Celebrating 125 Years of Excellence 1892-2017

Annual Report 2017
EECS Department History

EECS was formed in 2007 out of a merger between the Computer Science and Electrical and Computer Engineering departments. Though EECS is just a decade old, the long-established departments from which it was created have given it a rich heritage that can be traced back more than 125 years.

1891- First electricity appears on campus
1892- First Electrical Engineering student
1895- First Electrical Engineering bachelor’s degree earned
1907- Electrical Engineering becomes its own department
1913- First Electrical Engineering graduate courses offered
1930- Ferris Hall opens; Electrical Engineering moves in
1958- The first computer, a 30-bit LGP, is brought to campus
1972- "Rocky Top" first played at a UT football game
1972- Department of Computer Science is formed, MS degree introduced
1975- Bachelor of Arts introduced for Computer Science
1975 & 1977- Min H. Kao earns E.E. M.S. and Ph.D., respectively
1987- C.S. Ph.D. introduced
1987- Pat Summitt and Lady Vols win first NCAA Championship
1989- First Ph.D. in C.S. completed
1989- Innovative Computing Lab (ICL) established by Dr. Jack Dongarra
2005- Alumnus Min H. Kao donates $17.5 million to ECE Department
2007- ECE and CS merge, EECS formed; ground breaks on Min H. Kao Building
2011- NSF/DOE Engineering Research Center CURENT established
2012- EECS faculty and staff move into Min H. Kao Building
2013- Systers: Women in EECS@UTK formed
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### Department At A Glance

#### DEGREES OFFERED

- **Bachelor of Science**
  - Electrical Engineering
  - Computer Engineering
  - Computer Science

- **Master of Science**
  - Electrical Engineering
  - Computer Engineering
  - Computer Science

- **Doctor of Science**
  - Electrical Engineering
  - Computer Engineering
  - Computer Science

#### ACCREDITATION

All undergraduate degree programs under the Department of Electrical Engineering and Computer Science are accredited by ABET.

#### ENROLLMENT FIGURES

<table>
<thead>
<tr>
<th>Enrollment (Full-Time)</th>
<th>Faculty</th>
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<tr>
<td><strong>Academic Year 2017-2018</strong></td>
<td><strong>Academic Year 2017-2018</strong></td>
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<tr>
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<th>Degrees Granted</th>
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<td><strong>Total</strong></td>
<td><strong>Total EECS Freshmen</strong></td>
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<td>214</td>
<td>222</td>
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#### 2016 ASEE SURVEY DATA

- **16th nationally** among public EECS programs in research expenditures per tenure-line faculty member. Research expenditures grew 47% from FY 2014 - FY 2017.

- **9th nationally** among public EECS programs in PhD enrollment per tenure-line faculty member. PhD enrollment grew 13% from Fall 2014 - Fall 2017.

(Survey data from the American Society for Engineering Education)

### Current Faculty Includes:

- **3** ENDOWED CHAIRS
- **10** ENDOWED PROFESSORSHIPS
- **2** UNIVERSITY DISTINGUISHED PROFESSORS
- **10** IEEE FELLOWS
- **4** NAE MEMBERS
- **3** NAI MEMBERS
- **10** NSF CAREER Awardees
Awards For 2016-2017

Faculty Awards
- Dr. Yilu Liu named a Fellow of the National Academy of Inventors, 2016
- 2017 Alexander Prize for exceptional undergraduate teaching and distinguished scholarship, The University of Tennessee - Dr. Benjamin Blalock
- Chancellor’s Award for Research and Creative Achievement, 2017 - Dr. Hairong Qi
- UT TCE Professional Promise in Research Award, 2017 - Dr. Qing “Charles” Cao
- UT TCE Professional Promise in Research Award, 2017 - Dr. Daniel Costinett
- UT TCE Teaching Fellow Award, 2017 - Dr. Jens Gregor
- UT TCE Teaching Fellow Award, 2017 - Dr. James Plank
- UT TCE Research Fellow Award, 2017 - Dr. Leon Tolbert

Paper Awards

Student Awards
2017 University of Tennessee Chancellor’s Honors:

Extraordinary Academic Achievement
Extraordinary Academic Achievement honors are awarded to undergraduates who exhibit extraordinary scholarship.
- Sunay Bhat

Extraordinary Professional Promise
Extraordinary Professional Promise honors are awarded to undergraduate and graduate students who demonstrate professional promise in teaching, research or other contributions.
- Mst Shamim Ara Shawkat
- Cheng Cheng
- Hantao Cui
- Yong Li
- Liu Liu
- Haoyang Lu
- Yiwei Ma
- Ifana Mahbub
- Sabikun Nahar
- Ying Qu
- Farhan Quaiyum
- Alireza Rahimpour
- Lingyun Ren
- Samira Shamsir
- Aysha Siddique Shanta
- Yang Song
- Wenxuan Yao
- Zhifei Zhang
- Jiecheng Zhao

Scholar Athlete Awards
Scholar Athlete Awards honor students who excel exceptionally in both scholarship and athletics.
- Sunay Bhat

Top Collegiate Scholar Awards
The Top Collegiate Scholar Awards honor undergraduates who exhibit extraordinary scholarship.
- Richard Austin McEver

Alumni Awards
- Michael C. Crabtree received a Distinguished Alumnus Award
- Barbie S. Bigelow received an Alumni Professional Achievement Award
A message from the department head

In 2017, the Department of Electrical Engineering and Computer Science (EECS) is celebrating several anniversaries as shown by the historical timeline on page 1. The first student in electrical engineering started at UT 125 years ago in 1892. The Department of Electrical Engineering was founded 110 years ago in 1907, and the Department of Computer Science was formed in 1972 (45th anniversary). These two departments merged in 2007, making 2017 the 10th anniversary for EECS at UT. For the last 125 years, our numerous faculty, staff, and students have made innumerable significant accomplishments to the fields of electrical engineering, computer science, and computer engineering.

Systers, Women in EECS @ UTK, has started its fifth year of programs to promote the recruitment, retention, and mentoring of women students in the department. This issue highlights several members of the Systers board and how they found a welcoming community of students (page 15), and want to pass along that spirit to the next group of incoming students.

Alex Weber has lived a life of service since joining the U.S. Navy in 2005 and then becoming a Navy diver (page 21). A few of his humanitarian missions are highlighted, and he has since chosen to earn a degree in electrical engineering at The University of Tennessee. He hopes to be able to merge his love for engineering with his love for diving in his post college pursuits.

We highlight two of our large research centers, the Innovative Computing Laboratory (page 9) that has led developments in high performance computing for more than 25 years, and CURENT, an NSF/DOE Engineering Research Center founded in 2011 to provide foundational tools that can improve the future electric grid and train the next generation of engineers. CURENT’s education and diversity programs (page 12) are highlighted in this issue.

Dr. Bimal K. Bose (page 19) was initiated into the National Academy of Engineering in 2017, capping a long career in industry and academia that had him making historical contributions to power electronics.

We also highlight three generations of Blalocks at UT (page 6): Dr. Vaughn Blalock, who served as a professor at UT for 33 years, his son, Dr. Ben Blalock, who has been a professor at UT since 2001, and his son, Quillen Blalock, a senior in electrical engineering following in his father’s and grandfather’s footsteps.

Our department’s research expenditures eclipsed $21 million in FY2017, and we had more than 200 Ph.D. students. EECS ranked 9th nationally among public EECS programs in PhD enrollment per tenure line faculty member, and ranked 16th in research expenditures per tenure line faculty member. Research contributions made by faculty and students continue to make outstanding positive changes for the world.

We are proud that our thousands of alumni continue to make engineering, scientific, entrepreneurial, and humanitarian contributions to society. You can be proud of the trajectory of your home department and alma mater. We hope you get a chance to see the many exciting things going on in the department by visiting us soon.

Leon M. Tolbert
Dr. T. Vaughn Blalock was a longtime professor of Electrical Engineering at the University of Tennessee. His career here spanned 33 years, from 1965 to 1998. His son, Dr. Benjamin Blalock, is currently a professor of Electrical Engineering at UT. And if the trend holds, there may one day be another Blalock teaching Electrical Engineering at UT: Benjamin’s son, Quillen, is an EE major in the Department of Electrical Engineering and Computer Science and has set his sights on becoming a professor, too.

Dr. T. Vaughn Blalock

Dr. T. Vaughn Blalock had a long, successful and well-respected career at UT. His achievements, academic honors and accolades include:

- Chancellor’s Award for Excellence in Teaching
- Eta Kappa Nu EE Outstanding Teaching Award
- M.E. Brooks Distinguished Faculty Award
- Mortar Board Outstanding Faculty Award
- Alumni Outstanding Teacher Award
- IEEE Region 3 Joseph M. Biedenback Outstanding Engineering Educator Award
- Award of Excellence from the Halliburton Education Foundation
- Industrial Research-100 Award for the development of the Johnson Noise Power Thermometer-Industrial Prototype System
- 50 refereed papers
- 5 patents spanning Johnson noise thermometry, thermal noise power thermometry, double delay-line filters for pulse amplifiers, and a high level white noise generator

“Dad’s entire academic career was focused at the University of Tennessee- 33 years,” said Dr. Benjamin Blalock. “Many UT alumni have said that he was a great teacher and mentor. My family and I are very proud of that. Dad loved analog electronics and instrumentation. In addition to his work at UT, Dad also consulted some 40 years at the Oak Ridge National Laboratory, as well as a number of technology firms in and around Knoxville.”

“My father obtained all of his degrees from UT: BSEE, MSE, and PhD. Interestingly, his PhD is in Engineering Science and Mechanics, because at that time UT did not yet offer a PhD in electrical engineering. Also interesting, my parents methodically had one child per degree. I am happy to be the ‘PhD kid!’ And yes, all three of us became electrical engineers with a passion for analog electronics. Genetic correlation or genetic disorder? Too close to call.”

“Periodically, while running errands with Dad, we would

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continued from page 6

sometimes run into some of his former students. The gratitude and respect reflected in their eyes spoke volumes to me. Years later, during Dad’s memorial service, former students shook my hand and told me how thankful they were for all Dad had done for them. To me, that was true impact in the greatest sense. To this day, I remember the look in their eyes as they spoke to me in the receiving line. Today, often times after I finish a class lecture, I step out of the classroom, excited from the engagement of the class, and realize – Wow – this is how Dad must have felt.”

Dr. Benjamin Blalock

In the beginning, Dr. Benjamin Blalock’s career path was not necessarily set in stone. “Neither Dad, nor I, had a grand plan for me to ultimately work at UT. I did not know I would ever have the opportunity to follow in my father’s footsteps. My parents always wanted us to make our own decisions.”

In fact, Dr. Benjamin Blalock’s career might have taken an entirely different path. During high school, he considered pursuing a music degree, and he might have ended up actually marching to the beat of a different drummer.

“Symphonic percussion and rock-and-roll drum set playing commanded much of my adolescent energy,” Dr. Blalock said. “I was an energetic teenager. Though I ultimately majored in Electrical Engineering at UT, I marched for two years in the Pride of the Southland Band, played percussion in the UT Concert Band, participated in UT’s jazz small groups program as a drummer, and studied percussion under UT’s Keith Brown. UT’s music program was definitely a huge highlight of my freshman and sophomore years at UT.”

“By junior year, however, I decided it was time to be 100% EE. During my senior year at UT I had the opportunity to work as an undergraduate teaching assistant in the electronics lab. I loved it! I found working with students and helping them with their projects tremendously satisfying. At that point I realized I wanted to be a university professor. I simply could not neglect the sense of excitement my father conveyed for EE.”

After earning his bachelor’s degree in Electrical Engineering at UT in 1991, he went on to earn his master’s and Ph.D. in EE at Georgia Institute of Technology in Atlanta, finishing the latter degree in 1996. In August 2001, he returned to the University of Tennessee to teach, and today he is the Blalock-Kennedy-Pierce Professor in the Department of Electrical Engineering and Computer Science, where he directs the Integrated Circuits and Systems Laboratory (ICASL). His research focus at UT includes analog/mixed-signal integrated circuit design for extreme environments (both wide temperature and radiation) across multiple semiconductor technologies, ultra-low power (nano-Watt level) analog IC design for signal processing and computation; multi-channel monolithic instrumentation systems; and gate drive integrated circuits for wide bandgap power electronics.

He has co-authored over 200 refereed papers, and is a senior member of the IEEE. Dr. Blalock has also received numerous teaching and research awards at UT, including:

- 2017 Alexander Prize for exceptional undergraduate teaching and distinguished scholarship
- 2015 College of Engineering Outstanding Faculty Advisor Award
- 2015 College of Engineering Research Achievement Award
- Blalock-Kennedy-Pierce Professorship in Analog Electronics
- 2011 College of Engineering Teaching Fellow
- 2009 Gonzalez Family Award for Excellence in Teaching

Dr. Blalock has also served as an inspiration to his son, Quillen, who is also an Electrical Engineering student at UT.

Quillen Blalock

“I did not always know that I would follow in my father’s and grandfather’s footsteps in regards to profession,” said Quillen, “but I always aspired to live up to their examples as a good person. Their character as a friend, husband, father, and Christian is very inspirational to me, and engineering was an avenue where they found they could use these traits. I always
one of my passions is teaching. I love the opportunities my dad and my grandfather had to positively influence younger generations not only in a rigorous academic field, but also in life. I believe there are many exciting developments in the electrical engineering field of research that will discover in the near future, and I’d love to be a part of that as well. If everything works out, perhaps I’ll even get the opportunity to fill that role at UT as well.”

“My favorite project was easily the audio amplifier I had to build with my lab partner, Sam Brown, in ECE 336 with Dr. Nicole McFarlane. It was a difficult project, but I’ve never been more excited about the completion of any other one. The project required the amplifier to amplify audible sound through a speaker. When Sam and I had finally designed, debugged, and built our amplifier, we chose to try and play Rocky Top using the amplifier.

The T. Vaughn Blalock Graduate Award was created in honor of the eldest Dr. Blalock. The award is provided to a first-year UT EE graduate student focusing on electronics. The intent of the award is to help retain some of the best UT seniors in electronics for UT’s graduate program. “The endowment for this award was made possible thanks to donations to UT received in my father’s name following his death on December 28, 2000,” said Dr. Benjamin Blalock.

T. Vaughn Blalock Graduate Awardees include: Tim Grundman, Lanie Britton, Steven Bunch, Austin Womac, Ben McCue, James K. Griffin, Jeremy Brantley, Jacob Shelton, Alex McHale, David Basford, and William Norton. This award provides a financial stipend, approximately $2,000 per semester for two semesters, which is added on top of the student’s graduate assistantship, generally a research assistantship provided by the student’s faculty advisor.

Dr. Blalock is proud of his father’s legacy, and of the EE students who have benefitted from the award and gone on to greater success. He said, “All of the past awardees found good jobs after completing their graduate work. Approximately half of these students are working locally in the greater Knoxville area as electrical engineers. It is wonderful to see UT electronics students still benefiting from Dad’s legacy.”

Donors can give to the T. Vaughn Blalock Graduate Award by visiting giving.utk.edu/givetoengr. Enter amount into “Other Fund Not Listed” line, and add “T. Vaughn Blalock Graduate Award” in the “Please Describe Fund Not Listed” line below.
Situated in the heart of the University of Tennessee campus and at the nexus of academia, government, and industry, the Innovative Computing Laboratory impacts the world as a leader in advanced scientific computing and high performance computing (HPC) through research, education, and collaboration.

The unique challenges of today’s computational research are characterized by large datasets and the need for greater efficiency, performance, and power. ICL’s cutting-edge efforts, which now span more than 25 years, have evolved and expanded with the agility and focus required to address those challenges. ICL’s work encompasses a solid understanding of the algorithms and libraries for multicore, many-core, and heterogeneous computing, as well as performance evaluation and benchmarking for high-end computing. In addition, ICL’s portfolio of expertise includes high-performance parallel and distributed computing, with keen attention to message passing and fault tolerance.

The tools and technologies that ICL designs, develops, and implements play a key role in the use of supercomputing for discoveries in areas such as the life sciences and drug design, climate science, earthquake prediction, energy exploration, combustion and turbulence, advanced materials science, and more.

ICL’s founder, Dr. Jack Dongarra, established the lab in 1989 when he received a dual appointment as a Distinguished Professor at the University of Tennessee, Knoxville and as a Distinguished Scientist at Oak Ridge National Laboratory. Since then, ICL has grown into an internationally recognized research laboratory, specializing in numerical linear algebra, distributed computing, and performance evaluation and benchmarking. Dr. Dongarra is perhaps best known for his development of the LINPACK benchmark application, which is used to evaluate high-performance computing (HPC) performance and to rank supercomputers in the international Top500 list.

Research

Increased efforts to keep pace with the evolution in HPC hardware and software present unique challenges that only a handful of enabling technology researchers are capable of addressing successfully. ICL’s cutting-edge research efforts have provided the foundation for addressing these challenges and serve as catalysts for success in their ever growing research portfolio. Its vision, its expertise, its determination, and its track record continue to position ICL as a leader in academic research.

What originally began over 25 years ago as in-depth investigations of the numerical libraries that encode the use of linear algebra in software, has grown into an extensive research portfolio. ICL has evolved and expanded its research agenda to accommodate the aforementioned evolution in HPC, which includes a focus on algorithms and libraries for multicore and hybrid computing. As ICL has gained a solid understanding of the challenges presented in these domains, it has further expanded its scope to include work in performance evaluation.
and benchmarking for high-end computers, as well as work in high performance parallel and distributed computing, with efforts focused on message passing and fault tolerance.

Numerical Linear Algebra

Numerical Linear Algebra algorithms and software form the backbone of many scientific applications in use today. With the ever-changing landscape of computer architectures, such as the massive increase in parallelism and the introduction of hybrid platforms utilizing both traditional CPUs as well as accelerators, these libraries must be revolutionized in order to achieve high performance and efficiency on these new hardware platforms. ICL has a long history of developing and standardizing these libraries in order to meet this demand, and the center has multiple projects under development in this arena.

Performance Evaluation and Benchmarking

Performance Evaluation and Benchmarking are vital to developing science and engineering applications that run efficiently in an HPC environment. ICL’s Performance Evaluation tools allow programmers to see the correlation between the structure of source/object code and the efficiency of the mapping of that code to the underlying architecture. This relationship is important for performance tuning, compiler optimization, debugging, and finding and correcting performance bottlenecks. ICL’s benchmark software is widely used to determine the performance profile of modern HPC machines, and has come to play an essential role in the purchasing and management of major computing infrastructure by government and industry around the world.

Distributed Computing

Distributed Computing is an integral part of the high performance computing landscape. As the number of cores, nodes, and other components in an HPC system continue to grow explosively, applications need runtime systems that can exploit all this parallelism. Moreover, the drastically lower meantime to failure of these components must be addressed with fault tolerant software and hardware, and the escalating communication traffic that they generate must be addressed with smarter and more efficient message passing standards and practices. Distributed Computing research at ICL has been a priority for nearly two decades, and the lab has several projects in that area under active development.

2016/2017 Highlights and Accolades

ICL to Participate in a Project Essential to the Nation’s Security and Competitiveness

The biggest news for ICL in the last year is the US Department of Energy’s Exascale Computing Project (ECP). The ECP was established in July 2015 as part of the National Strategic Computing Initiative. The aim of the ECP is to develop a capable exascale ecosystem that will encompass applications, system software, hardware technologies and architectures, and workforce development to meet the scientific and national security needs of the US Department of Energy in the early-2020s timeframe. In late 2016, ICL won proposals to participate in six of 35 software development awards and one of four co-design center awards for the ECP. First year funding for all the ECP software development awards totals $34 million. The four co-design centers were selected as part of a four year, $48 million funding award. For its role in the ECP software projects and the co-design center, ICL will receive about $3.3 million in funding the first year and more than $3.4 million in each of the next two years, for an overall total of approximately $10.2 million. DOE’s vote of confidence in ICL as evidenced by these awards is a product of ICL’s more than 25 years of hard work in delivering solid open-source software to the research community, industry, and society in general.

Dr. Dongarra is the principal investigator on three of the 35 software development proposals funded for the first year of the Exascale Computing Project (ECP).

These software development projects are enabling ECP to create a comprehensive software stack for exascale systems, including programming models and run time libraries, mathematical libraries and frameworks, tools, lower-level system software, data management and I/O, and in situ visualization and data analysis.

Jack Dongarra Wins HPDC Achievement Award

For his groundbreaking contributions to high performance computing, Dr. Jack Dongarra was honored with the 2016 High Performance Parallel and Distributed Computing (HPDC) Achievement Award, which he accepted at the 25th annual Association for Computing Machinery’s HPDC conference in Kyoto, Japan.
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The HPDC conference established the achievement award to recognize leading computer scientists who have made long-lasting and influential contributions to the foundation or practice of high-performance parallel and distributed computing and for seminal contributions and a sustained record of high impact in the field.

Paper on ATLAS Earns SC16 IEEE Test of Time Award

Clint Whaley and Jack Dongarra’s “Automatically Tuned Linear Algebra Software,” a paper written and published nearly 20 years ago for the SC98 supercomputing conference, received an IEEE Test of Time Award at SC16 in Salt Lake City. This paper was a major development in what would become the ATLAS software project.

Regarding the selection of this paper, the SC16 conference website stated: “This paper has received hundreds of citations, and new citations still appear. In addition to the portable performance that ATLAS provides to the CSE community, the autotuning strategies used in ATLAS have been an inspiration to other research teams who are doing similar work.”


Dongarra Becomes a Foreign Member of the Russian Academy of Sciences

On October 31, 2016, Vladimir Fortov, president of the Russian Academy of Sciences (RAS), informed Dr. Jack Dongarra that the organization had elected him as a foreign member. In making this esteemed list of well-known scientists from various countries and disciplines, Dongarra joins a number of other Nobel laureates, seven seven Nobel laureates, including famous American statesman Henry Kissinger.

New Research Projects, Publications, Conferences & Events

In addition to 29 research projects already underway as of 2016, 11 new projects are underway in 2017, funded by new awards from DOE and the National Science Foundation as part of the ECP.

“In winning the array of seven awards from the US Department of Energy’s Exascale Computing Project (ECP) during the fall of 2016, ICL earned a place among the elite set of researchers from DOE laboratories who will create the software infrastructure for the nation’s first exascale machines. In addition, several other projects will begin in the 2017 year under new awards from DOE and the National Science Foundation. Following are brief summaries of the activities in which we will be involved when the work funded by these new awards gets underway in 2017.”

Furthermore, in the last year, the research team at ICL produced 40 publications and participated in 34 conferences in the US and abroad.

“For the next three (or, potentially, seven) years,” said Dr. Dongarra, “ICL will be part of the elite vanguard of researchers from DOE laboratories and designated universities that will create the software infrastructure needed to exploit the power of the nation’s first exascale machines. Each of our research groups will have high-profile software projects of significant impact to the ECP. Our successes with the National Science Foundation in 2016 also guarantee that we will continue to push forward with our traditional research agendas in all three ICL focus areas,” Numerical Linear Algebra, Distributed Computing, and Performance Evaluation and Benchmarking. “The stage is set for plenty of inspiration and enthusiasm at ICL as we continue the research in our respective areas and participate in the nation’s major push to achieve exascale computing early in the next decade.”

Dongarra establishes Professorship in HPC

In 2017, Dr. Jack Dongarra endowed the new Jack Dongarra Endowed Professorship in High-Performance Computing in the EECS Department. The professorship will be given to a faculty member in the Department of Electrical Engineering and Computer Science in the Tickle College of Engineering. The individual selected shall have expertise and be working in the area of high-performance computing.

(Katie Jones of ORNL contributed to this article.)
Spotlight On: CURENT Education and Diversity Programs

CURENT, the Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks, is a National Science Foundation Engineering Research Center that is jointly supported by the National Science Foundation (NSF) and the U.S. Department of Energy (DoE). A collaboration between academia, industry, and national laboratories, CURENT is led by the University of Tennessee, Knoxville. Partner institutions include Northeastern University, Rensselaer Polytechnic Institute and Tuskegee University. Each campus has their own faculty and/or staff working to carry out CURENT’s education and outreach initiatives. At the University of Tennessee, that is Dr. Chien-fei Chen, Education & Diversity Director and Dr. Daniel Costinett, Education & Diversity Co-Director.

CURENT’s vision is of a nation-wide or continent-wide transmission grid that is fully monitored and dynamically controlled in real-time for high efficiency, high reliability, low cost, better accommodation of renewable energy sources, full utilization of energy storage, and accommodation of responsive load. Fulfilling this vision requires a new generation of electric power and energy systems engineering leaders with global perspectives and diverse backgrounds.

All CURENT partner universities share a common goal to develop education programs that will provide multi-disciplinary, team-driven, and systems-oriented educational opportunities to pre-college students and engineering educators, as well as undergraduate and graduate college students. The objectives of CURENT’s education and diversity programs are:

• To design a multi-disciplinary curriculum focused on electric energy transmission system analysis and problem-solving skills
• To develop connectivity with industry, partner institutions, and the larger power and energy system community
• To introduce pre-college and undergraduate students to the possibility of pursuing careers in power and energy
• To extend education and outreach program development to each CURENT partner campus
• To establish programs that increase domestic student participation and attract minority and underrepresented students.

CURENT offers a variety of educational and diversity programs:

• For pre-college students and engineering educators: Activities that inspire young students and teachers to learn engineering-related knowledge
• For undergraduate students: Research experiences, certificate programs and innovative curriculum offerings for university-level students
• For graduate students: Specialized certificate programs, CURENT-specific curriculum tracks, and industry connectivity activities for graduate-level students.

Pre-College & Engineering Educator Programs

A fundamental component of CURENT’s pre-college program is to inspire young students and teachers through education outreach. Its goal is to inform K-12 students about present and anticipated energy-related issues, encourage problem-solving through creativity and an active imagination, and to familiarize them with possible engineering career paths. Pre-college program objectives include promoting diversity from an early age with the goal of increasing enrollment of underrepresented populations in university programs; promoting energy and engineering literacy in elementary schools and inspire students to explore engineering and science education; developing long-term partnerships with schools; providing teachers and young scholars with research opportunities to advance their engineering knowledge; and introducing electrical, renewable energy, and power system concepts into classrooms.

Four representative programs are the Young Scholars program, Research Experience for Teachers (RET), Adventures in STEM Camp and Family Engineering Night.

The Young Scholars program at CURENT, for grades 9-12, gives high school students interested in electrical engineering a chance to perform research with CURENT faculty and graduate students in its campus laboratories. This all-day research experience occurs over 3-5 weeks in the summer. There are several benefits to the program: UTK admissions seminars, guided research projects, mentoring by graduate students & faculty, power and energy systems classes, communication & presentation seminars, field trips and social events.

The Research Experience for Teachers (RET) program offers K-12 educators with a focus in STEM fields the opportunity to do research with CURENT faculty and graduate students for continued on page 13
either an academic year or summer term. This program helps K-12 teachers and community college instructors develop curricula related to electricity and the power grid. Teachers who have participated in RET find it to be an invaluable learning experience.

Joe Foy, Math, Physics and Programming Instructor at L&N STEM Academy in Knoxville is another educator who has participated in the RET program. Among other activities, he has done research on wind and solar power, and created problems for his programming and physics students based on that research. He appreciates the opportunities that the RET program provides. “I appreciated the untiring effort and leadership of Dr. Chien-fei Chen. She was extremely thorough, hard-working, professional, a great listener, and totally committed to the success of RET personnel. She was encouraging to all participants.”

Lauren Sanderson is a teacher of pre-calculus, algebra 2, applied math concepts and “Response to intervention” (RTI) math at Bearden High School in Knoxville. She participated in the RET program for two summers, in 2016 and 2017. “I created three lesson plans each year that dealt with math and electrical engineering. I related light bulbs to cosine and sine waves. I related wind turbines to math calculations. I created a lesson to talk about frequency and amplitude with trigonometric functions. I also created a breakout game on solving for variables from wind turbine calculations. The RET program was an excellent program to have teachers get together and create lesson plans, activities, and learn about electrical engineering. I would come back every summer if I could!”

Ruben Saroukhanian, Instructor of Computer Networking Technology at Nashville State Community College, said that he has gained a lot from the RET program. “It gave me time for research, prepping up materials to include into the Network Security course. RET widened my outlook and introduced me to the new developments, problems and solutions that apply to the security of power generation, transmission and distribution. This is an excellent program that gives a fresh perspective to school teachers and even college instructors and professors.”

At Adventures in STEM Camp, for grades 6-8, students are immersed in a week full of hands-on activities, lab visits, and team projects in UT labs and classroom rooms that expose the exciting challenges of being a scientist or researcher. Overall, the week will be geared towards students who are interested in expanding their knowledge of engineering, math, and biology. Over the last two years, Ms. Minton, the biology and STEM teacher from German-town, TN, has participated in the STEM Girls Camp, teaching girls about electricity and electrical engineering, engaging them in hands-on activities, interviewing CURENT faculty and students, and taking them on trips to see electrical engineers in the field.

Parental involvement and support are essential in order to have a successful pre-college program. CURENT organizes Family Engineering Nights, for grades K-8, multiple times each year, inviting parents from the partner pre-college schools to experience the Center’s research and education activities.

Sequoyah Elementary in Knoxville is one such school that hosts a Family Engineering Night event every year, and each year the student and family participation has increased. Erin McCol- lum, an instructor in the Science Lab at Sequoyah, has participated in this event for the last seven years. She plans and organizes all of the activity stations for the school’s Family Engineering Night. Activities can range from parachute building, testing structures over a simulated earthquake structure and solar cars to newspaper towers, catapults, and straw rockets. “This event is highly anticipated and very well attended by students and their families,” she said. “I have always gotten positive feedback after our events. Kids say it’s so fun and parents are excited to do the hands on activities with their children. Our science, technology, engineering, and math initiatives are very strong at Sequoyah, so this event is just another way to reinforce the skills they are already learning in the classroom.”

Undergraduate Education Programs

CURENT’s undergraduate education program has three key pieces: Research Experiences for Undergraduates (REU); an undergraduate concentration in Power and Energy Systems; and Senior Design projects in electrical power systems. Through the undergraduate education program, the Center expects to produce a diverse and uniquely qualified group of students that can become a pipeline for the graduate program. Undergraduate students who successfully complete REU, concentration in power and energy systems, and senior design projects in electrical power systems will be given priority for the Center’s graduate fellowships.

The Research Experience for Undergraduates (REU) program pairs participants with graduate mentors to work on one of CURENT’s projects. This program places undergraduates into power systems or power electronics research projects. REU offers undergraduate students outside of UT, Knoxville the chance to perform in-depth research with faculty at CURENT’s world class facilities. Students will work on various research topics, such as power systems, power electronics and drives, alternative energy sources, cyber security and smart grids and large data analytics and visualization.

Each student will customize
his or her own research, based on personal interests, by working closely with faculty and graduate students throughout an eight week summer program. The program culminates with a poster presentation to faculty, graduate students and fellow researchers to highlight each individual’s work.

Kellen Michael Oleksak says that his REU experience “was a great introduction to the deeper learning, and uncharted territories that one would encounter in an engineering research facility.” Oleksak, an Electrical Engineering major here at the University of Tennessee, Knoxville, participated in the program during the summer of 2017. The research group he worked with developed and tested power system models for large scale North American grid systems. “My research involved studying devices used in these systems to generate and transmit electricity, as well as control power already being distributed,” said Oleksak. “Then my main focus was on developing a software tool for grid system analysis.” His REU experience “made me work harder in my courses and pushed me to learn more about subjects than just what is presented in class. I felt constantly challenged to achieve progress and that is what I enjoyed most about the REU at UTK.”

Jessica Wert is an Engineering Sciences major at Smith College in Northampton, Ma. She thoroughly enjoyed her REU experience. “This was my first formal introduction to power systems, so it was eye-opening. The program was extraordinarily well-facilitated from faculty lectures, industry- and research-oriented field trips, and social events. A strong sense of community was developed among student researchers as we learned about power systems and electronics from all possible perspectives. I completed research advised by Dr. Hector Pulgar under the mentorship of Jonathan Devadason. My project was to produce an analysis and visualization of frequency in power systems with the goal of locating key points such as the center of inertia and determine ideal locations for placement of fast-acting energy storage units. This REU experience had an overwhelmingly positive impact on my overall college experience and sparked my continued interest in power systems.”

Undergraduate Concentration in Power and Energy Systems
CURENT offers undergraduate students the opportunity to focus on Center-related topics through an Electrical Power & Energy Systems track. Students who select this concentration will earn a university-issued certificate stating that they have obtained advanced knowledge on the subject. The department offers a concentration for undergraduates who are interested in the fields of power system and power electronics. This concentration pulls together currently-offered courses to provide students with an in-depth focus towards control systems, operations, planning, system components, power electronics, and circuits.

Senior Design Projects
Senior students can submit a design project as part of their graduation requirements. The CURENT design program allows students to collaborate and create projects based on research being done in the Center. Faculty will work with undergraduates on the projects. Recent examples include a solar energy device, overseen by Dr. Leon Tolbert, and a controllable load testbed, overseen by Dr. Fran Li.

Graduate Education Programs
CURENT supports more than 100 graduate students among the four domestic partner schools.

Graduate Certificate Program & Courses - CURENT offers a Graduate Certificate for students interested in expanding and solidifying their understanding of power and energy systems. The Certificate in Power & Energy Systems is intended for currently admitted graduate students in electrical engineering, computer engineering, or computer science.

Graduate Research Funding Opportunities - There are typically numerous, funded, research opportunities available at CURENT. CURENT offers Graduate Research Assistantships (GRAs) for students who will perform research. In addition to the CURENT GRA positions, each faculty member also has resources available through additional funding sources such as research grants, company sponsorships and private donations.

Diversity Programs
CURENT is committed to promoting diversity within all science, math, technology, and engineering fields. From kindergarten through graduate school, we strive to offer programs and opportunities that will both inspire learning and increase the motivation for students and educators.

Diversity Goals
• Promote, increase, and maintain the diversity of the Center’s leadership, faculty, and students to levels above the national average for engineering programs
• Increase enrollment of domestic graduate students

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Systers: Women in EECS @ UTK is a volunteer student organization whose mission is to recruit, mentor, and retain women in the Electrical Engineering and Computer Science (EECS) department at the University of Tennessee. Going into its fifth year of existence, Systers is proud of its accomplishments so far: mentoring young women entering EECS; reaching out to girls in the community to tell them about opportunities in their field; and helping ensure that talented students have access to the EECS department’s resources and their community’s industry opportunities, regardless of gender.

Systers is as committed as ever to its seven core mission programs: mentorship; the Circles program (a series of discussion groups); tutoring; the Skills Series (workshops on common skills necessary for success in industry and/or academia); community outreach programs, social events (such as the Welcome Back Celebration at the beginning of each fall semester); and conference travel awards, where Systers funds members to attend professional conferences for women in technology.

Select Systers Events from 2016-2017:

• Systers held Skills Series events, such as the Introduction to MATLAB class, where participating students gained hands-on experience with the basic functions of this popular programming language.

• Systers held an “Expo Workshop,” designed to prepare students for the Spring Engineering Expo, a large event on campus in February where they could meet and network with potential employers and representatives from several companies. At the workshop, company representatives and professionals reviewed resumes, hosted mock interviews and critiqued “elevator speeches.”

• Also in February, Systers hosted the Little Systers Outreach Event. At this free event for high school girls from around East Tennessee, attendees learned the basics of Electrical Engineering, Computer Engineering, and Computer Science; about career opportunities in these historically male-dominated fields; and how to be successful as a woman in engineering. The special keynote speaker for this event was Stephanie Espy, a chemical engineer, graduate of MIT, UC Berkeley and Emory University, founder of MathSP Academic and Test Prep Coaching, and the author of Stem Gems, a book that promotes stem careers for girls. Some of the participants said afterwards that they were leaning towards careers in engineering and similar fields.

• In August 2017, Systers hosted its fifth annual Welcome Back Celebration, along with the IEEE and ACM student organizations. The event featured a booth fair with recruiters from visiting employers, lab tours and demos, seminars with Oak Ridge National Laboratory, a pizza party and a raffle. Several hundred students came to the Min Kao building to kick off the fall semester and enjoy the party.

• In October, members of Systers will once again attend the Grace Hopper Celebration of Women in Computing, this time in Orlando, Florida. The Grace Hopper Celebration is a conference that connects, inspires, and guides women in computing and is the world’s largest gathering of women technologists. The event’s organizer, the Anita Borg Institute, expects 18,000 attendees in 2017.

A group of Systers members shared their thoughts about their student organization and what it means to them:

Discovery

As the only engineering student on her dorm floor, former Systers President Divyani Rao was excited to find out that there was a student organization like Systers in EECS. She started at UT in 2013 and heard about Systers in her CS102 class. Trea-
surer Aysha Shanta first learned about Systers from a friend who had been a board member. “She told me how she was a member of the founding board of the Systers organization and how it inspired her to contribute to the lives of women in the Electrical Engineering and Computer Science Department,” said Shanta, Current Systers President Sophie Wardick “first learned about Systers during my freshman year from one of the TAs in my Introduction to Computer Science class. After hearing about everything that Systers has to offer, I decided to attend one of the events, and the rest is history!”

Elation

Several members recall feeling elated upon discovering Systers. Shanta said, “I was both excited and motivated by hearing that such an organization existed and had the dream that someday I might be able to contribute to the great purpose of the organization.” Systers Secretary Ava Hedayatipour felt more comfortable “knowing that I am in an environment that values student organizations. I learned about how important it is to have these organizations when I started working as a teaching assistant and saw among my students that being among the few girls in EE and CS can be overwhelming, especially for undergraduate students.” Daniel Barry, Outreach Chair and one of Systers’ male members, was “tremendously impressed that such a wide-spanning student-run organization could exist. The mentorship, tutoring, and Circles programs, to name a few, take a lot of planning and finesse to be successful, yet Systers has been providing them flawlessly.”

Joining Systers

For Wardick, the decision to join Systers was an easy one. “As a new freshman Computer Science major, I was definitely a little intimidated by the college experience. I was looking for a sense of community in the EECS department, and from the first Systers event I went to, I felt like I finally belonged.” Being a Systers member made Hedayatipour’s first year in the United States and first year as a Ph.D. student much easier, too. “I wanted to help others in the same situation to have a better experience in the EECS department.” Barry joined during his sophomore year, while taking a special topics course sponsored by Systers. “This course opened my eyes to issues related to equality and professional conduct present in both academic environments and the workplace. As such, I was motivated to join Systers in their mission to recruit, mentor, and retain women in the fields of electrical engineering, computer engineering, and computer science.”

Each year, with the desire to become more involved in the organization, several Systers members take the next step and become board members. Systers Vice President Gangotree Chakma said, “I used to attend almost all of the events organized by Systers, and it made me more involved and interested to serve as a board member of Systers.” “I was involved with Systers for a year, and I volunteered to help with many of their events,” added Systers Mentorship Chair Mihaela Dimovska. “Thus I was encouraged to apply for a board position and be able to help even more.” Wardick tells a similar story; “After participating actively in Systers programs and events for about a year, I decided that I was ready to take my involvement to the next level. I was excited to have the ability to help carry out the Systers mission and shape the direction of some of the programs that meant a lot to me as a member.” When Barry was nominated for the 2017-2018 Systers board, he decided to run in the board election. “I felt that I was ready and able to lead and act on the discourse within the EECS Department on the issues I learned from the class Systers had sponsored.”

Engineer and author Stephanie Espy, signing books at the Little Systers event in February Activities

Once they have been elected, the Systers board members have plenty to keep themselves busy. Shanta helped with making budgets for every event Systers organized the past year. She oversaw the pizza party at the Welcome Back Celebration in 2016 and 2017, which were attended by more than 500 people and 300 respectively. She conducted a Matlab workshop for Systers’ members in the spring 2017 semester. “Meetings with the board every week and discussing the future of the organization is a huge responsibility in itself,” Shanta said. “The goal is to brainstorm ideas with a bunch of enthusiastic people from different majors and work towards the same goal of recruiting, mentoring and retaining the women in the department. Also, as a member, I was a part of Systers outreach programs where I was in charge of assigning volunteers and welcoming the high school students. I went to L&N STEM Academy to motivate students to attend the Outreach program.”

In Wardick’s first year on the board, she was the Communications Officer. “My main responsibilities,” said Wardick, “included managing the communication between the Systers board and the membership through email, social media, advertising, and our Systers website. I also collaborated with our Outreach Officer to create a monthly newsletter detailing all of Systers’ activities.” As the new, current President, she oversaw the planning of the Welcome Back Celebration, Systers’ annual back-to-school event for the EECS department. “Throughout the year, I also coordinate our donor relations and communicate with
fun to see the girls’ faces light up when they complete an activity and see the real applications of computing or electrical engineering, and it is so gratifying to know that we may have sparked a passion for these disciplines in them.

Barry said, “My favorite activity as a member of Systers is the weekly Circles meetings because it is an ongoing dialogue with other Systers members wherein there is discussion of their experiences and thoughts regarding some of the same issues outlined in Sheryl Sandberg’s book, *Lean In*. It is a highly successful means of making new friends and expressing one’s thoughts.”

**Systers Has Had a Positive Influence on Personal and Professional Development**

Rao believes that Systers has enriched and positively impacted her college experience. She feels like Systers has helped her become more comfortable speaking in public, and more confident, both professionally and personally.

Hedayatipour said, “I have made a lot of friends and wonderful experience by being a Systers member. These experiences range from trying out new restaurants as a part of mentorship program, to traveling to San Francisco or being in charge of setting up rooms and microphones for an event. Each experience is unique and wonderful when I recall them.”

Wardick reiterated the confidence-building aspect of being a member of Systers. “If it weren’t for Systers,” she said, “I would not have had the courage to press on through some of the hardest parts of the Computer Science major. Hearing the stories of other women, especially my peers, who have faced similar challenges yet continue to defy stereotypes and achieve great things has definitely inspired me to strive for success.”

Several Systers, as a result of membership in the organization, have had the opportunity to take on leadership roles and inspire others.

Soon after she joined, Divyani Rao was participating in activities such as speaking to computer science clubs at middle schools; she was elected to be the Outreach Officer as a sophomore; and as a board member, she helped out with all of Systers’ activities.

Dimovska said, “I believe that I have such an opportunity now by being a board member and Mentorship chair. As one of our board alumni put it, the Mentorship program helps people get one step ahead in achieving their goals, by getting support from people who are already there. I believe this program is a valuable resource for students and helps our mission to recruit and retain women in EECS, thus it inspires and helps the people involved in it to achieve their goals.”

“Before I became a Systers Board member,” said Wardick, “I had the opportunity to grow as a leader by serving on the Systers Outreach Committee that organizes our annual Little Systers event. In addition to the responsibilities of my board positions, I also have helped plan events like our Undergraduate Social, organized trips to two conferences, and visited local high schools to promote women in engineering. Now that I am the Systers president, I have a more visible leadership role.”

**Continued Growth**

The student organization would like to continue to grow and encourage more people, particularly women in EECS, to get involved and use its programs. “I would love to see Systers continue to increase its active membership,” Wardick said. “I think it is important that we try to engage all of the women in our department so that they know about all of the programs we have to help them succeed.”

**Looking to the Future**

The present Systers board members hope to leave the organization in good shape and in good hands after graduation, as well, so that future students can reap the benefits of the efforts they are making today. “The future of Systers depends a lot
on the work that we do as the current board members,” said Shanta. “If we are able to retain more women in the department than the previous year, then we can call our year a success.”

Wardick added, “It is always exciting to see what new ideas each new Systers board will introduce, but regardless of which events and programs come and go, I believe our organization will continue to be successful as long as we stay true to our core mission of recruiting, retaining, and mentoring women in EECS. Along these lines, I think Systers should work on continuing to develop younger members into leadership positions because these members are the future of our organization.”

Post-Graduation Careers

Systers members believe that their experiences in this organization will have a positive impact on their careers after graduation, too.

Rao has already received an internship at Cisco after inter-viewing while at the Grace Hopper Celebration. “If I hadn’t been a member of Systers, this opportunity wouldn’t have arisen,” she said.

“Yes, definitely- it will have a positive impact, I’m sure,” said Dimovska. “In Systers I get to network with many inspiring women, people from industry and academia, and I make many new connections and learn about career possibilities that I could take one day. Also, being in Systers I get to share my interest for computer science with many other people and by interacting with them I learn new things from my field.”

Wardick said, “I’ve grown a lot, both personally and professionally, because of my involvement in Systers the past few years. I am grateful to be plugged in to such a strong community of both past and present Systers members. Because of the conferences for women in tech that I have attended with Systers funding, I have also had the chance to connect with women across the country, whether they are fellow university students or highly successful women in industry. As I figure out how to navigate my future career, I am so thankful to have such a diverse and supportive network of women who I can learn from.”

Barry agrees. “It has taught me how to have conversations with new people and work cooperatively to achieve goals. The Circles program and being on the Systers board have helped improve my articulation and public speaking,” and effective communication is key to a successful career.

Above All, Systers is a Community

More than one Systers member said that, overall, the thing they like best about Systers is the sense of community and camaraderie that the organization engenders in its members.

“Meeting new and inspiring people, I am lucky to know all the other members; each of them impress me by their ideas and dedication,” said Hedayati-pour.

“My favorite thing about being a member of Systers,” Barry added, “is participating in a genuine community that fosters mentorship and education to promote successful career and leadership development in EECS.”

Finally, Sophie Wardick summed it up, saying “The community aspect is definitely my favorite part of being a Systers member. Because of Systers programs like mentorship, Circles, and even our departmental events, I have met so many great friends and mentors from a wide range of educational backgrounds, from freshman to graduate students, and from a wide range of disciplines, from electrical engineering to computer science. I am so thankful for the experiences I have been able to have with these women as we continue to learn and grow, and I look forward to sharing these experiences with our new members every year as Systers continues to expand.”

CURENT

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• Increase the enrollment and the diversity of undergraduate students

Collaborative Programs

Besides its own programs and efforts, CURENT also works with the Tickle College’s Engineering Diversity Programs, the Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP), the National Society of Black Engineers, and additional groups to facilitate the most effective and accessible programs.

The center collaborates with various programs on campus and provides project content for programs such as Middle School Introduction to Engineering Systems (MITES) and High School Introduction to Engineering Systems (HITES). These programs identify and select pre-college students who demonstrate interests within engineering and offer them the opportunity to explore UT. Other programs include Engineering Volunteers for Ninth Graders (eVOL9) and Engineering Volunteers for Tenth Graders (eVOL10). The Tickle College’s Engineering Diversity Programs Office offers these summer programs. Their objective is to provide an introduction to engineering, showcase the applications of math and science, and show students what engineers do in the real world. Participants learn about careers in engineering, visit engineering labs and facilities, compete in engineering challenges, cultivate new friendships, and gain a jump-start on their academic careers.
Emeritus spotlight

Dr. Bimal Bose

EECS Professor Emeritus Dr. Bimal Bose had a long and successful career in power electronics, in both industry and academia. He has won several awards and written many books and publications on power electronics. He even has an award named for him and has recently been elevated to one of the highest echelons in engineering.

Dr. Bimal Bose was born into a large family in Khalis Khali, a remote village in Bangladesh, at the time a part of India. He was an undergraduate student at Bengal Engineering College (BEC), now called the Indian Institute of Engineering Science and Technology, Shibpur.

Engineering education was not very developed after India established its independence in 1947. Students seeking higher engineering degrees normally studied in the universities of the United Kingdom. Gradually, after independence, the government of India established a number of Indian Institutes of Technologies (IITs) that grew to be world-class institutions.

Later, Dr. Bose came to America. “I pursued my master’s degree at the University of Wisconsin, Madison, from 1958 to 1960. I was selected as a scholar for the USA-India Technical Cooperation Mission (TCM, which later became United States Agency for International Development [USAID]), and my expenses for the Wisconsin study were covered by TCM. Besides education, the TCM organized an excellent program for my all-round experience with the American educational system. Under the terms of this program, I was required to teach in an Indian university for a minimum period of three years."

“I conducted my M.S. research on the study of three-phase, diode-bridge rectifier harmonics and their effects on general utility systems using a distributed-parameter, LC-model transmission line.”

“Coming from India to the USA, and Wisconsin in particular, was an exciting experience for me. It was a different world, where people looked so lively and prosperous. With an Indian friend, I rented an apartment where I used to cook Indian food, but during the day, I ate American food in the university cafeteria. Winter weather in Wisconsin was extreme, and sometimes temperature used to fall to -16°F. The streets and the two lakes, Mandota and Manona, in Madison were completely frozen. I found it difficult to walk on the sidewalks and roads with a heavy coat and my briefcase in hand. I could hardly believe that men were ice-fishing on the lakes.”

“After completing my studies at the University of Wisconsin, I returned to India and joined the faculty at BEC, where I introduced a new course in industrial electronics. I did my doctoral research at Calcutta University on Ramey magnetic amplifiers from 1960 to 1965.”

From 1960 to 1971, Dr. Bose was in the faculty of BEC, where he researched magnetic amplifiers, supervising many MA-based research projects.

“The year 1971 was momentous for me, as I emigrated from India to the USA and started my academic career at Rensselaer Polytechnic Institute (RPI) as a visiting professor in modern power electronics.”

“I applied for a faculty position at RPI, but getting an offer while I was in India was not easy. To test my knowledge, the department chairman asked me to submit four doctoral research topics and formulate a full senior/graduate course in power electronics. This was quite a challenge for me as an Indian whose strength was mainly in magnetic amplifiers. However, GE-CRD (General Electric Corporate Research and Development), which worked closely with RPI’s EE Department, examined my submission and approved it. The official appointment letter from RPI helped me to get my emigration visa or “green card” easily from the American consulate.”

Dr. Bose was at RPI for five years, until GE-CRD offered him a full-time job in 1976. “I could not refuse GE-CRD’s attractive offer. Having spent sixteen years in university career, I always felt that I had a large gap in my education and expertise. As a graduate student, I did not have much experience getting my hands dirty in fabricating large power converters with complex electronic circuits, or solving
the real world EMI (electromagnetic interference) problems of large converters. My doctoral studies were rich with analytical work using complex waveforms, equations, etc., but not with real world applications.”

“GE-CRD was then considered the ivory tower of power electronics worldwide, and power electronics specialists from all over the world used to visit its labs in Schenectady. All the conferences were then filled with the company’s papers, and there were hardly any papers from universities. I thought it would be very unwise not to accept the GE offer.”

Dr. Bose worked on several different types of projects at GE-CRD, including an electric vehicle called the ETV1, and control development of a linear inductor machine for railroad propulsion.

Due to various factors such as internal GE volatility into the 1980s and competition from Japanese companies, such as Hitachi, Toshiba and Mitsubishi, Dr. Bose decided to return to a university career in 1987, after spending eleven years in GE-CRD.

“I found that my expertise in power electronics had improved significantly due to the blending of practical experience with my theoretical knowledge. I also gained tremendous visibility in the world in the power electronics field because of my books and other publications. I thought it was the right time to migrate to the prestigious university job where I really belonged. One fine morning, I got a call from Prof. Jack Lawler of the University of Tennessee, Knoxville, with an invitation to visit the campus. There I was offered the endowed Condra Chair of Excellence in Power Electronics Applications.”

He was tasked with building up the then-fledgling power electronics program. For the next 15 years, he helped strengthen the program and paved the way for landing the National Science Foundation-backed Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks.

“In parallel, I also started working as Chief Scientist of the newly established Power Electronics Applications Center (PEAC) of the Electric Power Research Institute (EPRI). Part of my responsibility was to promote power electronics education and research in the United States. In addition to my regular graduate students, I managed to recruit a large number of visiting professors and research scholars from abroad to come and work in my laboratory, funded by their respective governments. All of them were brilliant scholars.”

During his years at UT, Bose was honored seven times by the IEEE, including being named a Life Fellow, as well as receiving a lifetime achievement award, the IEEE Lamme Medal and the Millennium Medal for Outstanding Contributions in Power Electronics. He was also given an honorary D. Sc. degree from the President of India.

Dr. Bose retired from the University of Tennessee in 2002, but two of his greatest honors have come since his retirement from teaching.

Dr. Bimal Bose Energy Systems Award

In 2014, the IEEE Industrial Electronics Society (IES) established the Dr. Bimal Bose Energy Systems Award, to recognize an individual who is a young researcher with outstanding contributions to the field of Industrial Electronics applied to Power Electronics and Energy Systems. The candidate must be a member of IES who, on the date of nomination, is within his/her 25 years of professional experience from the date of his/her last academic degree. The award consists of an honorarium of $3,000, award certificate, and travel support to attend the award ceremony. To date, there have been three Bose Energy Systems Award recipients: Dr. Marco Liserre in 2014, Dr. Mariusz Malinowski in 2015 and Dr. Samir Kouro in 2016.

Member of the National Academy of Engineering

For its class of 2017, the prestigious National Academy of Engineering elected Dr. Bose to its ranks. Election to the NAE is considered to be among the highest recognitions in engineering fields, and it is a recognition of a lifetime’s worth of accomplishments. “This honor has come to me very late in my career, but I am thrilled with the news,” said Dr. Bose. “I would like to express my immense gratitude to UT, particularly to Tickel College of Engineering Dean Wayne Davis and the head of the department, Leon Tolbert, for giving me a favorable environment in pursuing my intellectual activities.” Dr. Davis said, “Professor Bose has been instrumental in laying the groundwork for some of the successes that came after him. “His efforts have helped both our college and the world at large, so his election is well-deserved.”

Dr. Bose has experienced the satisfaction that comes with achieving many of the goals he has set for his life, and his hope is that the students of EECS will have the opportunity to do the same. “Coming from a remote village in Bangladesh, it was my dream to see the whole world with my own eyes and make important contributions to the world. I had to overcome mountainous hurdles step-by-step, to fulfill the ambitious goals in life and reach where I am today. Although my goals are yet unfulfilled, I often feel that I am the happiest person on earth. Achieving the goals of life requires persistent ambition, courage, and hard work, but when you reach the top of the Himalayan Mountains, the mind remains filled with perennial pleasures. My advice to young engineers: have a dream in life and try to realize that dream with hard work. Have a long-term ambition and short-term career goals, with the fire always burning in your mind.”

1. [Palensky, Peter. “National Academy of Engineering Adds Pioneering UT Professor as Member.” IEEE Industrial Electronics Magazine June 2017.]
A Life of Service

Like other new recruits to the United States Navy, Alex Weber pledged its motto “Not for self but for country” when he joined its ranks a dozen years ago.

That mindset of putting others first was a driving force in his time as a Navy diver, highlighted by his participation in recovery efforts following the devastating Japanese tsunami in 2011 as well as with missions to recover and identify remains of US soldiers killed in the Vietnam War.

Now, the electrical engineering student is working to make a difference on land.

Weber grew up in Giles County, Tennessee before joining the Navy after high school. In 2005, while serving as an electrician’s mate aboard the nuclear carrier USS Ronald Reagan, Weber noticed a dive team doing repairs on a nearby ship.

“I've been in love with the water all my life, and have been diving for most of it. Once I saw them at work I decided right there on the spot that I was going to be a Navy diver,” said Weber.

He’s now been to all seven continents with the Navy and describes the post-tsunami aftermath as one of the most vivid memories of his lifetime. Remnants of houses and roofs greeted his ship even while it was still far out to sea.

“We had a pretty grim task to do, recovering bodies, people that had been trapped in houses and vehicles and swept to sea,” said Weber.

“Yet, even with their families, friends, and possessions gone, the people of Japan went out of their way to make us feel welcome. We’re talking about people who had nothing left to give, yet gave us all they could.

Their gratitude was unreal.”

His service as a Navy diver also took him to the jungles of Vietnam to bring closure five decades in the making. Again, faced with the task of recovering human remains, Weber scoured rivers and mud that was “10 feet deep at times” to bring American soldiers and pilots back home.


Thinking about his own education, however, is what brought him back to his home state and to UT in the spring of 2016. He had an interest in electrical engineering and knew that UT had a strong program in the field.

“I chose Electrical Engineering because I have always had a passion for technology,” said Weber. “As a Navy Diver, I had the opportunity to work with some pretty amazing equipment both underwater and on the surface to include but not limited to ROV's, side-scan sonar, hand-held sonar imagery, electronically controlled rebreathers, and underwater communications.

Once I chose Electrical Engineering, I found that this was not only the right major for me, but that I have a passion for more than just the field I started out pursuing.

“I believe I have found my passion in embedded systems and control systems.”

While being closer to relatives in his home state was an advantage, the move came with its own set of challenges.

“It wasn’t easy to be back in
a classroom for the first time in a decade, with vast life experience differences—not to mention age differences—than your classmates,” said Weber, who is now a senior. “Questions about where to go, what to do, how to rediscover your social and educational skills are things that plague all veterans. Having support for veterans is critical.”

In his spare time, Weber supports other veterans by fostering and training PTSD support dogs for Smoky Mountain Service Dogs. Such dogs help returning military members cope with getting back into normal society by placing them with a loving companion who is directly responsible for them.

“Veterans can have any number of stresses that, by their training, they keep hidden. PTSD dogs are a great way of helping alleviate that,” says Weber.

Weber also helps vets by tutoring through the Veteran’s Pre-College Program, a Department of Education program designed to assist eligible veterans in pre-college assistance including benefits navigation, school selection, career advice and exploration, financial aid assistance, and education skills.

Into the Deep

Weber expects to graduate in Fall 2019, and his post-college plans merge the two loves of his life: diving and engineering.

Underwater rovers—made famous by Bob Ballard for their use in finding the wrecks of the cruise liner Titanic—continue to play an invaluable role in oceanographic research, from exploration and recovery to weather prediction.

Weber’s minor in entrepreneurship has also opened the possibility to him that he might one day start his own deep sea robotics company.

“I’d love to help continue that research, maybe work with the National Oceanographic and Atmospheric Administration in developing and deploying that kind of technology,” said Weber. “There are still a lot of things unknown about the ocean, and I think my background would help me make a difference in those efforts.”

Weber continued, “I still feel that I will gear my career pursuit towards underwater technology, but my time here at UT has helped me broaden my interests and goals. I look forward to learning even more and gaining the proper skills and experience needed to fulfill my goals.”

While those goals might still be a few years away, one thing is certain: if it helps others, there’s no doubt he’ll achieve it.

In addition to the normal coursework that comes with engineering, Weber tutors other students. This summer, he also raised money through a Go Fund Me account for an Ecuadorian animal sanctuary where he and other engineering students helped build foot bridges during a Global Initiatives trip.
Industry Partners

Industry members that fund EECS research

- Applied Nanotech
- Applied Research LLC
- BAE Systems, Inc.
- Boeing Company
- Catalyst Repository Systems
- Chronos Tech
- Covidien LP
- Cree Wolfspeed
- decibel Research
- Eastman Chemical Company
- Eleon Energy, Inc.
- eMIT, LLC
- GE Global Research
- General Motors Corp.
- GL PwrSolutions, Inc.
- Hewlett Packard
- Honeywell
- II-VI Foundation
- Intel Corporation
- Intelligent Automation, Inc.
- MaXentric Tech LLC
- Morpho Detection, LLC
- Novell
- Oak Ridge National Laboratory
- Power America
- SAIC
- Semiconductor Research Corp.
- Sloan Kettering Cancer Center
- Texas Instruments, Inc.
- United Technology Research Center
- Volkswagen Group
- Y-12 National Security Complex

Employers that are hiring EECS graduates

- Accenture
- Adrenaline Inc.
- Aerospace Testing Alliance/Arnold
- Engineering Developing Complex
- ALCOA
- ARC
- Asurion
- AT&T
- BAE Systems, Inc.
- B-Line Medical
- Boeing Company
- Bridgestone Manufacturing Co.
- Broadcast Music, Inc.
- BSH Appliances
- CADParts & Consulting, LLC
- Cadre5, LLC
- Caterpillar Financial
- Cerner Corporation
- Cisco Systems
- Clayton Homes
- Clean Air Engineering
- CNS Y-11
- Colgate Palmolive
- Collider Inc.
- Dennis Group, LLC
- DENSO Manufacturing
- DPRA
- Duke Energy
- Eastman Chemical Company
- Eaton Corporation
- Electric Power Research Institute (EPRI)
- Emerson Process Management
- Epic Systems
- EventBooking
- F.B.I.
- Garmin
- General Dynamics
- General Electric
- Georgia Pacific
- Gerdau Long Steel Knoxville
- Google
- Green Mountain Coffee Roasters
- Haskell Company
- Hutchinson Sealing Systems
- Intergraph
- International Paper
- Invista
- Jackson WWS
- Johnson City Power Board
- JTEKT
- Kimberly-Clark
- Knoxville Utility Board
- L3 Communications
- Logan Aluminum
- Mahle
- Maryville City Schools
- Memphis Light, Gas and Water
- Motorola Solutions
- MPI
- NASA Johnson Space Center
- Nissan
- Norfolk Southern
- Nutanix
- Oak Ridge National Laboratory (ORNL)
- OpenText
- Optum Technology
- OSIsoft, LLC
- Pariveda Solutions
- Pilot Flying J
- Pro2Serve
- Proctor and Gamble
- Red Hat Inc.
- Red Ventures
- Regal Cinemas
- SABIC
- Sandia Labs
- Schneider Electric
- Science Applications International Corp. (SAIC)
- Scripps Networks
- Shaw
- Siemens Molecular Imaging
- SL-TN
- Southern Company
- Specialized Application Workshop & Software Mill, LLC
- TechMah, LLC
- Tennessee Valley Authority (TVA)
- Tesla
- Texas Instruments
- Textron Aviation
- Time Warner Cable
- United States Air Force
- United States Navy
- UnitedHealth Group
- University of Tennessee
- University of Tennessee Health Science Center
- US Smokeless Tobacco
- Vacuum Technology Inc.
- Volkswagen
- Walmart
- White Stone Group, The
- Y-12 National Security Complex
- Yik Yak
Industrial Advisory Board 2017-2018

Chairperson

Mr. C. Chris Meystrik
Chief Technology Officer
Jewelry Television
Knoxville, TN

Members

Mr. Josh Birdwell
Director of Point-of-Sale and Digital Application
Pilot Corp.
Knoxville, TN

Dr. Rebecca Collins
Software Engineer
Google Inc.
New York, NY

Mr. Michael Evans
Managing Vice President- Dallas Office
Pariveda Solutions, Inc.
Dallas, TX

Dr. John Garrison
Engineer
Department of Defense
Huntsville, AL

Dr. Brad Grinstead
Chief Operating Officer
IAVO Research and Scientific
Durham, NC

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President and CEO
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Knoxville, TN

Mr. Brian LaRose
Global Technical Architect Specialist
VMWare
Maryville, TN

Mr. John McNeely
President and CEO
Sword and Shield Enterprise Security, Inc.
Knoxville, TN

Mr. John B. O’Dell, Jr.
IT Supervisor of IT Financial Reporting & Analysis and Contract Relationship Manager
Eastman Chemical Company
Kingsport, TN

Dr. Jelena Pjesivac-Grbovic
Staff Software Engineer
Google Inc.
Mountain View, CA

Mr. Dan Roberts
President and CEO
InterFET Corporation
Richardson, TX

Mr. Joel Seligstein
Founder & CEO
Parallel Plaid
San Francisco, CA

Mr. Richard Stair
Design Engineering Manager, High Power Chargers Product Line
Texas Instruments
Knoxville, TN

Mr. Ron Thompson
Director Business Development – Global Marketing
Eaton Corporation
Louisville, TN

Dr. Ken Tobin
Director and Corporate Research Fellow, Measurement Science and Systems Engineering Division
Oak Ridge National Laboratory
Oak Ridge, TN

Dr. Richard (Dick) Todd
President
RIS Corp.
Knoxville, TN

Mr. J.D. Wilson
Assistant to the General Managers-Distribution
Georgia Power Company
Woodstock, GA

Dr. Brian Worley
President and Chief Executive Officer
PYA Analytics, LLC
Knoxville, TN

Ms. Angela Yochem
Chief Information Officer
BDP International
Plano, TX
**CURENT Industry Members**

ABB, Inc., Raleigh, NC  
American Transmission Company, Waukesha, WI  
Arizona Public Service, Phoenix, AZ  
Boeing, Seattle, WA  
Danfoss, Nordborg, Denmark  
Dominion Virginia Power, Richmond, VA  
Eaton, St. Bruno, QC Canada  
Electric Distribution Design, Inc., Blacksburg, VA  
EnerNex, Knoxville, TN  
EPB, Chattanooga, TN  
EPRI (Electric Power Research Institute), Knoxville, TN  
etap, Irvine, CA  
GEIRI North America, Santa Clara, CA  
General Electric Energy Solutions, Niskayuna, NY  
Genscape, Louisville, KY  
Hitachi America, Ltd., Santa Clara, CA  
Huawei Technologies USA, Plano, TX  
ISO New England, Holyoke, MA  
Keysight, Santa Rosa, CA  
Lawrence Livermore National Laboratory, Livermore, CA  
Mitre Corporation, Bedford, MA  
National Instruments, Austin, TX  
National Renewable Energy Laboratory, Golden, CO  
National Rural Electric Cooperative, Arlington, VA  
New York ISO, Rensselaer, NY  
Oak Ridge National Laboratory, Oak Ridge, TN  
Opal-RT Technologies, Montréal, Québec, Canada  
OSIsoft, San Leandro, CA  
Pacific Northwest National Laboratory (PNNL), Richland, Washington  
Peak Reliability, Vancouver, Washington  
PJM, Philadelphia, PA  
Raytheon BBN Technologies Corp, Cambridge, MA  
Southern Company Services, Atlanta, GA  
Technology for Energy Corporation, Knoxville, TN  
Tennessee Valley Authority, Chattanooga, TN  
V&R Energy, Los Angeles, California
Our Mission:

The mission of the Department of Electrical Engineering & Computer Science (EECS) is:

- To provide high quality education in computer science, computer engineering, and electrical engineering at the undergraduate, masters, and doctoral levels through a creative balance of academic, professional and extracurricular programs;
- To foster and maintain mutually beneficial partnerships with our alumni, friends, industry and local, state and federal governments through public services assistance and collaborative research; and
- To be a major contributor to our nation's technology base through scholarship and research to grow beyond disciplines by participation in ethics and leadership programs.

Our Vision:

EECS is resolved to become one of the country’s top 25 public departments. To bring this vision to reality, the department is committed to these five charges:

1. Attaining national and international recognition among peer institutions for excellence in both research and teaching;

2. Assembling a dynamic body of faculty who exemplify excellence and innovation in the pursuit and delivery of knowledge and will perpetuate the highest standards of engineering education for future generations.

3. Graduating students who are well educated in technical knowledge, who have solid communication and teamwork skills, and who can compete successfully in the global business world and contribute significantly to the national base of engineering education and technology;

4. Investing strategically in the department's most important resources—students, faculty and programs—through the vigorous acquisition of private gifts from individuals, corporations and foundations; and

5. Partnering with academic, industrial and government entities that share and enhance the mission of EECS, so that our educational and collaborative efforts result in the maximum, positive, economic impact locally, regionally, nationally and globally.
**Departmental Scholarships 2017-2018**

**Carol & Malcolm Bayless Scholarship**  
Ian Douglas Lumsden  
Sean Michael Toll

**Beta-Phi Chapter, Eta Kappa Nu**  
Dakota Blake Sanders

**Dr. Michael E. and Mrs. Jane N. Casey Scholarship**  
Douglas M Aaser

**Grace O. Davis Memorial Scholarship**  
Johnathan Paul Burns

**S. T. Harris Scholarship**  
Kira Jeannette Evans  
Larry Everett Marshall  
Phuc Tran Hoang Pham

**Urban and Susan Hilger Scholarship**  
Parker Lee Gensheimer

**Dr. Eldredge Johnson and Mrs. Lynda Herndon Kennedy Scholarship**  
James Miner Bates  
Wang Hanfeng

**Robert and Alliene Lay Scholarship**  
Thomas Mitchell Turner

**W. O. Leffell Scholarship**  
Jacob Scott Allen

**Tanner L Fry**  
Weihong Huang  
Micah Joseph Perry  
Zhifei Zhang

**Edgar Wyman McCall Scholarship**  
Adam Brian Dalton

**Harland D. Mills Scholarship**  
Tapajit Dey

**Min H. Kao Scholarship**  
Kendra Marie Anderson  
Chandler Jackson Bauder  
Quillen Vaughn Blalock  
Katelyn Alexandria Bolinsky  
Samuel Denis Brown  
Grant Richard Bruer  
Isaiah Christian Cash  
Jeremiah Duncan  
Daniel Felipe Enciso  
Gary Brent Hurst  
Idan George Kanter  
Andrey Karnaukh  
Gerald Liso  
Luke Johnston Mills  
Cody Nathan Orick  
Abigail Jane Proside  
Charles Peter Rizzo  
Samuel Browder Rose  
Benjamin Franklin Sergent  
Michaela D Shoffner  
Jerome E Vaz  
Sophie Elizabeth Wardick  
Rachel Marie Weeks  
Sean Joseph Whalen  
Andrew R Wintenberg

**Billy J. and Sylvia F. Moore Scholarship**  
Daniel P Barry  
Kellen Oleksak

**Leonard B. Murray, Jr. Scholarship**  
Thomas Mitchell Turner

**Leonard B. Murray, Sr. Scholarship**  
Kellen Oleksak

**Erby Roy and Jean Bush Nankivell Scholarship**  
Charles Dylan Boggs  
Mohammad Ehsan Raoufat  
Rhett Alec Sexton  
Wenxuan Yao  
Chongwen Zhao

**J. Frank and Joan Uhl Pierce Scholarship**  
Yong Li  
Haoyang Lu

**Leonard and Betty Shealy Scholarship**  
Eric J Auel  
Jiaming Zhao  
Nicklaus K Penley  
Alexander Caine Teepe  
Kelsey Nicole Veca

**Charles and Martha Sprankle Scholarship**  
Tyler Brady Crafton  
Avie Desai  
Adam Z Foshie  
Jacob H Isaacs  
Thomas Andrew Jean  
Nasib Mansour  
Spencer David Miller  
Abdel-Kareem Moadi  
Toy Marcus Reid  
James Scott Tucker

**Fred Smith Vreeland Scholarship**  
Joshua K Bolinsky

**Charles Weaver Memorial Scholarship**  
Joshua K Bolinsky  
Tanner L Fry

**Arthur F. Woods Scholarship**  
Christopher Miller Dean  
Chad Michael Goral  
Justin Micah Hill  
Deven Christopher Hills  
Duncan L Musgraves  
William Pierce  
Mahmoud Qasim Agha  
Jacob A Rutherford  
Daniel Street Sawyer  
Matthew Scott Taylor  
Bennett Seth Waddell  
Brandon Marquez Woodley
Departmental Fellowships 2017-2018

Department Excellence Fellowship Award
Shaghayegh Aslazadeh
Zhou Dong
Mohammad Aminul Haque
Shahram Hatefi Hasari
Rayhan Hossain
Yu Jiang
Razieh Kaviani Baghbaderani
Maziyar Khosravi
Le Kong
Dingrui Li
Haiguo Li
Yang Liu
Mariana Magdy Mounir Kamel
Haoran Niu
Nattapat Praisuwan
Liang Qiao
Tasmia Rahman
Ren Ren
Bhagyashri Telsang
Isaac Morcos Thalos
Xiaoyang Wang
Ziming Wang
Chujie Zeng

Dr. T. Vaughn Blalock Memorial Award
William E. Norton

Ron Nutt Fellowship
Tasmia Rahman Tumpa

Min H. Kao Fellowships
Bo Liu
Samira Shamsir
Yang Song

Ali Mohsin
Bin Wang
Shuyao Wang

Ali Mohsin
Bin Wang
Shuyao Wang

Tickle Fellowship
Zhihao Jiang
Dustin McAfee
Fanqi Wang

Tickle Fellowship
Zhihao Jiang
Dustin McAfee
Fanqi Wang

Tennessee Excellence Fellowship
Spencer P. Cochran
Alan R. Grant
Andrew Foote
Ruiyang Qin
Matthew B. Olson
Jared M. Smith
Tianwei Xia

Tennessee Excellence Fellowship
Spencer P. Cochran
Alan R. Grant
Andrew Foote
Ruiyang Qin
Matthew B. Olson
Jared M. Smith
Tianwei Xia

Chancellor’s Award
Sherif Hassanein Amer
Gangotree Chakma
Mihaela Dimowska
Jeff Dix
Saajid Al Haque
Tanner C. Hobson
Ling Jiang
Taher Naderi
George E. Niemela
John Reynolds
Firoozeh Sepehr
Aysha Shanta
Mst Shamim Ara Shawkat
Joseph T. Teague
Abigail E. Till
Paige R. Williford

Chancellor’s Award
Sherif Hassanein Amer
Gangotree Chakma
Mihaela Dimowska
Jeff Dix
Saajid Al Haque
Tanner C. Hobson
Ling Jiang
Taher Naderi
George E. Niemela
John Reynolds
Firoozeh Sepehr
Aysha Shanta
Mst Shamim Ara Shawkat
Joseph T. Teague
Abigail E. Till
Paige R. Williford

Bodenheimer Fellowship
Richard Joseph Connor
Adam W. Disney
Summer Church Fabus
Elliot D. Greenlee
Aaron R. Young

Bodenheimer Fellowship
Richard Joseph Connor
Adam W. Disney
Summer Church Fabus
Elliot D. Greenlee
Aaron R. Young

PEER Award
Clarence L. Jackson

PEER Award
Clarence L. Jackson

CURENT Fellowship
Melanie Gonzalez

CURENT Fellowship
Melanie Gonzalez

DOE WBG Power Electronics Trainees
Jared Baxter
Doug W. Bouler
Spencer P. Cochran
Jacob H. Dyer
Andrew Foote
Jordan A. Gamble
Frances Garcia
Maevie E. Lawniczak
Daniel Merced
Mark Nakmali
Jason Palmer
Kamal Sabi
Jordan Sangid
Nathan Strain
Craig Timms
Paige R. Williford

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Frances Garcia
Maevie E. Lawniczak
Daniel Merced
Mark Nakmali
Jason Palmer
Kamal Sabi
Jordan Sangid
Nathan Strain
Craig Timms
Paige R. Williford

Min H. Kao Fellowships
Bo Liu
Samira Shamsir
Yang Song

Min H. Kao Fellowships
Bo Liu
Samira Shamsir
Yang Song
By the numbers

How EECS at UT compares to aspirational institutions

We’ve collected data from universities we consider aspirational peers over the past year to see how our EECS program compares. The data from our aspirational universities has been averaged and displayed in the following charts.

Our aspirational peers are: California-Davis, Colorado, Florida, Maryland, Minnesota, North Carolina State, Penn State, Utah and Wisconsin.
Financial Information
Numbers reflect the department’s financial information for FY17.

Total Resources
$33,200,953

- Externally Funded Gifts, Grants & Contracts
  - $11,456,114

- Recurring & Nonrecurring State Funds
  - $21,938,183

Expenditure Breakdown of State Funds
$11,456,114

- Salaries & Benefits
  - $10,167,336

- Equipment
  - $395,388

- Miscellaneous Operating Expenses
  - $893,390
Mongi Abidi  
Ph.D. The University of Tennessee  
Professor  
*Pattern recognition, image processing, robotics*

Micah Beck  
Ph.D. Cornell University  
Associate Professor  
*Networks, distributed computing*

Michael W. Berry  
Ph.D. University of Illinois  
Professor  
*Bioinformatics, information retrieval*

Benjamin J. Blalock  
Ph.D. Georgia Institute of Technology  
Kennedy-Blalock-Pierce Professor  
*Analog and mixed-signal circuits*

Qing (Charles) Cao  
Ph.D. University of Illinois  
Associate Professor  
*Wireless and distributed sensor networks*

Daniel J. Costinett  
Ph.D. University of Colorado  
Assistant Professor  
*Power electronics, electric vehicles*

Judy Day  
Ph.D. University of Pittsburgh  
Associate Professor  
*Model predictive control, translational medicine*

Mark Edward Dean  
Ph.D. Stanford University  
Fisher Distinguished Professor  
*Neuromorphic computing, data center reliability*

Seddik M. Djouadi  
Ph.D. McGill University (Canada)  
Professor  
*Automatic control, smart grid applications*

Jack Dongarra  
Ph.D. University of New Mexico  
University Distinguished Professor  
*High performance and scientific computing*

Scott Emrich  
Ph.D. Iowa State University  
Associate Professor  
*Genome-focused bioinformatics, parallel computing, arthropod genomics*

Aly E. Fathy  
Ph.D. Polytechnic Institute of New York  
James W. McConnell Professor  
*Antennas and microwaves*

Jens Gregor  
Ph.D. University of Aalborg (Denmark)  
Professor  
*Image processing, biomedical data visualization*

Gong Gu  
Ph.D. Princeton University  
Professor  
*Graphene, electronic materials*

Jian Huang  
Ph.D. The Ohio State University  
Professor  
*Data analytics and visualization*

David Icove, P.E.  
Ph.D. The University of Tennessee  
UL Professor of Practice  
*Fire protection and forensics*

Syed Kamrul Islam  
Ph.D. University of Connecticut  
James W. McConnell Professor  
*Bio-electronics and sensors*

Michael Jantz  
Ph.D. University of Kansas  
Assistant Professor  
*Software systems, compilers*

Michael A. Langston  
Ph.D. Texas A&M University  
Professor  
*Bioinformatics, data analytics, graph theory*

Fangxing (Fran) Li, P.E.  
Ph.D. Virginia Tech  
James W. McConnell Professor  
*Power systems modeling and economics*

Husheng Li  
Ph.D. Princeton University  
Associate Professor  
*Wireless communications and networks*
Yilu Liu  
Ph.D. The Ohio State University  
Governor’s Chair Professor  
*Power systems monitoring and control*

Bruce J. MacLennan  
Ph.D. Purdue University  
Associate Professor  
*Bio-inspired computation, artificial morphogenesis*

Stephen Marz  
Ph.D. University of Tennessee  
Lecturer  
*Operating systems, programming languages*

Donatello Materassi  
Ph. D. Università degli Studi di Firenze (Florence)  
Assistant Professor  
*Stochastic systems, control and system identification*

Ericsson Harlan Mills Chair Professor  
*Data analytics, software engineering*

Garrett Rose  
Ph.D. University of Virginia  
Associate Professor  
*Memristors, Nanoelectronics, hardware security*

Max Schuchard  
Ph.D. University of Minnesota  
Assistant Professor  
*Computer security and privacy, censorship circumvention systems, crypto-currencies*

Jinyuan (Stella) Sun  
Ph.D. University of Florida  
Associate Professor  
*Cybersecurity, network privacy*

Kai Sun  
Ph.D. Tsinghua University (China)  
Associate Professor  
*Power system dynamics, stability, control*

Leon M. Tolbert, P.E.  
Ph.D. Georgia Institute of Technology  
Min H. Kao Professor  
*Power electronics, renewable energy*

Kevin Tomsovic  
Ph.D. Washington University  
CTI Professor  
*Power system modeling and control*

Bradley T. Vander Zanden  
Ph.D. Cornell University  
Professor  
*Graphic programming, instructional technology*

Fei (Fred) Wang  
Ph.D. University of Southern California  
Professor and Condra Chair of Excellence in Power Electronics  
*Power electronics, aerospace applications*

Jie (Jayne) Wu  
Ph.D. Notre Dame  
Associate Professor  
*Bio-electronics, microfluidics, MEMs*

Yan Xu  
Ph.D. The University of Tennessee  
Eastman Professor of Practice  
*Power systems, power electronics*
EECS has 39 (for 2017-2018) full-time tenured and tenure-track faculty members who are all leaders in their fields. Each year they successfully compete for and receive prestigious awards and accolades. Their research and scholarship are not only helping keep the department on the cutting edge of its disciplines, but also teaching and training the engineers of tomorrow.

**Strength Area**

**Tenured/Tenure-Track Faculty**

<table>
<thead>
<tr>
<th>Biological applications</th>
<th>Intelligent systems, data mining, and machine learning</th>
<th>Power systems, power electronics, and renewable energy</th>
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<tbody>
<tr>
<td>Berry • Day • Emrich • Islam</td>
<td>Berry • Emrich • Gregor MacLennan • Mockus</td>
<td>Costinett • F. Li • Liu Pulgar • K. Sun • Tolbert Tomsovic • F. Wang</td>
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<td>Langston • McFarlane Peterson • Wu</td>
<td>Parker • Qi</td>
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<tr>
<th>Computer systems and architecture</th>
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<td>Beck • Dean • Jantz Mockus • Peterson • Plank Rose • Vander Zanden</td>
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<tr>
<td>Berry • Dean • Dongarra Gregor • Huang • Langston Peterson</td>
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<th>Microelectronics, microwave, and MEMS</th>
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<th>Networked and embedded systems and cybersecurity</th>
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<td>Beck • Cao • Djouadi H. Li • Parker • Qi Schuchard • J. Sun</td>
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<th>Signal processing, systems, and controls</th>
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<td>Djouadi • H. Li Materassi • Qi</td>
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<td>Abidi • Gregor • Huang Qi • Vander Zanden</td>
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<tr>
<td>Undergraduate Graduates 2016-2017</td>
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<tr>
<td>Ammar Sherif Abdelwahed</td>
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<tr>
<td>Tony Dakota Abston</td>
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<tr>
<td>David Jordan Andersshock</td>
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<td>Jonathan Wayne Andrews</td>
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<td>Caleb Michael Askew</td>
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<td>Ahmad Qasim Awad</td>
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<td>Kyle Gabriel Bashour</td>
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<td>Jared Alexander Baxter</td>
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<td>Sunay G. Bhat</td>
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<td>Colin C. Bird</td>
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<td>Ethan Avogadro Black</td>
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<td>Jacob Ryan Blankenship</td>
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<td>Mark Christopher Bolles</td>
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<td>Kyle Brashear</td>
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<td>Travis Jeffrey Brown</td>
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<td>Hollis X Hop Bui</td>
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<td>Joseph Burke</td>
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<td>Ksenia Olegovna Burova</td>
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<td>Daniel L. Caballero</td>
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<td>Kylie Spencer Cantrell</td>
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<td>Vishnu Chander</td>
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<td>Joshua Chavarria</td>
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<td>Alick Yowela</td>
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<td>Xiao Zhou</td>
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</tbody>
</table>
Masters Graduates 2016-2017

MohammadReza AhmadzadehRaji  
Non-thesis MS  
Advisor: Dr. Jian Huang

Saad Abdeluleah Alharbi  
Non-thesis MS  
Advisor: Dr. Husheng Li

Yazeed Masaud Alkhrijah  
Non-thesis MS  
Advisor: Dr. Mongi A. Abidi

Abdulaziz Faraj AlMutairi  
Non-thesis MS  
Advisor: Dr. Yilu Liu

Sadika Amreen  
Non-thesis MS  
Advisor: Dr. Audris Mockus

Jessica Danielle Boles  
Battery Energy Storage Emulation for Power System Applications.  
Advisor: Dr. Leon M. Tolbert

Daniel Robert Brown  
A Practical Realization of a Return Map Immune Lorenz Based Chaotic Stream Cipher in Circuity.  
Advisor: Dr. Donatello Materassi

Nicholas Alexander Cavopol  
Effects of Distance, Antenna, and Channel on an Ultra Wide Band Location System, and Quantifying Them to Increase Accuracy.  
Advisor: Dr. Aly Fathy

Tianxiang Chen  
Non-thesis MS  
Advisor: Dr. Daniel J. Costinett

Steven Andrew Clukey  
Architecture for Real-Time, Low-SWaP Embedded Vision Using FPGAs.  
Advisor: Dr. Mongi A. Abidi

Shawn Michael Cox  
Non-thesis MS  
Advisor: Dr. James S. Plank

Kelley Ann (McCoy) Deuso  
Non-thesis MS  
Advisor: Dr. Mark Edward Dean

Mahendra Duwal Shrestha  
Efficient Simulation of a Simple Evolutionary System.  
Advisor: Dr. Michel V. Vose

Patricia Jean (Draney) Eckhart  
DANNA: Dynamic Adaptive Neural Network Array Scaled Across Multiple Chips.  
Advisor: Dr. Mark Edward Dean

Gabriel Alejo Gabian  
High-Current Integrated Battery Chargers for Mobile Applications.  
Advisor: Dr. Daniel J. Costinett

Jin Jong Gu  
CMOS Based Impedance Sensing.  
Advisor: Dr. Nicole Nelson McFarlane

Richard Kyle Harris  
Design of an Integrated Silicon Carrier Nonlinear-carrier PWM Controller for Boost Converter Applications.  
Advisor: Dr. Benjamin J. Blalock

Sadra Hemmati  
Non-thesis MS  
Advisor: Dr. Seddik M. Djouadi

Alok Hota  
Non-thesis MS  
Advisor: Dr. Seddik M. Djouadi

Parul Kaushal  
Gyraor Capacitor Modeling Approach to Study the Impact of Geomagnetically Induced Current on Single-Phase Core Transformer.  
Advisor: Dr. Syed K. Islam

Hansaka Angel Dias Edirisinghe Kodituwakku  
InSight2: An Interactive Web Based Platform for Modeling and Analysis of Large Scale Argus Network Flow Data.  
Advisor: Dr. Jens Gregor

Jonathan William Lamont  
Non-thesis MS  
Advisor: Dr. David J. Icove

Derek Brittan Lusby  
Z Deviation Based Demand Side Control to Reduce FIDVR.  
Advisor: Dr. Kevin Tomsovich

Drew Mark Masters  
Non-thesis MS  
Advisor: Dr. Audris Mockus

Allen Clark McBride  
Non-thesis MS  
Advisor: Dr. Bruce J. MacLennan

Andrew Webster Nash  
Non-thesis MS  
Advisor: Dr. Michael W. Berry

Farhan Quaiyum  
Non-thesis MS  
Advisor: Dr. Aly Fathy

Sangamesh Nagashattappa Ragate  
Optimization of Spatial Convolution in ConvNets on Intel KNL.  
Advisor: Dr. Jack Dongarra

Benjamin David Roehrs  
A Sub-Threshold Low-Power Integrated Bandpass Filter for Highly-Integrated Spectrum Analyzers.  
Advisor: Dr. Benjamin J. Blalock

Isaac Ben Sherman  
On the Role of Genetic Algorithms in the Pattern Recognition Task of Classification.  
Advisor: Dr. Bruce MacLennan

Gregory Martin Simpson  
Tagamajig: Image Recognition via Crowdsourcing.  
Advisor: Dr. Mark Edward Dean

Jingyi Tang  
Non-thesis MS  
Advisor: Dr. Leon M. Tolbert

Michael Gabriel Trout  
Modeling and Design of a Low-Level RF Control System for the Accumulator Ring at Spallation Neutron Source.  
Advisor: Dr. Donatello Materassi

Ryan Donald Wagner  
A GPU Implementation of Distance-Driven Computed Tomography.  
Advisor: Dr. Jens Gregor

Caleb James Williamson  
Non-thesis MS  
Advisor: Dr. Mark Edward Dean

Christopher Joel Winstead  
Nonlinear Model Reduction Based on Manifold Learning with Application to the Burgers’ Equation.  
Advisor: Dr. Seddik M. Djouadi

Aaron Reed Young  
Scalable High-Speed Communications for Neuromorphic Systems.  
Advisor: Dr. Mark Edward Dean

Yang Zhang  
Scheduling for Timely Passenger Delivery in a Large Scale Ride Sharing System.  
Advisor: Dr. Hairong Qi
## Doctoral Graduates 2016-2017

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<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Advisor</th>
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<tbody>
<tr>
<td>Austin Peter Albright</td>
<td>A Quantitative Measure of Mono-Componentness for Time-Frequency Analysis.</td>
<td>Dr. Hairong Qi</td>
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<tr>
<td>Md. Riyasat Azim</td>
<td>Management of Isolated Operation of Microgrids.</td>
<td>Dr. Fangxing “Fran” Li</td>
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<td>Linquan Bai</td>
<td>Co-Optimization of Gas-Electricity Integrated Energy Systems Under Uncertainties.</td>
<td>Dr. Fangxing “Fran” Li</td>
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<td>Truman Andrew Bonds</td>
<td>Design and Control of Close Proximity Indirect Exposure for Nonthermal Atmospheric Pressure Plasma-Based Oxidation of Carbon Fiber Precursor.</td>
<td>Dr. Seddik M. Djouadi</td>
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<td>Christopher David Brumgard</td>
<td>Substituting Failure Avoidance for Redundancy in Storage Fault Tolerance.</td>
<td>Dr. Micah Beck</td>
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<td>Chongxiao Cao</td>
<td>Extensions of Task-based Runtime for High Performance Dense Linear Algebra Applications.</td>
<td>Dr. Jack Dongarra</td>
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<td>Wenchao Cao</td>
<td>Impedance-Based Stability Analysis and Controller Design of Three-Phase Inverter-Based Ac Systems.</td>
<td>Dr. Fei “Fred” Wang</td>
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<td>Cheng Cheng</td>
<td>Development of a Low Cost Biosensing Platform for Highly Sensitive and Specific On-site Detection of Pathogens and Infections.</td>
<td>Dr. Jie “Jayne” Wu</td>
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<tr>
<td>Md. Habib Ullah Habib</td>
<td>Monolithic Perimeter Gated Single Photon Avalanche Diode Based Optical Detector in Standard CMOS.</td>
<td>Dr. Nicole McFarlane</td>
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<td>Ronald Dewayne Hagan</td>
<td>Graph-Theoretical Tools for the Analysis of Complex Networks.</td>
<td>Dr. Michael A. Langston</td>
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<td>Md. Sakib Hasan</td>
<td>Modeling and Spice Implementation of Silicon-on-Insulator (SOI) Four Gate (G4FET) Transistor.</td>
<td>Dr. Syed K. Islam</td>
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<td>Can Huang</td>
<td>Studies of Uncertainties in Smart Grid: Wind Power Generation and Wide-Area Communication.</td>
<td>Dr. Fangxing “Fran” Li</td>
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<td>Heike Jagode</td>
<td>Dataflow Programming Paradigms for Computational Chemistry Methods.</td>
<td>Dr. Jack Dongarra</td>
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<td>Khairul Kabir</td>
<td>Analysis and Design of Communication Avoiding Algorithms for Out of Memory (OOM) SVD.</td>
<td>Dr. Jack Dongarra</td>
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<td>Yalong Li</td>
<td>Design, Control and Protection of Modular Multilevel Inverter-Based Multi-Terminal HVDC System.</td>
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<td>Hesen Liu</td>
<td>Wide-Area Measurement-Driven Approaches for Power System Modeling and Analytics.</td>
<td>Dr. Yilu Liu</td>
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<td>Yu Long</td>
<td>Design and Analysis of a Fully-Integrated Resonant Gate Driver.</td>
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<td>Zahra Mahoor</td>
<td>Neurotically Plausible Model of Robot Reaching Inspired by Infant Motor Babbling.</td>
<td>Dr. Bruce J. MacLennan</td>
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<td>Samir Said Sahyoun</td>
<td>Control Oriented Nonlinear Model Reduction for Distributed Parameter Systems.</td>
<td>Dr. Seddik M. Djouadi</td>
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<td>Ali Taalimi</td>
<td>Learning Multimodal Structures in Computer Vision.</td>
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<td>A Wide-area Analysis of Shifts in Electric Power System Generation Profiles and High-impact Event Scenarios.</td>
<td>Dr. Yilu Liu</td>
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<td>Computational Imaging Approach to Recovery of Target Coordinates Using Orbital Sensor Data.</td>
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<td>Programming Models’ Support for Heterogeneous Architecture.</td>
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<td>Sisi Xiong</td>
<td>Probabilistic Software Framework for Scalable Data Storage and Integrity Check.</td>
<td>Dr. Qing “Charles” Cao</td>
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<td>A Study on Wide-area Measurement-based Approaches for Power System Voltage Stability.</td>
<td>Dr. Fangxing “Fran” Li</td>
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<td>Chi Zhang</td>
<td>Robot Learning from Human Demonstration: Interaction.</td>
<td>Dr. Lynne E. Parker</td>
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<td>Xiaohu Zhang</td>
<td>Electric Power System Operations with a Variable Series Reactor.</td>
<td>Dr. Kevin Tomsovic</td>
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<td>Dao Zhou</td>
<td>Wide-Area Synchronsor Data Server System and Data Analytics Platform.</td>
<td>Dr. Yilu Liu</td>
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