students reviewing their competitive applications from four research groups in four different universities: two each from Kwangwoon, Soongsil and Chung-Ang universities, and three from Hanyang University. All nine were in a master’s degree program in their respective universities studying the promotion of research topics in wearable sensors and devices.

The six-day camp was scheduled for Jan. 5-10, 2020. Five faculty members in the ECE department and one in the department of interior design and fashion studies volunteered to provide various lectures and practicums in the wearable sensor and device category. Steve Warren and Charles Carlson, both ECE, introduced wearable sensors and signal processing techniques through lectures and practicums. Dwight Day, ECE, shared his previous NASA project experiences regarding flexible electronics and energy harvesting. Yingying Wu, from the department of interior design and fashion studies, provided a unique lecture on wearable technologies in functional clothing design. Don Gruenbacher, ECE, lectured on the topic of software-defined networks in the development of architectures and protocols for secure and robust communications. Students also had the opportunity to experience the microfabrication for a wearable micro-needle array offered by Kim. ECE department staff organized and helped with the South Korean guests’ flight schedule; accommodation, and budget arrangements. Two ECE graduate students, Jun Ying Tan and Sabera Fahmidha Shiba, also assisted with the practicums and outside activities.

The winter camp program included outside activities such as visiting the Hall of Space Museum and St. Mary’s salt cave in Hutchinson led by Day and Kim. A curator was assigned to the students and explained the different types of spaceships including the story of Apollo 13, working principles and functions of spacecrafts, and other attention-grabbing equipment such as the lunar module and lunar roving vehicle. The students also learned about the successes and failures in the history of the U.S. aerospace industry. At the Startaca salt mine students walked through the area where the raw portion of salt rocks had first been deposited.

Another activity was visiting Garmin, led by Gruenbacher, Warren, Carlson and Kim. A design engineering manager at Garmin, Daniel Croft, hosted the visit and arranged a tour of engineering lab areas. Students were able to see the modern state-of-art facilities at Garmin, including a general engineering lab, vibration tables, reliability lab and RF testing labs. Warren invited the Korean visitors and K-State hosts to his house for dinner giving all a chance to see his farm and horses and enjoy a back-yard-viewed sunset. The student group noted their enjoyment of this evening in later comments.

The evaluation of the entire Winter Camp for Research Experience resulted in excellent feedback. One student described the experience as follows: “The professors at Kansas State University took care of us closely and very kindly. Not only were the programs exciting, but the tours and home invitations were unforgettable!”

The Korea Display Industry Association plans to make a similar program a yearly event in the future.
NEW TRANSMISSION MODEL FOR EBOLA PREDICTED UGANDA CASES

by Stephanie Jacques

A new risk assessment model for the transmission of Ebola accurately predicted its spread into the Republic of Uganda, according to developers Caterina Scoglio, professor, and Mahbubul Riad, doctoral student, both in the Mike Wiegers Department of Electrical and Computer Engineering.


The specific scenario used in the simulation was similar to how actual events in Uganda started. According to the Uganda Health Ministry's June 18 release, there were three confirmed cases of Ebola in travelers to Uganda — all from one family that entered the country at the Kasese district border. Again in August, another confirmed case came through the Kasese district from Congo.

According to Scoglio, Ugandan officials were prepared for this and were able to stop further spread into the country.

"The risk assessment maps can be used to allocate and distribute limited resources," Scoglio said. "Uganda has about 4,000 doses of the new Ebola vaccine. They are vaccinating health workers, communicating about how to prevent spreading diseases and advising people to limit travel in high-risk areas. We have much respect and admiration for how Uganda has organized the preparedness and now the response."

The researchers used a simulation of Ebola in Uganda to test their model because the heavy traffic coming into the country at the Kasese district border. Again in August, another confirmed case came through the Kasese district from Congo. According to Scoglio, Ugandan officials were prepared for this and were able to stop further spread into the country.

"This is a very new type of model," Scoglio said. "Since we consider movement data in addition to constant contacts, we saw that not only are the districts directly bordering Congo at risk but districts on the path to some important Ugandan destinations also are at risk."

In 2018 Scoglio and her collaborators worked with Ugandan officials to collect movement data to model disease progression and find areas most at risk. According to the model, the Kasese district was the highest risk area for an infected person to enter the country. The researchers used the model to create a 150-day simulation of possible disease progression in Uganda and produced a map of 23 Ugandan districts at risk.

"One very important point for the public to understand is the concept of risk and probability with these maps," Scoglio said. "It should not be interpreted that these red regions will be affected because that will cause panic in the population, but rather these are a guide for allocation of limited resources in regions that could be potentially affected if no mitigations are implemented."

This model may open a new era in infectious disease management, Scoglio said. She gives credit to Aram Vajdi, doctoral student in electrical and computer engineering at Kansas State University, for developing the framework for the theoretical model based on a multilayer temporal network and the Gillespie algorithm. Scoglio also praised Riad, who applied the data collected from Uganda and how Ebola was transmitted to create the risk assessment.

According to Scoglio, network models used for highly infectious disease risk assessment must be able to anticipate changes in human-to-human contacts — unlike many other models based mainly on constant contacts and constant movement flows. Using these models can help increase the effectiveness of preventive measures by targeting the most critical regions while decreasing the risk of spreading Ebola and other infectious diseases.

ECE FACULTY AWARDS

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John Devore, professor in the Mike Wiegers Department of Electrical and Computer Engineering, has retired after 50 years of service to Kansas State University. Devore received the B.S. in physics in 1971, M.S. in computer science in 1973 and Ph.D. in engineering in 1984, all from Kansas State University. He was instrumental in the formation of and in developing the curriculum for the department’s second degree program, the B.S. in computer engineering. As that program grew, the department was renamed as the department of electrical and computer engineering.

During his academic career, Devore taught courses in both computer hardware and software, image processing, computer graphics and instrumentation. He was the 2016 recipient of the Robert R. and Lila L. Snell Excellence in Undergraduate Teaching Award. His research included image processing, applied instrumentation and digital design education.

His work at K-State has involved a variety of positions. He began by teaching a computer programming course for the department in the summer semester in 1970 and accepted a full-time programming position at the university computing center that fall. Over the next 12 years he served in a series of capacities there which included systems programmer, head of consulting services and head of programming services. From 1982-84 he taught courses in the department of electrical engineering while finishing his Ph.D. In the fall of 1984 he accepted a tenure-track position in that department at the rank of assistant professor. He was promoted to associate professor in 1991 and professor in 1998.

One of his research projects for KDOT resulted in an automated road-smoothness analysis system that became the standard in many states and the federal highway system. The software was incorporated into the major commercial road-smoothness testing systems produced by several companies and led to government agencies.

Devore's service to the university included chairing a committee making major revisions to traffic and parking regulations, serving for two terms on the board of directors of the K-State Credit Union and serving four terms on the university faculty senate. He is a longtime member of both the IEEE and ASEE professional societies.

He consulted for many companies and government agencies in Kansas and throughout the U.S. This work involved writing software, serving as an independent software verification authority and creating digital electronics designs. Devore's service to the university included chairing a committee making major revisions to traffic and parking regulations, serving for two terms on the board of directors of the K-State Credit Union and serving four terms on the university faculty senate. He is a longtime member of both the IEEE and ASEE professional societies.

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CONGRATULATIONS
2019-2020 GRADUATES

Electrical & Computer Engineering
Kansas State University
Class of 2019-2020
While ECE seniors were unable to experience the usual K-State commencement ceremony this year due to the COVID-19 pandemic, faculty and staff still thought the group deserved to be celebrated.

Don Gruenbacher, ECE department head, reached out to the seniors to see if they would be interested in a virtual experience and received an overwhelmingly positive response. Students Meagan Brucker, Sam Fruth and Macey Elkinton volunteered to be on a graduation committee with other staff and faculty members.

The committee decided on a May 16 Facebook Live event for graduates and their families to watch and participate with comments, even if quarantined and separated by distance. Gruenbacher delivered an introduction and announced the senior award recipients. This was followed by a PowerPoint slide for each graduate that contained his or her senior composite picture and personalized information such as best ECE class, favorite ECE professor, future plans, favorite quarantine activity, most memorable college experience and what you would tell your freshman self. Students could also select their favorite professor to read their slide information. The memories montage below shows some of the photos submitted by students for this display. Watch the virtual ceremony at facebook.com/KSU.ECE.

“We want to wish the ECE graduating class of 2020 the best of luck in their future endeavors,” Gruenbacher said, “and we hope they’ll keep in touch and visit us whenever they get a chance.”

ELECTRICAL ENGINEERING ADVANCEMENT FUND - I23400

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2019-2020 ELETRICAL AND COMPUTER ENGINEERING ADVISORY COUNCIL

Department faculty maintain extensive links to alumni and other industry personnel, keeping program offerings current to provide the best possible match between our graduates and employers’ needs. The ECE advisory council meets periodically to guarantee these goals are met.

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Dan Croft
Greg Deiter
William Dowling
Glen Fountain
Don Gemaehlich
Leslie R.E. Gordon

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