



**Fully Charged**  
and ready to grow  
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ELECTRICAL ENGINEERING  
AND COMPUTER SCIENCE

SETTING AI POLICY • SENSING A BOOST • HIGH-PERFORMANCE COMPUTING



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**On the Cover:** Summit, the fastest supercomputer in the world, resides just down the road at Oak Ridge National Laboratory and is used by several UT researchers.

# From the Department Head



For the Min H. Kao Department of Electrical Engineering and Computer Science, the past year included change and exciting opportunities. Most notably, campus leadership completed successful searches for a number of important positions. UT welcomed Donde Plowman back to campus to serve as chancellor in July, joining Provost David Manderscheid, who came to UT the previous summer.

The Tickle College of Engineering enjoyed the leadership of Mark Dean, the John Fisher Distinguished Professor in EECS, as the interim dean throughout last year. (See page 17 for a discussion of his accomplishments from this time.) We are grateful for all his hard work on behalf of the college and the department.

In July, Janis Terpeny joined TCE as our new dean, coming from Penn State. The college also appointed Paul Frymier as the associate dean for faculty affairs and Ozlem Kilic as the associate dean for academic and student affairs. Kilic is also a professor in electrical engineering, with a focus on antennas, wave propagation, satellite communications, and computational electromagnetics.

The EECS department continues to grow, with undergraduate enrollment growing to 832 students.

Yet again, the departmental research expenditures set a new record, with over \$25 million during fiscal year 2019 (July 2018 – June 2019). Our research expenditures per tenure track faculty member exceed those of our aspirational peers, meaning that our department is among the most productive in the country.

In January, I began serving as the department head for EECS after spending nearly 20 years on the faculty. I will seek to build on our momentum and am particularly excited about our amazing potential for continued growth. I look forward to working with faculty, staff, students, and alumni as we strive to maintain the Volunteer spirit of excellence in education, research, and service.

Sincerely,

**Gregory Peterson**  
Professor and Department Head,  
Min H. Kao Department of Electrical Engineering and  
Computer Science

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# LIVING ON THE EDGE

## Taufer Strengthens UT Expertise in Computing’s Next Frontier

By David Goddard.  
Photography by Shawn Poynter.



Just as a high-performing computer needs the right parts in order to work at its best, a high-performing department requires the right people to excel.

At UT, that right mix of people have helped make the Tickle College of Engineering a leader in the world of high-end computing, according to Dongarra Professor Michela Taufer, a globally respected expert in the field.

In fact, that’s what attracted her to UT in the first place.

“There is a very strong, very broad group of researchers here, covering many aspects of computing,” said Taufer, who works in the Min H. Kao Department of Electrical Engineering and Computer Science. “A lot of places can claim to excel in one area or another, but we have people who are experts in machine learning, in computing speed and power, in computing hardware, in many areas. High performance computing goes well beyond supercomputing, and we are helping lead innovation in this arena.”

Speaking of the edge, Taufer said that the next advancement taking place in computing is through what is called edge computing.

Whereas cloud computing involves information and data being stored in a centralized location, edge computing involves bringing those files and figures closer to where they are being used.

An increasing number of industries are using data and edge computing in a cycle of innovation: companies use their available data and information to help make starting decisions, then use the resulting

data gathered after those first actions to influence future improvements. It’s a cycle of continuous change and improvement.

“Edge computing and integration of data into decisions is the next big thing,” Taufer said. “So much of it is based on simulation, gathering analytics, plugging data into real systems, conducting analytics on those results, and using simulation to further hone in on the next round of changes.”

Edge computing holds particular value in areas where even the slightest improvement in performance could make big differences.

### CHANGING TECHNOLOGY HAS BROAD IMPACT

Take energy, for example. When used in conjunction with wind turbines, edge computing can better predict times of need, the best angle for blades to be pointed, which turbines to activate, and even the best path to route the produced power, all using the cycle of data gathering and use that Taufer described.

“Traditional computing won’t be replaced, but will be added to through things like edge computing or quantum computing,” she said. “Because we have people with expertise in those areas, UT can really be out in front.”

And that leadership impacts humanity in a number of ways.

Through the cyclical data, analysis, and implementation process Taufer and others at UT are stressing, surgeons can figure out the best way to operate on the brain before making the first incision; farmers can get a better idea of what and where to plant; and automotive engineers can design safer, more efficient vehicles, all of which are processes where failure results in a negative outcome for humans.

With so many potential areas affected by groundbreaking computing techniques, scientists like Taufer and her colleagues are in high demand, but she revealed another way UT is unique.

“Our motivation is the impact we can have on society” Taufer said. “We’re here to serve our community for the betterment of all, not for profit. Our payoff is energizing and integrating the next generation of researchers into that spirit of our department.”

She said it is exciting to see students come to UT with new ideas and watch faculty use their own expertise to help their pupils explore, develop, and push the boundaries of computing. Taufer’s department is particularly well positioned because it has faculty with advanced knowledge of several areas of key importance to computing, including applications, libraries, and hardware.

### GAINING POSITIVE ATTENTION

People beyond her department have taken notice, as well. UT and the University of Illinois are the only two universities in the US to be part of the multi-national Joint Laboratory for Extreme Scale Computing (JLESC). In fact, JLESC held its annual workshop at UT this April, bringing experts from national laboratories and universities from around the world to Knoxville.

As a highlight of her role in pushing the boundaries of computing, Taufer is serving as chairperson of SC19, the International Conference for High Performance Computing, Networking, Storage, and Analysis held in Denver, Colorado, this fall.

One of the topics she hopes to address is the need to seek partnerships and cooperation outside traditional areas. Supercomputing has typically been a small, narrowly focused community, but collaboration with other fields is key to the growth of the field.

“It is important to remain curious, to see possibilities and incorporate new ideas,” Taufer said. “UT trains students to think like that, get to what is important, and understand the big picture, and work toward the future.”

For Taufer and her colleagues, that future is limited only by their imagination.

## Get to Know Michaela Taufer, Dongarra Professor

### < HOW DID YOU GET INTERESTED IN HIGH PERFORMANCE COMPUTING AND COMPUTER SCIENCE? />

I had been involved in computer engineering before gaining my doctorate at the Swiss Federal Institute of Technology in Zurich, but it was there that I found myself growing up surrounded in a community of computer experts and was really excited by that. I took an interest in computational chemistry, which led to a position with the Scripps Institute in California after I earned my PhD. There, I really expanded the scope of my work and was able to figure out what I could give back through computing.

### < WHAT LED YOU TO UT? />

There is great opportunity here. The department is very vibrant, very forward-thinking. When the opportunity to come here first arose, Jack Dongarra talked to me about it and had me on a visit. It wasn’t until I was farther along in the application and interview process that Leon Tolbert, the department head at the time, told me it was for an endowed position in Jack’s name. It was such a surprise, such an honor. There was no way I could say no to that.

### < WHAT HAS BEEN THE BEST THING ABOUT BEING HERE? />

How I feel energized to come to work every day. Each day is a new challenge, a new opportunity, and I love that. I love Knoxville, too. I live downtown and walk to work a lot because I enjoy taking in the campus and how unique, almost European-like the downtown area is. I once got a call from the people in charge of the parking garage checking to see if I was OK, because I hadn’t moved my car in so long. Living here is a fantastic experience.

### < WHAT HAS BEEN THE BIGGEST CHANGE IN YOUR FIELD SINCE YOUR TIME AS A STUDENT? />

Computing is everywhere, in every aspect of life now. Everything is smaller, faster, much more accessible. Twenty years ago, the only people with interest in computing were scientists focused in on specific research areas, but now computing is part of every process of life. The growth in computing, and particularly in the ways people access it, has been tremendous.

### < WHAT ADVICE WOULD YOU GIVE BUDDING COMPUTER SCIENTISTS? />

Open your mind to opportunities. There can be a language barrier between disciplines, between how two types of researchers talk about ideas and problems and solutions, but that doesn’t mean both sides don’t have valid ideas. Be curious. Explore possibilities. Push boundaries. Make an impact, create discussions, get results, and build excitement through your work.



► A Day in the Life: **Lynne Parker**



In August, 2018, then-interim Tickle College of Engineering Dean Lynne Parker was asked to join the White House Office of Science and Technology Policy (OSTP) in a key role advising artificial intelligence policy and direction, while maintaining her professorship in the Min H. Kao Department of Electrical Engineering and Computer Science. Here are some highlights of a typical day for her.

As you might guess, no two days are the same. In my role as Assistant Director of Artificial Intelligence (AI), I lead in the development of White House policies that promote our nation’s leadership in AI.

**Sometime before 8 a.m. ►**

After going through the Secret Service security post at the White House complex, I arrive at my office in the Eisenhower Executive Office Building (EEOB), next door to the West Wing. It houses most of the Executive Office of the President (EOP) staff and is an architectural wonder, filled with beautiful curving staircases, colorful stained-glass rotundas, black and white tiled corridors, intricate crown molding, and extensive ornamentation. It’s quite a place to work!



**6-6:30 p.m.**

As a technical expert on AI, I provide insight and feedback to colleagues on technical issues for draft reports, speeches, testimony, Congressional legislation, and negotiated international documents. I review my meeting schedule for the rest of the week and take home with me any documents I might need to read. As with most, this day has ended with a sense of satisfaction that progress has been made on our nation’s AI agenda, keenly aware that this job provides a very special and rare opportunity to make a difference on behalf of the US and towards our goal of making sure that all Americans benefit from AI.



**4 p.m. ►**

Turning to AI policy actions, I have a meeting with EOP colleagues to consider appropriate policy approaches, making sure that reports strike the appropriate balance between fostering AI innovation and ensuring that AI is always used in a way that protects privacy and civil liberties.



**8:30-9:30 a.m.**

I turn now to my work on one of the many AI actions that the administration is pursuing as part of the President’s Executive Order on AI that established the American AI Initiative. Sometime mid-morning, I will have my first meeting with an outside group, this one from industry. Multi-stakeholder engagement is very important in my role, so I regularly meet with representatives from industry, academia, think tanks, and nonprofit organizations.



**10:30 a.m.-1 p.m. ►**

I continue work on AI policy, make calls to partners to discuss new strategic opportunities, and drop by the offices of OSTP colleagues to discuss issues. I’m continually discussing policy issues with my colleagues in the EOP and Federal agencies, helping ensure that we find the best pathway forward in AI policies for the nation. Before grabbing lunch at my desk, I’ll finish up on an upcoming presentation and answer invitations to speaking events.

**1-3 p.m. ►**

I turn to writing and editing documents that communicate our strategies, plans, and accomplishments in important areas of AI. An intern discusses progress on an AI assignment they are working on. Our interns are so helpful in advancing our policy agenda. I begin planning a meeting of the Machine Learning and AI Subcommittee, which I co-chair. It works on deliverables for the American AI Initiative.





# Sensors Get a **BOOST**

McFarlane Updates  
Glucose-Testing Technology

By David Goddard. Photography by Shawn Poynter.

Assistant Professor Nicole McFarlane has been developing technology to aid in eliminating the need for diabetics to administer glucose tests.

Though a necessity, the tests are frequent, often inconvenient, and can be painful, making the ability to bypass them of significant importance to patients.

“We’ve taken a two-pronged approach,” McFarlane said, of her initial breakthrough. “We’ve aimed to build a better sensor that will require a smaller sample size, but also be able to reliably replace the sensors people currently use.”

That work was built on the use of biologically-based analyte sensors, which can be implanted inside a patient to allow for continuous, accurate monitoring when paired with a neuro transmitter, eliminating the tests and the chances that patients would forget to take them.

From the start, McFarlane said her goal was to use changing technology in a quest to develop “smarter” devices, perhaps even ones that could inject the needed doses of insulin and thereby cut out the need for injections.

Some of those steps are already taking shape.

“We have been improving the technical specs of our various sensors, incorporating analog signal processing and neuromorphic-based readout electronics for our single photon avalanche diode (SPAD)-based sensors and working on integrating a microprocessor with our other sensor front ends,” McFarlane said. “Incorporating neuromorphic electronics helps us even more closely mimic biological systems, and SPADs help us create a device for which a single photon can elicit a current response, a great improvement over previous devices.”

Each new development has its own place in the overall sensor, with the SPAD-based portion intended for applications such as neutron detection and the electrochemical sensors intended for glucose and other analytes.

McFarlane said that her team is currently working on integrating multiple sensors on the same chips, which will add more functionality to the sensors. For example,

one sensor would be able to detect both temperature and impedance due to electrochemicals or pH balance.

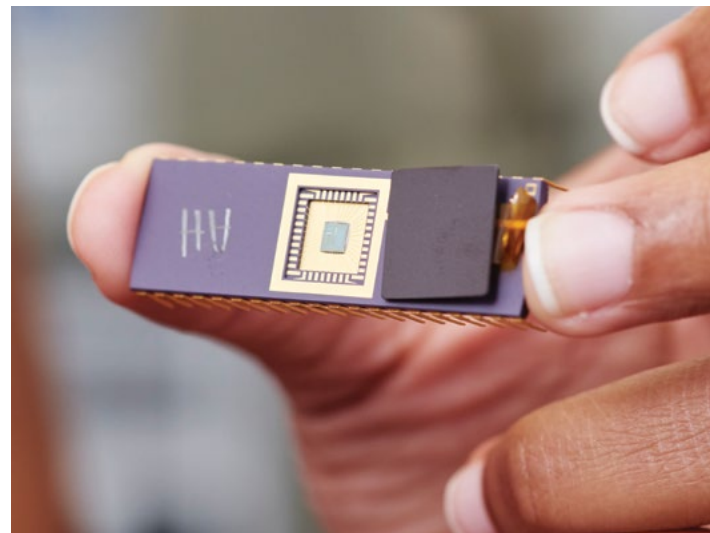
McFarlane’s improved sensors continue to hold promise in other areas requiring minute levels of detection, such as the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory.

SNS scientists study materials at the smallest scales, but the most common means of measurement—photomultiplier tubes—are expensive, require massive cooling efforts, and are inside a glass tube and thus, fragile.

“The Department of Energy is very interested in the ability to use the sensors because they are smaller, faster, and more cost efficient than tubes,” McFarlane said. “We use the same technology as the camera in your phone, which has the added benefit of not being magnetic.”

That last point is vital because experiments at SNS could have their outcomes tainted by outside magnetism.

The DOE’s Office of Science was impressed enough with the idea that it recently awarded McFarlane and her team \$600,000 to build out the concept for use at SNS, proving that, while the device itself is small, the impact it could have is huge.



“The Department of Energy is very interested in the ability to use the sensors because they are smaller, faster, and more cost efficient than tubes.”  
—Nicole McFarlane





“Energy inequality or poverty is one of the most pressing issues in a modern community.”

—Chien-fei Chen



## Engineering Electrical Equality

Photography and writing by Randall Brown.

Chien-fei Chen holds a unique position in the spectrum of UT engineering research. She is an environmental sociologist, a research associate professor in electrical engineering, and serves as the director of education and diversity for the CURENT research center.

The sociological approach of her work helps add a human element to CURENT’s overall focus on improving the world’s power-grid.

“My research centers on bridging the gap between social and technical sciences in energy efficiency issues regarding energy justice, energy policy, pro-environmental behavior, and renewable technology adoption,” said Chen. She pursues both formal and informal field work, including personal observations, reading, and discussions with local residents and researchers from different countries.

“I want to build on this experience and have an impact on academic and underserved communities, such as low-income communities,” she said. “Energy inequality or poverty is one of the most pressing issues in a modern community.”

Her work drew widespread attention this year when she was selected as one of 20 Fulbright Global Scholars from across the country. Her proposal, “When East Meets West: An Interdisciplinary and Cross-cultural Research on Energy Justice and Renewable Technology Adoption for Future Smart Communities,” focuses on energy needs and uses across social lines.

“This research will involve interdisciplinary cross-cultural research that focuses on the multifaceted aspects of energy justice and renewable energy adoption among low-income communities in China, the UK, and the US,” said Chen. “I will conduct an integrated analysis of social, behavioral, environmental, and technical impacts by using qualitative and quantitative methodology and integrated analysis and modeling rooted in social psychology, engineering, and computer science.”

Her goal is to better understand the complexities of social practices and technology adoption across cultures, while improving strategies to solve energy-efficiency problems, combat the global energy-inequality issues, and inform public policy.

“Renewable energy technology is growing fast, but it also raises pressing justice issues related to equity and fairness,” said Chen. There is strong and increasing interest throughout academia, industry, and policy makers to investigate energy efficiency and energy poverty issues.

“The Fulbright will allow me to extend my current interdisciplinary collaboration by focusing on cultural and energy behavioral differences between the eastern and western societies, especially among the vulnerable communities,” she said.

“More importantly, understanding people’s daily energy practices and barriers in the western and eastern societies could influence local policymaking as well as cultural understanding.”

## Microgrids Hold the Key to Keeping Power Flowing After Disasters

Written by David Goddard.

Hurricanes cause problems, injuries, and even deaths in a number of ways, not the least of which is failure of the power grid.

In the case of Hurricane Maria, for example, the amount of time it took to restore power in the US territory of Puerto Rico became an international story. It was seven months before most power had been restored.

Power loss can be life-threatening in many ways—from hospitals and shelters losing the ability to run critical care devices to failed pumping stations exacerbating flooding to fires sparked by people trying to cook or provide heat.

But it doesn’t have to be that way.

Microgrid technology now being refined will make it less likely for power to go off and, if it does, allows it to be restored much quicker.

Researchers at UT and Oak Ridge National Laboratory have spent much of the past decade improving microgrid technology, helping make the systems more efficient, dependable, autonomous, and cost-effective.

“They are smaller, more localized, and much easier to control and repair if needed,” said Min H. Kao Professor Leon Tolbert. “If there is a loss of power we can get it restored in hours rather than weeks or months.”

Think of microgrids as backup generators for the full power grid. They unite to distribute power across a region, but if something threatens the system they can operate independently. So when a storm strikes a power plant, the grid goes into “island mode.” Each microgrid switches to focusing just on its own area so one plant going down doesn’t affect the operation of the rest.

Tolbert points out that the benefit of microgrids is that critical emergency services like hospitals, first responders, and emergency shelters can continue to operate without disruption.

“Microgrid stations aren’t just connected to the grid but also have back-up power sources for when the rest of the grid goes down,” Tolbert said. “It varies, but they can have solar panels, fuel cells, diesel, even batteries—whatever it takes to keep them running in their particular environment.”

Fueled by the outcry over the length of time it took to restore power after Hurricane Sandy, the Associated Press studied how long it typically took to restore power to customers. They found that, on average, swaths of coverage areas remained without a functioning power grid two to three weeks after major hurricanes. And these weren’t in rural areas but major global centers like New York, Miami, New Orleans, and Houston.

Tolbert, along with UT-ORNL Governor’s Chair for Power Electronics Yilu Liu and Condra Chair of Excellence Fred Wang, is helping change that.

“The big thing in the past has been the cost, but the price of materials has come down and solar panels, fuel cells, and batteries are becoming cheaper all the time,” Tolbert said. “They are now practical. They just have to be implemented.”

Learn more about microgrids at [tiny.utk.edu/microgrids](https://tiny.utk.edu/microgrids).

### ► UT is currently working on several microgrid-related projects:

Along with the Chattanooga Electric Power Board (EPB) and other partners, UT and CURENT designed and tested a flexible microgrid for the airport there to reduce costs and customer outages. Local photovoltaic generation and battery energy storage allows the system to continue to power critical systems, such as Federal Aviation Authority equipment, with excess production being shared with the adjacent community through smart switch control.

Another development is a controller that enables the microgrid to communicate with a variety of equipment. Energy producers may receive incentives such as voltage support for not only generating power, but also by participating in the system service. It will be demonstrated in Duke Energy’s North Carolina service territory.

Two closely related projects funded by the US Department of Energy may help in both generation and storage. Power conditioning system (PCS) converters can be used to link microgrids into the main grid, helping supply power when the normal system crashes. Fast PCS can also enable fault isolation, harmonic filtering, grid stability enhancement, unbalance load support, power quality improvement, and more, and could potentially enable companies to reduce their electric bills and peak demand charges.





# Sisters Help Each Other Stay Charged for Electrical Engineering

Photography and writing by Randall Brown.

**The Garcia sisters** enjoy a unique support system as first-generation college students: they have each other.

Before eldest sister Frances completed her master’s degree this past December, the trio studied electrical engineering together at UT. Younger siblings Diane and Christine are still on campus, embodying the spirit of “familia,” the supportive community approach promoted by the Society of Hispanic Professional Engineers (SHPE), which all three have been involved with. Their close family connection enhanced their experience all the more.

“There were definitely advantages,” said Christine. “I knew how professors taught the classes because my sisters had taken the class before, and they also had notes and tips. They definitely helped me gear my study habits to be more successful.”

“The main advantage I saw was having backup,” agreed Frances. “If I was stressed, bored, had something exciting to share, or wanted a friend to go to the gym with I could just hang out with them.”

“It helps that we’re all three in electrical engineering, Hispanic, and female,” said Diane.

“**And we’re family, so everything is relatable. When I’m thinking something and laughing, Christine is probably thinking the same thing and laughing.**”

—Diane Garcia

The sisters’ strong relationship helped them engage socially, from playing intramural soccer together on campus, to participating in groups like SHPE, Systers: Women in EECS, IEEE, and the Campus Entertainment Board. Earlier, they all enjoyed pre-college summer programs at UT.

“I always knew I wanted to do engineering, through programs like INSTEP,” said Diane.

“The same summer that Diane did INSTEP, I did the MITES program,” said Christine. “That was our first experience with UT engineering. Frances got to go to the Tennessee Governor’s Academy for math and science when she was a junior in high school.”

These introductions inspired them all to pursue engineering at UT, which has included a commute from their home in nearby Lenoir City.



Christine, Diane, and Frances Garcia (l-r) stand in front of one of the CURENT labs.

“It helped all of us, because commuting is hard,” said Diane. “But since we were all in the same ballpark, we all went home to the same home every night, we would make sure we were all on track. Now we don’t carpool, because our schedules are a lot more different.”

Frances blazed the trail as the first to graduate and now works as a microelectronics engineer at NSW Crane with the Navy and Department of Defense in Indiana.

“To some degree I felt a sense of leadership and responsibility to guide my sisters into making advantageous academic choices,” she said. “I would try to help out with homework questions they might have or studying for exams whenever I could.”

“She definitely set the groundwork for us in understanding what’s expected to be successful,” said Christine. “It was hard transitioning from high school to college, but she definitely helped that transition go smoother since she experienced it before we did.”

Diane and Christine both work at Einstein Bros. Bagels, offering them a good third space to commune over electrical engineering. They use Facetime to talk daily with far-off Frances. Both are already planning their summer.

“I’m going to do an internship this summer with U.S. Cellular,” said Christine. “I’ve done undergraduate research on power systems, so this will expand the umbrella of what I’ve done, because that’s more telecommunications.”

“I’m looking, for this coming year, to get a co-op,” said Diane, who is working through the office of Engineering Professional Practice for that. “I am interested in the automotive industry.”

Through studies, soccer, or careers, the Garcias’ family bond and Volunteer Spirit should continue to serve them along whatever paths they decide.

Join Hunter.  
Join the Journey.

“I am extremely grateful for the opportunities that support from the college’s alumni and friends has afforded me. I will continue to strive for excellence to show that this support is making a positive impact on students.”

—Hunter Mann

Class of 2020,  
Computer Engineering Major



Invest in the journey to help other students enhance their educational experience. Call **865-974-8890** or visit **[giving.utk.edu/eecs](https://giving.utk.edu/eecs)**.



# Fully Charged *and Ready to Grow*

By David Goddard. Photography by Shawn Poynter, Steven Bridges, and Jack Parker.

The Min H. Kao Department of Electrical Engineering and Computer Science has a rich history that dates back to UT's first EE classes in the late 1800s.

Associate Professor Charles Perkins had but one undergraduate student in 1892, Sidney Albert Beyland, but just four years later the number had grown to 85 and the department was off and running.

Computing courses began at UT in the 1950s, with the first on-campus computer—a Librascope General Purpose 30-bit—coming into use in 1958.

Eventually, the Department of Computer Science was created in the College of Arts and Sciences. It remained there until a 2007 merger with the Department of Electrical and Computer Engineering created the department we know today.

Now, more than 125 years since its humble beginning, Perkins has a hall named in his honor, UT has a number of important national centers related to both electrical engineering and computer science, and the department's ranks have grown from Beyland's class of one to nearly 1,000 undergraduates and a few hundred graduate students.

Now, more than ever, the Min H. Kao Department of Electrical Engineering and Computer Science is fully charged and ready to grow.

## We've Got the Power

The department has several experts in research and technology related to the power grid, its security, and new ways of mitigating outages, many of whom work through CURENT, the Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks.

Founded in 2011, CURENT was UT's first NSF Engineering Research Center and the first to address challenges with the national power grid. Former Department Head Kevin Tomsovic and UT-ORNL Governor's Chair for Power Electronics Yilu Liu serve as director and deputy director, respectively, of a team that includes 13 faculty members—five of whom hold named professorships—in three departments across two colleges, in addition to faculty at three partner universities.

CURENT focuses on monitoring the power grid in real time through the lab's patented FNET/GridEye system; actuation, in this case bringing new forms of power into the grid, including large amounts of renewable energy; control, or managing both the voltage and frequency of power on the grid; and modelling, which involves studying the overall state of the system and measures related to its security.

Additionally, the Power Engineering Laboratory and Power Information Technology Laboratory offer additional avenues in the pursuit of power-related engineering, with many faculty members serving in more than one group.

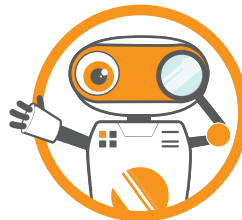
## ► A Decade of Growth



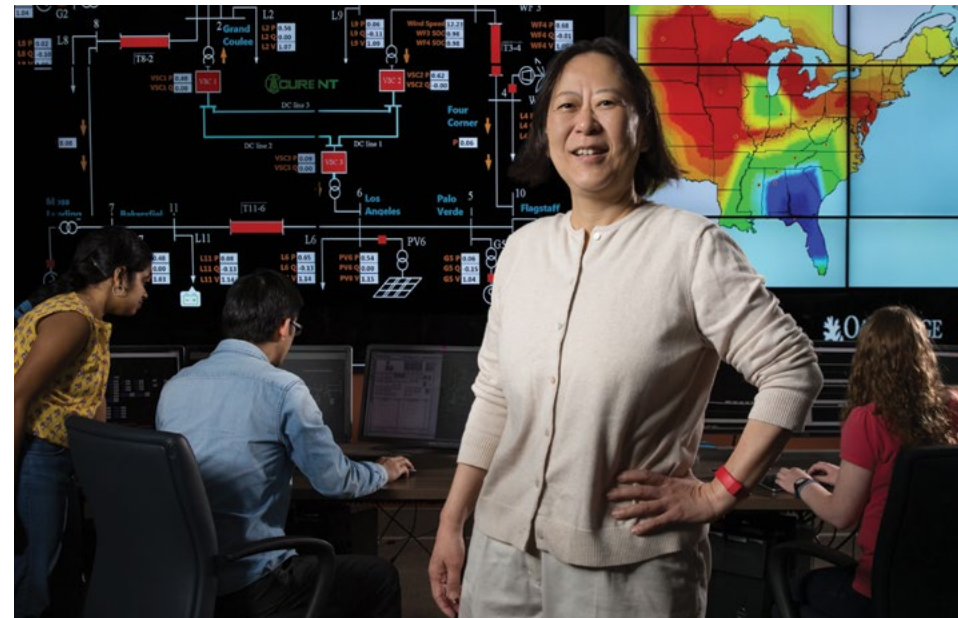
In 2008, there were 473 undergraduate and 227 graduate students housed within the department, but by 2018 those numbers had grown to 834 and 245, respectively. That's a growth of more than 54% in a decade overall and more than 76% at the undergraduate level.



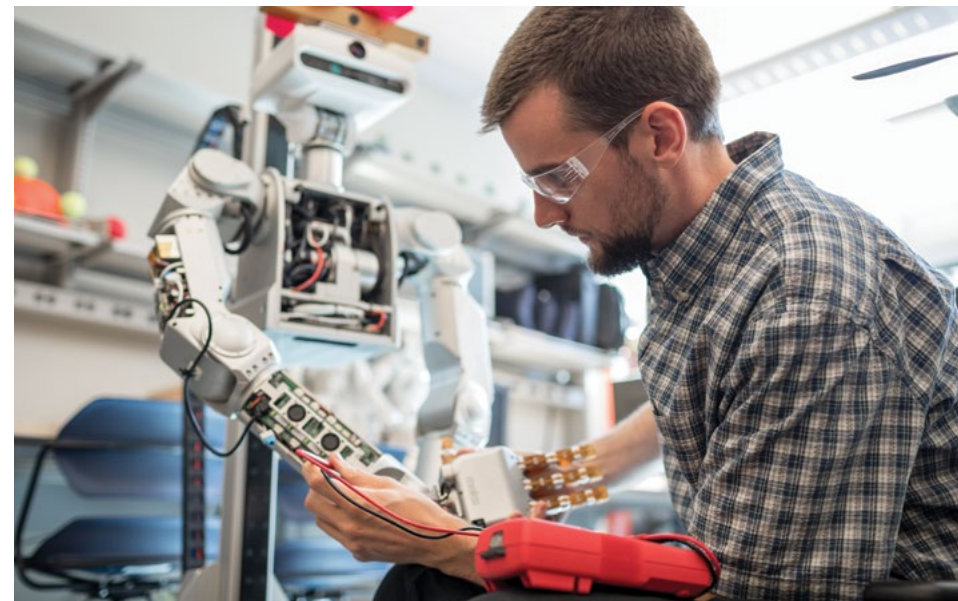
The faculty has grown by 30% since 2009, going from 36 to 47, including 10 named professorships and one UT-ONRL Governor's Chair.



The amount of research has climbed with the department responsible for nearly \$37 million in research expenditures in 2018, more than \$25 million of which came from outside grants and projects.



► Yilu Liu works with students in one of the CURENT labs, researching power grids.



► A graduate student works in the robotics lab, checking circuitry.



► Many department faculty and researchers hold joint appointments with ORNL, where they have access to Summit, the world's fastest supercomputer.





- ◀ A senior works on his senior design project in one of the Min H. Kao Engineering Building's lab spaces.



- ◀ Jack Dongarra, director of the Innovative Computing Laboratory, was recently named a fellow of the Royal Society.

## Pushing Computing's Frontier

High-performance computing, cloud and edge computing (p. 2), neuromorphic computing, and distributed computing are all areas where the department has experts who can help shape the conversation around computing.

The Joint Institute for Computational Science, run in conjunction with Oak Ridge National Laboratory, has helped UT's reputation in computing grow thanks to the many partners who have worked with it or through one of its projects. Most notable of those is the National Institute for Computational Sciences, founded with a \$65 million NSF grant in 2007 and the specific mission of bolstering high-performance computing in the United States.

Elsewhere, Distinguished Professor Jack Dongarra maintains the benchmark for the world's fastest computers, something that not only brings attention to the department but also led to his selection as a fellow of the Royal Society in 2019.

The department is also home to John Fisher Distinguished Professor Mark Dean, co-inventor of the PC, who most recently served as interim dean of the college.

## Keeping it Safe

One of the key tasks of an ever-connected world is to ensure our increased online and virtual activity remains free from hackers, data thieves, and others seeking to exploit flaws and lapses in security.

Any step of online processes, communications, or transactions can be a potential point of exploitation, making the ability to bring a variety of experts crucial to overall security efforts.

The department is well-positioned to meet these demands, with multiple faculty members tackling security concerns related to data, networks, software, hardware, systems, information, and cybersecurity.

For students, the department offers a minor in cybersecurity that combines many of those research areas as well as how they apply to different systems. Additionally, graduate students can pursue concentrations in cybersecurity and cyberinfrastructure.

At the 2018 Computer Science Annual Workshop—the largest student-led cybersecurity competition in the world—Assistant Professor Max Schuchard and doctoral student Jared Smith won first place in the applied research competition, publicly highlighting the department's strength in this area.

## Connect the Bots

Whether through the Internet of Things, machine learning, or artificial intelligence, the future of technology is increasingly connected. Professor Lynne Parker's expertise in artificial intelligence is well-known, landing her a job as assistant director for AI in the White House Office of Science and Technology Policy (p. 4), while on campus, Professor Michael Berry complements that knowledge with his own research that's shaping part of the AI and smart robotics puzzle.

Professor Mongi Abidi has three major research programs that touch on aspects of these topics, including 3D imaging and data fusion for use in robotics as well as automotive simulation and design, and automated video tracking, inspection, and threat detection for carry-on baggage—all areas with implications for the general public.

Associate Professor Nicole McFarlane is also helping bridge the human-technology gap by developing implantable sensors to monitor glucose levels for diabetic patients, with an eye on one day being able to use them to deliver much needed medicine, all while eliminating the need to prick fingers or inject medicine (p. 6).

## ► Support

A notable boost for EECS came in 2011 with the opening of the department's new building, named for alumnus Min H. Kao, co-founder of Garmin. In 2018, the department was renamed in his honor. In addition, there are conference rooms named for James W. McConnell and Thomas King; lab spaces named for Min H. Kao, J. Frank Pierce, Eaton, and IBM; offices named for Joel Seligstein, and a student suite named for Daw Lu, with each of those coming in honor of and response to support given to the department.





Assistant Professor **Ahmedullah Aziz** received his PhD in electrical and computer engineering from Purdue University in 2019 and his master's in electrical engineering from Pennsylvania State University in 2016. Prior to beginning graduate studies, he worked as an engineer in the Tizen Lab of the Samsung R&D Institute in Bangladesh, where he explored and prototyped innovative ideas for leading-edge electronics.

His research interests include mixed-signal VLSI circuits, non-volatile memory, and beyond CMOS device design. He explores device-circuit-system co-design techniques with an emphasis on emerging technologies like complex-oxide electronics, ferroelectrics, and spintronics. Aziz plans to use the core research facilities at UT along with the resources of his new lab to contribute to the field of exploratory nanoelectronics. He is also excited about the unique opportunity to collaborate with ORNL.

"I am delighted to be part of a vibrant and rapidly growing department. I sincerely appreciate the company of the esteemed colleagues and bright students at the beautiful campus of UT Knoxville," he said.



Assistant Professor **Jian Liu** leads the MoSIS (Mobile Sensing and Intelligent Systems) Lab at UT. Before joining UT, he received his PhD from Rutgers University in 2019.

Liu's research interests span mobile sensing and computing, cybersecurity and privacy, intelligent systems, smart healthcare, and machine learning. His research has been regularly featured in the media including BBC News, Yahoo News, MIT Technology Review, NBC New York, IEEE Spectrum, WCBS TV and Voice of America TV, among others. He also holds 4 US patents, two of which have been licensed to industrial companies.

"I am really excited about joining such a great EECS team," Liu said. "The department has remarkable interdisciplinary research and close cooperation with Oak Ridge National Laboratory, and I look forward to making my contribution to the department in both education and research."



Assistant Professor **Andre Zeumault** received his PhD and bachelor's degree in electrical engineering from the University of California, Berkeley, in 2017 and 2011, respectively. Following his PhD, he was a postdoctoral fellow at the Georgia Institute of Technology in the Departments of Materials Science and Engineering, Chemistry, and Physics.

His research focuses on developing preparation and characterization methods of solution-processed metal oxide semiconductors for electronics applications, including thermoelectrics, optoelectronics, and bioelectronics. His specific interests include refining electrical characterization methods for accurate benchmarking of device performance, modeling the role of disorder in electronic and thermal transport, and defining processing protocols for controlling the structural and chemical evolution of films. Recently, he has focused on methods of decoupling crystallinity from chemical composition during film evolution to facilitate greater electrostatic control for device applications.

"I am quite thrilled to be joining the EECS team at UT this fall," Zeumault said. "In my interactions thus far, I've experienced the culture of the department's faculty and staff to be highly professional, accommodating, welcoming, and collegial. This, combined with the department's sincere commitment to excellence in research, teaching, and service is what led me to be drawn to UT."

## DEAN'S IMPACT

### Will Last Far Beyond Year as Interim

By David Goddard. Photography by Shawn Poynter.

#### *If you don't think a lot can happen in a year, just ask Mark Dean.*

Dean recently wrapped up just shy of a year as interim dean of the Tickle College of Engineering, having made many positive impacts during that tenure that will resonate in the college for years to come.

While the role came unexpectedly to him, years of managing research organizations at IBM helped prepare him to lead his alma mater in its time of need.

"Running a college is a lot like being in charge of research at a major technology company like IBM," said Dean, who served as the John Fisher Distinguished Professor in the Min H. Kao Department of Electrical Engineering and Computer Science prior to the appointment. "There are seven leadership styles, and the key is knowing what style to leverage in a given situation. You have to be willing to listen and understand each situation, to support and answer to your stakeholders, and to compromise and get buy-in whenever possible."

He said that aside from the teaching component at a university, the experience of working with a large number of doctorate-holding team members, initiating cutting-edge research in answer to current problems, and helping fill the needs of those funding the research—whether funding agencies in academia or outside partners in the business world—were very similar and helped ease his transition to serving as interim dean.

In turn, Dean said he was able to more rapidly get down to the "nuts and bolts" of running a college.

As dean, he eagerly assumed opportunities for increased interactions with students and student organizations.

"When I came to UT from IBM in 2013, one of the biggest draws for me was the chance to work with students, to help them see new possibilities and to dream up new ideas, and to help shape their educational and career paths," Dean said. "I love working with students, interacting with them, and hearing their ideas. They are our future."

An added value of talking to students, according to Dean, is their tendency to speak their minds. Even if it can sometimes be blunt, hearing a student's perspective can lead to new ideas and solutions—something Dean particularly likes. He regularly encourages students to ask questions since they often bring up points that faculty haven't considered.

The importance of getting varying perspectives is driven home by Dean's observation on the impact that engineers have on the world.

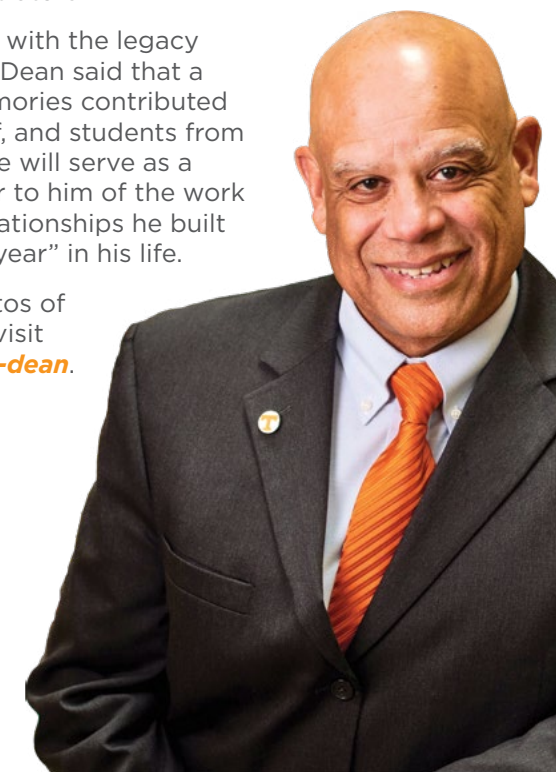
"Other lines of work might impact a few hundred people's lives in the course of their career," Dean said. "But an engineer? An engineer, by default, is dealing with things like bridges and roads, power and water, aircraft and vehicles, computing devices and applications—the kinds of things that impact thousands if not millions of people. People depend on engineers to get it right, and to get it right the first time. The impact engineers have cannot be overstated, so it's critical that we consider as many ideas and views as possible."

Other projects that Dean is proud to have accomplished during his tenure include:

- ▶ Creating a college-wide Senior Design Showcase
- ▶ Establishing a once-a-semester Dean's Open Forum with students and faculty
- ▶ Expanding the Summer Bridge program
- ▶ The integration of communications at the college level
- ▶ The hiring of two associate deans and several other college administrators

While he is happy with the legacy he leaves behind, Dean said that a scrapbook of memories contributed to by faculty, staff, and students from around the college will serve as a constant reminder to him of the work he did and the relationships he built during a "special year" in his life.

To check out photos of his time as dean, visit [tiny.utk.edu/dean-dean](http://tiny.utk.edu/dean-dean).





# FACULTY NOTES

Associate Professor **Micah Beck**’s article, entitled “Hourglass Model of Layered Systems Architecture,” is the cover story of the July 2019 issue of *Communications of the ACM*, the magazine of the Association for Computing Machinery.



▲ **Jack Dongarra**, Distinguished Professor and director of UT’s Innovative Computing Laboratory, was named a foreign fellow of the Royal Society. Founded in 1660, the society is the oldest science-based foundation in the world. Other fellows include science icons Isaac Newton, Albert Einstein, and Stephen Hawking. Dongarra was honored for his work with supercomputing, including compiling the TOP500, his annual ranking of the world’s fastest, most powerful computers. Dongarra also received the 2019 SIAM/ACM Prize in Computational Science and Engineering. The honor is awarded for outstanding contributions to the development and use of mathematical and computational tools and methods for the solution of science and engineering problems.



UT-ORNL Governor’s Chair **Yilu Liu** received Patent number 10,191,094 for “Synchrophasor Measurement Method for Power Systems” (UTRF 17111).

Associate Professor **Garrett Rose** received a \$1.5 million, three-year Air Force Research Laboratory grant for his project proposal, entitled “Reconfigurable and Very Efficient Neuromorphic System.” RAVENS aims to be an energy-efficient neuromorphic architecture specifically tailored for control and other spatio-temporal applications commonly implemented with resource constrained computer systems.

**Rose** and students **Aysha Shanta** and **Mesbah Uddin** received third place in the Best Paper Award Contest at the ACM Great Lakes Symposium on VLSI for their work, entitled “Design for Eliminating Operation Specific Power Signatures from Digital Logic.” Other authors on the paper include Badruddoja Majumder and Sakib Hasan.

Dongarra Professor **Michela Taufer** was selected as the 2019 Person to Watch by *HPCWire Magazine*, the leading publication for news and information for the high-performance computing industry. She was also elected general chair of the 2019 International Conference for High Performance Computing, Networking, Storage, and Analysis, and received the 2019 IBM Faculty Award (\$20,000).

Professor **Jayne Wu** received the Chancellor’s Award for Research and Creative Achievement at the Chancellor’s Honors Banquet this spring. The honor is bestowed to senior faculty in recognition of excellence in research, scholarship, and creative achievement. Wu’s research centers around diagnostic technology.

IBM recently awarded the university a POWER9 server stack like the kind used on the Summit supercomputer housed at Oak Ridge National Laboratory. Summit is made up of a warehouse-sized room of many dozens of server stacks working in collaboration to make calculations at incredible speeds, while this server stack will allow its use as a learning tool for faculty and students at a scaled-down size. UT is one of the first universities in the world to have a server stack like the kind used on Summit. Dongarra Professor **Michela Taufer** and EECS Department Head **Gregory Peterson** along with UT Distinguished Professor **Jack Dongarra** will play key roles in the use/maintenance of the server.

# STUDENT NOTES

EE students **Alex Weber** and **Makenzie Swicegood** earned second place in last spring’s VolCourt pitch competition for Backdoor, a smartphone application to help pet owners track lost pets. The team received \$1,000, office space in the UTRF Business Incubator, legal advice from Morehous Legal Group, and design services from Innovative Design Inc.

Senior **Carl Edwards** was named a 2019–2020 Goldwater Scholar this past May. The most prestigious undergraduate STEM scholarship in the United States, it is awarded to college sophomores and juniors who intend to pursue research careers in the natural sciences, mathematics, and engineering. Edwards is an honors computer science and honors mathematics major. He has done research at ORNL and through EuroScholars at the University of Zurich in Switzerland and plans to attend graduate school.

Eight EECS students were recognized for their exceptional contributions to UT at the 2019 Chancellor’s Honors Banquet. Students receiving recognition for Extraordinary Professional Promise include **Shaghayegh Aslanzadeh**, **Chandler Bauder**, **Farnaz Foroughian**, **Ava Hedayatipour**, **Shahram Hatefi Hesari**, and **Farshid Tamjid**. **Kendra Anderson** was named a Top Collegiate Scholar while **Kelsey Veca** was honored for Extraordinary Academic Achievement.



▲ PhD student **Wenxuan Yao** won the 2019 North American Synchrophasor Initiative (NASPI) Award for Outstanding Grad Student. The awards recognize the significant accomplishments and contributions of its members. This marks the third year in a row that a UT student has won a NASPI award. Yao’s work on m-UGA has improved PMU sampling accuracy and PMU signal acquisition. M-UGA allows higher resolution PMU deployment and enhances power system observability.



▼ PhD student **John Reynolds** competed in the finals of the 2019 Three Minute Thesis Competition. Although he did not win with his presentation, entitled “Exploring Natural Patterns,” reaching the finals was a great achievement in communicating his research to a general public. The 3MT competition cultivates students’ academic, presentation, and research communication skills.

Three EECS students were honored last spring at the Graduate Student Senate Awards Ceremony. **Farnaz Foroughian** and **Farshid Tamjid** were awarded for Excellence in Graduate Student Teaching. This award is presented to graduate teaching assistants and associates for extraordinary performance in teaching. **Shahram Hatefi Hesari** was awarded for Excellence in Service. This award is presented to graduate and professional students who are extraordinary campus leaders, participate in service learning or other community initiatives, and/or provide service leadership to their academic discipline through service in professional organizations.





# Senior Design Showcase

By David Goddard. Photography by Shawn Poynter.

*In the spring*, EECS seniors completed their capstone Senior Design class, which involves tackling real-world scenarios and using advanced problem-solving skills to create solutions for a client.

Senior design is the final educational element that ties together all the engineering, science, and humanities learnings as our students transition to the next phase of their lives.

The 23 EECS teams participated in the college’s inaugural Senior Design Showcase on April 25, which included more than 125 projects from all eight UT engineering departments. The event brought together students, faculty, sponsors, and guests to review the projects and celebrate the hard work of our students throughout their final two semesters.



## 2019 Best Poster Award and 2019 People’s Choice Award

### Fitness Breath Analyzer

- **Client:** EECS
- **Team Members:** William Lowe, Rojae Johnson, Deven Hills, Grayson Kirk, Matt Kramer, Rhett Sexton
- **Faculty Advisor:** Jayne Wu
- **Project:** The team designed a breath sensor that allows a user to examine the concentrations of different gases in their breath. These gases can be used to determine fitness metrics such as whether a user’s body is in fat burning or cardio mode. The breath analyzer will be useful for fitness enthusiasts and researchers who need to know one’s breath content.

Having the students display and present their projects publicly sets a higher standard for their completed work while enhancing their interpersonal skills— helping to kick-start their engineering careers upon graduation. The showcase also gives our up-and-coming students an aspirational perspective for their senior year.

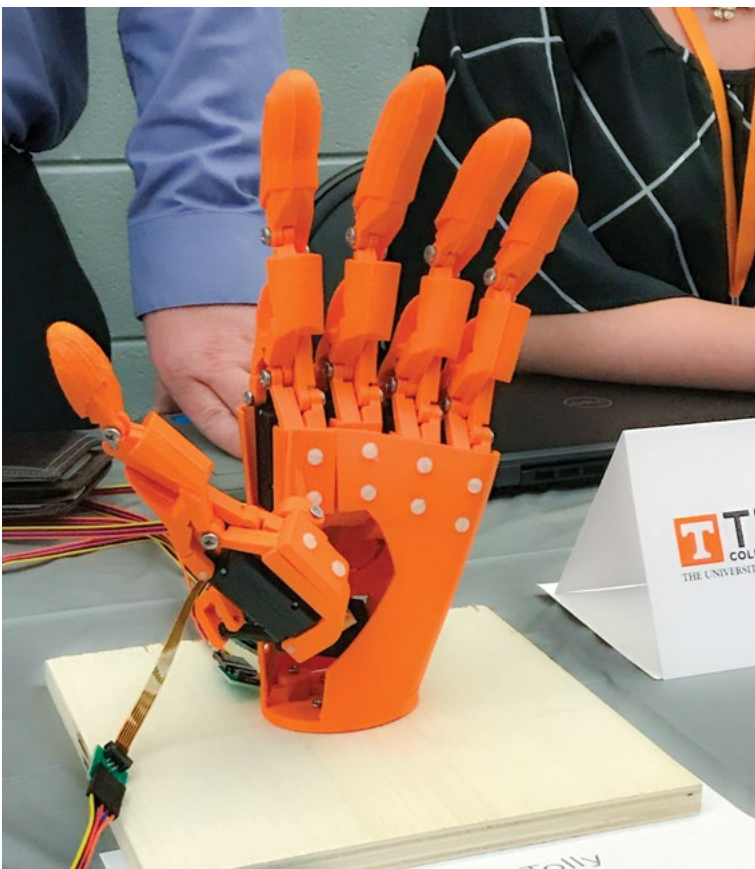
Following the showcase, the teams participated in a poster presentation to the EECS Industrial Advisory Board, and two EECS teams received awards based on criteria including innovation, quality of the executive summary, quality of the poster, knowledge of the presenters, and professionalism of the presenters.



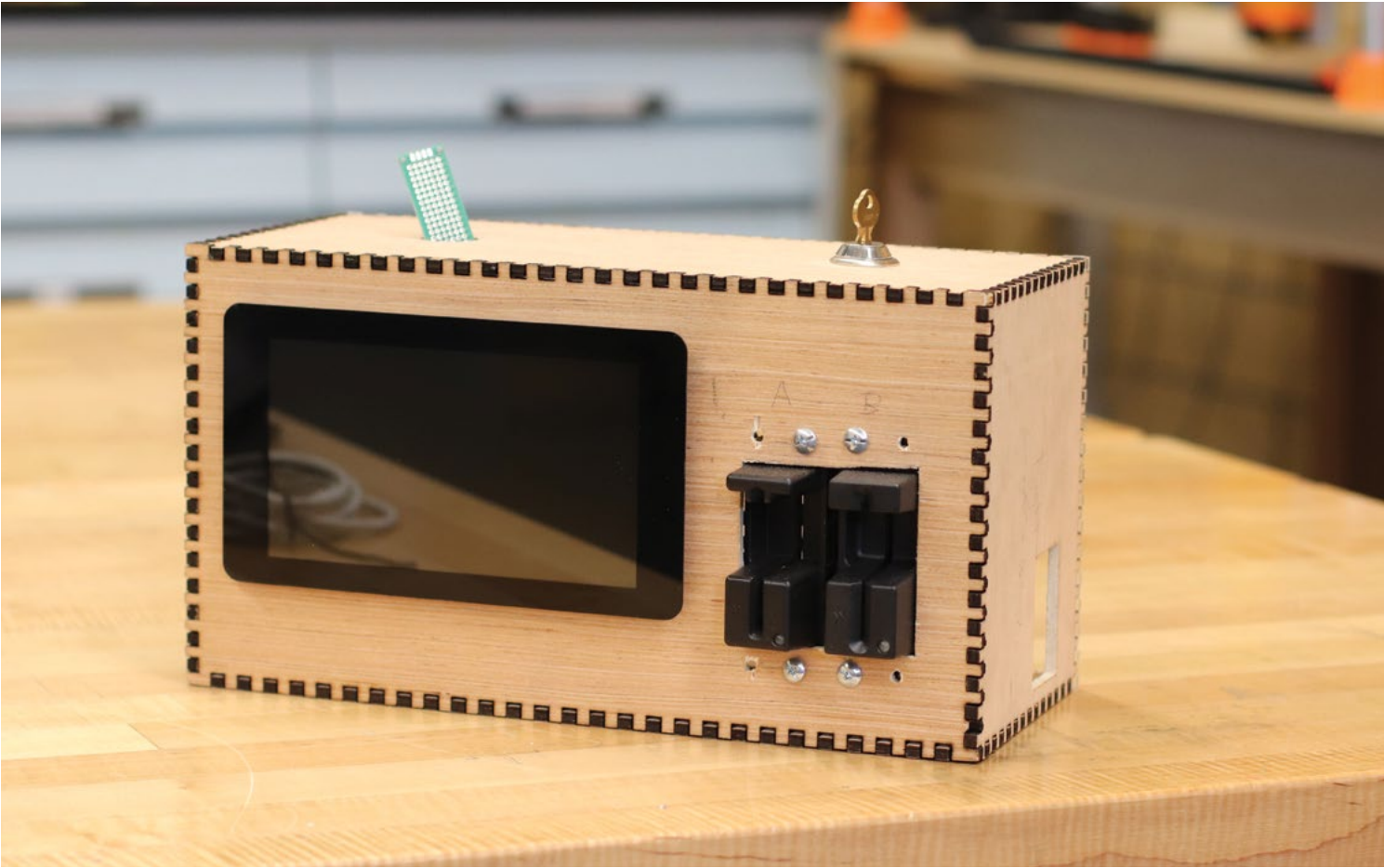
## 2019 Best Project Award

### Tolly

- **Client:** EECS
- **Team Members:** Makenzie Swicegood, Alex Weber, Gabriela Sabin, Justin Stephens, Emily Weeden, Brian Friend, Ben Chesney, Zac Cole
- **Faculty Advisor:** Chad Duty (Mechanical, Aerospace, and Biomedical Engineering)
- **Project:** The team developed a 3D-printed, cost-effective, bionic prosthetic for below-the-elbow amputees. Tolly is currently designed specifically for a biomedical engineering student. In subsequent senior design projects, the project will be further developed.



(Clockwise from top left) Senior design student demonstrates the Min Kao Engineering Building tour robot, bionic prosthetic developed by senior design team, ICS machine safety switch prototype, and students demonstrate EcoCAR video cameras.







## Scanning for New Opportunities

By Austin Jones.

Electrical Engineering junior **Austin Jones** is working as a co-op student at Siemens Molecular Imaging, a Knoxville-based diagnostic imaging company with systems for computed tomography (CT), tomography, magnetic resonance imaging (MRI), molecular imaging, X-ray products, ultrasound systems, and imaging IT.

“I work for the Electrical Research and Development Department. My responsibilities include running tests on boards that will go on to be used in scanners, working on any current assignments and assisting the engineers as best I can,” said Jones. “The boards I most commonly test find their way into the newest revision of Siemens PET/CT machines. I have had multiple projects, but most involved building diagnostic tools for the engineers to use.”

Jones initially met representatives from Siemens at the college’s Engineering Expo and interviewed with them the next day. Within two months, he’d received his assignment. The work allowed him to grow and learn, exposing him to new technical and professional experiences.

“I learned to work with new programming languages such as C#, bash, and batch. I feel proficient in wire crimping and making. Also, I have used many drawing tools like Visio, a tool for creating engineering documents and drawings, and GIMP, a photo editor, for various projects,” Jones said. “My work at Siemens has allowed me to get comfortable with a collection of software, embedded software, and firmware tools that I didn’t know existed.”

Jones also worked with Field Programmable Gate Arrays (FPGAs), which are useful for prototyping large digital logic circuits in a small footprint.

“An FPGA consists of a good deal of logic gates on a microscopic scale that can be configured and programmed to emulate any digital circuit. The use of an FPGA is very broad in scope given the reprogrammability gives it great versatility,” he said.

He was given responsibilities that initially seemed beyond his scope of understanding, but that didn’t hold him back from getting the job done.

“An important challenge I’ve had to overcome has been dealing with a project that was completely out of my level, and it seemed my only option was to read all of the provided source code to try to find something to fix the issue I was having. Then, I learned the author of the code changed some time ago. Talking with the original author of the code was a quick, concise way to find out why problems arose. The main takeaway was that when you need help, ask around for it.”

As with most students’ co-op experiences, Jones said his most valuable takeaway was the real-world knowledge he gained and how it has shaped his future outlook.

“This experience has helped me grow as an engineering student. All of the aforementioned work with FPGAs, embedded software, and firmware have made me really enjoy computer engineering. However, I do value the amazing things that happen in the EE space. So, I’ve decided to minor in computer science. I hope to find a broad mix of all that is computer and electrical. I think this experience has greatly affected my outlook on school and what there is to learn.”

## The Garmin Experience

By Alex Yen, Senior, Electrical Engineering.

The Min H. Kao Scholars had the opportunity to visit Garmin International’s Headquarters in Olathe, Kansas, in April. Five other students and I, along with Department Head Greg Peterson, flew to Garmin’s hangar in Olathe where we were greeted by Jen Larson, one of Garmin’s university recruiters, who served as our guide for the day.

In the morning session, we learned about lifestyle and benefits of the surrounding Kansas City from a representative of MyKC, an initiative begun by the Kansas City Area Development Council, aimed at promoting Kansas City as a destination for talent. Afterwards, we met up with former Tennessee alumni, including design engineer Jason Mills and software engineer Camille Crumpton for lunch.

In the afternoon, we toured the reliability lab, which houses all the equipment used to evaluate Garmin’s products for wear and tear under different conditions. Garmin produces a large variety of products, including the fitness, outdoor, automotive, marine, and aviation sectors, each of which has certain requirements and product lifetime expectations. Accordingly, the reliability lab included equipment such as altitude, temperature, pressure, and salt fog chambers to evaluate avionics and stress and impact testing mechanisms for watches and wristbands. One of the interesting pieces of equipment in the lab was a windmill-like device suspended above a water tank that simulated a swimmer’s motion to evaluate the wear to the watch.

Near the end of the tour, the students were split up for hardware and software tours (two other students and I went on the hardware tour). Jason Mills gave us a tour of the design benches in the aviation group, where we saw some of the boards designed by the hardware engineers. Jason showed us one of his projects with the audio panels in a plane, where external COM, microphone, pilot, co-pilot, and passenger I/O must be directed and managed easily in the cockpit.

One of the topics Jason described was that of lightning protection, a unique design problem in avionics. All I/O for avionics must be rated for certain classifications of lightning strikes, which vary in voltage and amperage. I enjoyed the opportunity to speak with him and learn about design decisions that go into product development.

Through this experience, I learned not only about Garmin’s work environment but also saw how the skills I’m learning in class can be applied to solve real-world problems.



(From top) EECS students take a private jet from Knoxville to Kansas City to tour Garmin’s campus. Students are led on a tour of Garmin by one of the engineers on site. EECS students take a picture on site in front of Garmin’s press wall.





**Ralph D. Heath** has a long track record of success, collaboration, and philanthropy, rising to the presidency of Lockheed Martin from 2005-12 before he retired after more than 37 years in engineering and industry.

As a result of his strong record of accomplishment, Heath has been named the Nathan W. Dougherty Award winner for 2019, the highest honor given by the Tickle College of Engineering.

Heath is a firm supporter and alumnus of both the Tickle College of Engineering and Haslam College of Business, having earned his bachelor’s in electrical engineering in 1970 and MBA in 1975.

Academic and industry experiences led Heath to contribute to the growth of both colleges by creating the Heath Integrated Business and Engineering program and establishing its initial endowment.

He cited certain areas of overlap between the two colleges as his inspiration to foster collaboration, pointing out that future graduates of the program will

enter the work force with “the necessary technical skills, systems thinking, and business savvy to add real and sustaining value to organizations.”

In addition to serving in various roles at Lockheed Martin, Heath serves on the Boards of Advisors for both colleges as well as the Smithsonian National Air and Space Museum, and is an American Institute of Aeronautics and Astronautics fellow.

Dougherty, the award’s namesake, served as dean of the college from 1940 to 1956 and was a captain of UT’s football and basketball teams as a student athlete in the early 1900s. He was inducted into the College Football Hall of Fame in 1967.

Recognizing Dougherty’s success in engineering and education, the award singles out those who have “brought honor and distinction to the college through their achievements or who have made significant contributions to the engineering profession in Tennessee through their professional activities” and has been given annually since 1957.



Alumnus Receives DoE Early Career Award

**Catherine Schuman** (PhD/CS, '15) recently received a DoE Office of Science Early Career Research Program Award. Schuman, who works in ORNL’s Computer Science and Mathematics Division, received funding for her proposal, “Learning to Learn: Designing Novel Neuromorphic Algorithms with Machine Learning.” The project will use machine learning and high-performance computing to create new algorithms that will enable real-time continuous learning for neuromorphic systems, which are novel, energy-efficient computing systems inspired by biological neural networks.



Leading Tennessee’s Tech Valley

By Laura Tenpenny

“We were two guys in a garage,” **John McNeely**, former president and CEO of Sword & Shield Enterprise Security reminisced.

Thus begins many a tech giant origin story. Google, Microsoft, HP, and others famously started in the humble garage.

“When Sword & Shield moved into an office building, that was a major milestone,” McNeely (MS/CS ’00) said.

Sword & Shield, based in Knoxville and the largest such company in the state, specialized in cybersecurity solutions. It recently completed a merger with two other similar companies to become Avertium, more than doubling its employees and gaining multiple centers around the US. McNeely now serves on Avertium’s executive team as the general manager for the company’s east operations.

“We grew from two to sixty-five employees prior to the merger,” McNeely recalled. “Our people are our biggest asset, the driver of success.”

His partner James Goldston (BS/EE ’86) founded the company and developed its name, which is based on a Bible verse from Ephesians that urges readers to “put on the full armor of God,” including sword and shield. That guiding principle served them well through many hardships from 9/11 to the dot-com bubble to the death of McNeely’s partner, Goldston, in 2006.

“Despite difficulty, many years of 20 percent growth, Inc. 500 ratings, and other accomplishments garnered interest from across the country,” McNeely said. “Sunstone Partners, a growth equity group, turned out to be the right partner to get us to the next level.”

Long before the merger, the teenage McNeely considered being an architect or a nuclear engineer. Then, a computer math class caught his attention.

“On an Apple II computer, I fell in love with programming and its creative process,” McNeely remembered. “I entered UT Chattanooga with a full track and cross country scholarship and majored in computer science.”

Following a few years in the workforce at TVA and then Southwest Research Institute in Texas, he moved back to Tennessee for a job at Lockheed Martin and completed his master’s degree at UT Knoxville. Taking one class per term, he worked full-time as a software engineer and had a young family.

“My master’s definitely equipped me from a technical standpoint, and I received lots of support from Dr. Jens Gregor especially,” McNeely said. “Through our conversations about my work and his similar research, he became my thesis advisor. He later got me involved with the department’s IAB board, on which I still serve.”

Goldston’s wife worked with McNeely at Lockheed and witnessed McNeely’s impressive hacking skills, so she introduced him to her husband. A garage, some computers, and a fax machine later, they were in business. Shortly after, they brought on another partner, Will Henderson of US Internet, Knoxville’s first ISP.

“Now we’ve completed a merger. There’s a small percentage of mergers that actually happen,” McNeely acknowledged. “We hope to continue growing while maintaining a healthy, fun work culture, catering to middle-market clients, and contributing to the local community.”



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*big orange. big ideas.*



Setting Artificial  
Intelligence policy  
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