ELECTRICAL & COMPUTER ENGINEERING
TEXAS A&M UNIVERSITY

TRANSFORMING ENGINEERING EDUCATION
Arthur Clarke famously said that every sufficiently developed technology is indistinguishable from magic. Today, almost all technology has the imprint of electrical and computer engineering. By choosing this area of study, our students are embarking on an exciting and productive career and helping shape a better future for mankind.

This year has brought significant additions to the Department of Electrical and Computer Engineering (ECEN). One associate professor, four young assistant professors and a professor of practice joined us in our mission to challenge young minds in the process of discovery and invention. All our faculty members, including our tenured and tenure-track faculty members, work tirelessly across several focus areas across departments providing opportunities for students to experience interdisciplinary research and education.

Every Aggie ECEN student graduates with a solid background of fundamentals, stretching his or her imagination and preparing for an exciting future. Our undergraduate curriculum gives students a solid foundation in electrical engineering and computer engineering. We also require industry experience through senior design capstone projects or internships. Our graduates enter the workforce with a robust knowledge in electrical and computer engineering trends ready to be productive contributors.

Miroslav M. Begovic
Department Head
Carolyn S. & Tommie E. Lohman ’59 Professor

Our graduate programs stress research and development. The M.S., M.Eng. and Ph.D. programs offer opportunities to conduct original research, working closely with renowned faculty. The M.Eng. program allows applicants to work on their degrees from anywhere in the world through distance learning. Our activities are focused on achieving preeminence while growing into one of the largest engineering programs.

Miroslav M. Begovic
Department Head
Carolyn S. & Tommie E. Lohman ’59 Professor
## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our Research Groups</td>
<td>6</td>
</tr>
<tr>
<td><strong>Research Articles</strong></td>
<td></td>
</tr>
<tr>
<td>Addressing Concerns</td>
<td>8</td>
</tr>
<tr>
<td>Signal Processing Techniques</td>
<td>9</td>
</tr>
<tr>
<td>Identify Gut Microbial Biomarkers of Colon Cancer</td>
<td></td>
</tr>
<tr>
<td>ECEN Joins U.S. Department of Energy, India in Energy Access Initiative</td>
<td>10</td>
</tr>
<tr>
<td>Big Data At Work</td>
<td>12</td>
</tr>
<tr>
<td>Exploring Nature’s Fundamentals</td>
<td>14</td>
</tr>
<tr>
<td>Restoring Power in Areas Hit by Hurricane Harvey with NSF RAPID Grant</td>
<td>15</td>
</tr>
<tr>
<td>First Aggie Named Kirchner Food Fellow</td>
<td>16</td>
</tr>
<tr>
<td><strong>Rising Seniors at a Glance</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Faculty Profiles</strong></td>
<td>19</td>
</tr>
<tr>
<td><strong>External Advisory and Development Council</strong></td>
<td>27</td>
</tr>
<tr>
<td><strong>Gift and Endowment Opportunities</strong></td>
<td>30</td>
</tr>
</tbody>
</table>
OUR RESEARCH GROUPS

Analog & Mixed Signal
Analog and mixed signal research areas include high-speed electrical and optical input-output interfaces, clock recovery systems, RF transceivers, harvesting circuits, RF MEMS, active and passive sensors, mmwave circuits, robust signal processing, low-voltage, high-performance analog circuit design; analog mixed-mode fault diagnosis of integrated circuits, power management and bio-medical circuits and systems.

Contributing Faculty • Kamran Entesari, Sebastian Hayas, Aydin Karsilayan, Oscar Moreira, Sam Palermo, Edgar Sanchez-Sinencio, Sebastian Hoyos, Aydin Karsilayan, Oscar Kamran Entesari, Contributing Faculty

Biomedical Imaging, Sensing & Genomic Signal Processing
The Biomedical Imaging, Sensing and Genomic Signal Processing Group brings together faculty members from a number of different disciplines to focus on the acquisition and analysis of biomedical images and signals, genomic signal processing and nano/micro systems for bio/medical applications. A set of core courses provides the student with a background in both medical imaging instrumentation, image processing and analysis, genomic signal processing and biosensing, and elective courses are available in all areas. Laboratories have been established in magnetic resonance imaging, ultrasound imaging, genomic signal processing and integrated micro/nano/bio systems.

Contributing Faculty • Steven Wright, Ulisses Borga Neto, Aniruddha Datta, Edward Dougherty, Arum Han, Jim Ji, Hangue Park, Sung Il Park, Xiaoning Qian, Raffaella Righetti, Yang Shen, Byang Jun Yoon, Peng Yu

Device Science & Nanotechnology
The device science and nanotechnology program encompasses a wide range of research topics from electrophics to quantum computing. The electrophics program encompasses a range of technologies that make use of optical and electronic phenomena. Research areas of primary interest include fiber optics, Integrated optics and semiconductor lasers.

Contributing Faculty • Philip Hemmer, James Biordi, Ohannees Emroyan, Rusty Harris, Jun Kameoka, Latslo Kih, Pao-Tao Lin, Christi K. Madsen, Peter Rentzeiras, Fred Strieter, Chin B. Su, Haiyan Wang, Mark H. Weichold, Jun Zou

Electromagnetics & Microwaves
Research activities in electromagnetics and microwaves span a broad spectrum of applications. In particular, the theoretical and experimental aspects of antennas, electromagnetic theory, electromagnetic wave scattering, active and passive microwave and millimeter wave circuits, linear and non-linear optical or microwave guiding systems, and microstrip antennas.

Contributing Faculty • Kai Chang, Kamran Entesari, Gregory Hoff, Krzysztof A. Michalski, Robert D. Nevels, Cam Nguyen, Steven Wright

Information Science & Systems
Research activities in the information science and systems programs are focused on advancing the state-of-the-art in areas including information theory, coding theory, data compression, detection and estimation, receiver signal processing, networking, coding and network information theory, multimedia security, secrecy systems, optimization techniques, robust control, adaptive control and control of multi-agent systems. Current research projects include both fundamental research in the above areas as well as applied research. Typical applications are in communication networks, wireless networks, sensor networks, data storage systems, aircraft control, intelligent vehicular systems and robotics.

Contributing Faculty • Robert Balog, Miraslov Begović, Karen L. Butler-Purry, Katherine Davis, Melindad Einsani, Prasad Enjeti, Garng M. Huang, Mladen Kozunovich, Thomas Overbye, Dan B. Russell, Chanran Singh, Hamid Toosi, Le Ale

Computer Engineering & Systems
Computer engineering offers research opportunities in the areas of computer communications and networks, multimedia, storage systems, parallel and distributed computing and architecture, fault-tolerant computing and design for testing, computer aided design and testing tools, VLSI design and technologies, high-speed networks and architecture, intelligent systems and controls, and real-time systems and their architecture.

Contributing Faculty • Fang Hu, Pierce Cantrell, Gawon Cho, Nick Duffield, Paul Gatz, J-Hong Hau, Stavros Kalofarakis, Sunil Khatr, P.R. Kumar, Peng Li, Mi Lu, JV Rajendran, Narasimha Reddy, Srinivas Shakkottai, Weiping Shi, Alex Sprintson, Karam L. Watson, Xi Zhang

Electric Power Systems & Power Electronics
Two major efforts constitute the program: power systems power electronics. Faculty expertise from both power systems and power electronics is frequently combined in research activities. Power systems research is performed in the areas of analysis, reliability, monitoring, control and protection of power systems. Some of the faculty also have a strong interest in control systems, digital signal processing, data communications and intelligent system applications. Power electronics research is performed in the areas of motor drives, power electronic converters, utility interface issues, active filters, and electric and hybrid vehicles. Some of the faculty also have strong interest in power quality and diagnostics of electrical machines.

Contributing Faculty • Robert Balog, Miraslov Begovic, Karen L. Butler-Purry, Katherine Davis, Melindad Einsani, Prasad Enjeti, Garng M. Huang, Mladen Kozunovich, Thomas Overbye, Dan B. Russell, Chanran Singh, Hamid Toosi, Le Ale

Device Science & Nanotechnology
The device science and nanotechnology program encompasses a wide range of research topics from electrophics to quantum computing. The electrophics program encompasses a range of technologies that make use of optical and electronic phenomena. Research areas of primary interest include fiber optics, Integrated optics and semiconductor lasers.

Contributing Faculty • Philip Hemmer, James Biordi, Ohannees Emroyan, Rusty Harris, Jun Kameoka, Latslo Kih, Pao-Tao Lin, Christi K. Madsen, Peter Rentzeiras, Fred Strieter, Chin B. Su, Haiyan Wang, Mark H. Weichold, Jun Zou
Texas A&M University researchers have developed an intelligent transportation system prototype designed to avoid collisions and prevent hacking of autonomous vehicles. Modern vehicles are increasingly autonomous, relying on sensors to provide information to automatically control them. They are also equipped with internet access for safety or infotainment applications making them vulnerable to cyberattacks. This will only multiply as society transitions to self-driving autonomous vehicles in which hackers could gain control of the sensors, causing confusion, chaos and collisions.

Although autonomous vehicles are essentially large computers on wheels, securing them is not the same as securing a communication network that connects desktop computers and smartphones to large geographical areas due to the roles that the sensors and actuators play in the physical layer of the network.

Working in the Texas A&M’s Cyberphysical Systems Laboratory, Dr. P.R. Kumar, University Distinguished Professor in the Department of Electrical and Computer Engineering, along with graduate students Bharadwaj Satchidanandan and Woo-Hyun Ko, have applied the theory of dynamic watermarking of sensors in autonomous vehicles to prevent malicious attacks.

In their research demonstrations, 10 cameras recorded the movement of the self-driving prototype vehicles. The vision sensors in the system received the images and accurately calculated the exact location and orientation of the vehicles. Then they transmitted this information to a server, which in turn controlled the vehicles.

“Sensors are like GPS navigation in the network that gather information about the environment,” said Satchidanandan. “Actuators such as motors, or controls such as the steering wheel, interact with them. If the sensors are corrupted or their measurements had been tampered with somewhere along the line. With this new information, the researchers could predict a collision. The researchers showed that their technology could work in the lab. The actuators in the autonomous vehicles halted themselves when the sensors were tampered with.

“This is an instance of the broader concern of security of cyberphysical systems. The increasing integration of critical physical infrastructures, such as the smart grid or automated transportation, with the cyber system of the internet has led to such vulnerabilities,” said Kumar. “If these technologies are to be adopted by society, they will need to be protected against malicious attacks on sensors.”

The research is supported by the National Science Foundation, the National Science Foundation Science and Technology Center on Science of Information, the United States Army Research Office and the Qatar National Research Fund, a member of the Qatar Foundation.

“If these technologies are to be adopted by society, they will need to be protected against malicious attacks on sensors.”
An interdisciplinary team of researchers at Texas A&M University has been awarded a Division of Computing and Communication Foundations grant by the National Science Foundation to develop a gut-microbial investigation model that can identify dietary risk factors that cause colorectal cancer. The three-year, $350,000 project is a direct outcome of Texas A&M Engineering Experiment Station’s Interdisciplinary Seed Grants for Strategic Initiatives, which provided initial funding to establish the collaborative research effort.

The project, titled “Minimum Mean Square Error Estimation and Control of Partially Observed Boolean Dynamical Systems with Storage,” aims to develop and apply innovative signal processing techniques to uncover the complex interactions among microbes, human cells and their metabolic products in the gut. The project will produce innovative methods for estimation and control of processes that consist of the complex interactions of many switching elements, such as “presence” and “absence” of a particular microbial species in the gut, which are only indirectly observed through noisy biomedical assays.

“Our goal is to develop a signal processing framework that formalizes the interactions of the complex ecosystem observed in the human gut such as the microbial communities and their interactions with the gut epithelial cells,” said Dr. Ulisses M. Braga-Neto, associate professor in the Department of Electrical and Computer Engineering at Texas A&M and the principal investigator of the project. “This framework will allow us to study the effects of nutritional supplementation on this complex ecosystem in terms of changes in the microbial diversity and human gut gene expression in cell-signaling pathways.”

The project will provide life scientists with computational tools for biochemical pathway discovery as well as rational intervention design, as in optimal drug scheduling and diet modifications to treat human disease. The project will also provide training opportunities for undergraduate and graduate students, preparing them for highly interdisciplinary biomedical research.

Braga-Neto is assisted by an interdisciplinary collaborative team that includes Dr. Robert S. Chapkin, Distinguished Professor in the Department of Nutrition and Food Science at Texas A&M Agrilife; Dr. Arul Jayaraman, Ray B. Nesbitt Endowed Chair Professor in the Artie McFerrin Department of Chemical Engineering; Dr. Xiaoning Qian, assistant professor in the electrical and computer engineering department; and Dr. Ivan Ivanov, clinical associate professor of bioinformatics in the Department of Veterinary Physiology and Pharmacology. Dr. Johanna W. Lampe, associate division director of the Cancer Prevention Program in the Division of Public Health Sciences at the Fred Hutchinson Cancer Research Center is an external collaborator.

The researchers will contribute to the project in three ways: conducting reliability studies related to the deployment of methods, running studies using test beds located on the Texas A&M campus and developing educational short courses to train industry members. In a statement, U.S. Energy Secretary Rick Perry said the consortium of academic, public and private participants “demonstrates the U.S. and Indian commitments to ensuring access to affordable and reliable energy in both countries.” Perry added that “continued grid innovation will promote economic growth and energy security in the United States and India.”

The project aims to develop and apply innovative signal processing techniques to uncover the complex interactions among microbes.

The Smart Grid Center was created by the Texas A&M University System Board of Regents in 2012 to be a hub for research focused on helping to shape the vision of a smart grid, conducting research on the technologies and systems needed to achieve an integrated grid, and training students and industry professionals in both new and existing concepts and technologies.
BIG DATA AT WORK: RESEARCHERS DEVELOP MODEL TO PREDICT AND PREVENT POWER OUTAGES

High-speed winds during a thunderstorm may cause trees around an electric grid to crash into the distribution system feeders causing an outage in that area. Currently, most utility companies diminish such accidents by scheduling regular tree-trimming operations. This effort is costly and is based on a rotational approach to different service areas, which may take months and sometimes years, before all trees are trimmed. Texas A&M University researchers have developed an intelligent model that can predict a potential vulnerability to utility assets and present a map of where and when a possible outage may occur. The predictive feature allows the trees in the most critical areas with the highest risk to be trimmed first.

The model analyzed historical and close-to-real-time weather data and successfully predicted future vulnerabilities enabling utility companies to have efficient mitigation measures.

Dr. Mladen Kezunovic, Regents Professor and holder of the Eugene E. Webb professorship in the Department of Electrical and Computer Engineering, along with graduate students Tatjana Dokic and Po-Chen Chen, have developed the framework for a model that can predict weather hazards, vulnerability of electric grids and the economic impact of the potential damage.

By analyzing the impact of a potential vulnerability and weather impacts on power system outages, the researchers can predict where and when outages can occur. Predicting an optimal tree-trimming schedule that would minimize the risk of vegetation-related outages is only one of the applications.

The researchers describe their methodology for the framework as a three-part process. First, they investigate the probability of a potential hazard, such as severe weather. Next, they assess the vulnerability of the utility assets by taking the weather probability and predicting its impact on the assets. The last and most significant step is evaluating the impact of certain events and the calculation of costs of reliability indices and maintenance, replacement and repair.

The model analyzed historical and close-to-real-time weather data and successfully predicted future vulnerabilities enabling utility companies to have efficient mitigation measures, such as inspection, repair and maintenance processes.

“When outages happen, utility companies lose millions of dollars in just repairs,” said Dolic. “The past has shown how certain outages have cost precious lives too.”

The researchers used CenterPoint Energy’s utility data in their framework and have presented a proof of concept to the company. Their next step is implementation of the model on CenterPoint’s database and environment.

Kezunovic awarded The Texas A&M University System’s Regents Professor Award

In 2016, Dr. Kezunovic received The Texas A&M University System’s Regents Professor Award for his exemplary contributions to their university or agency and to the people of Texas. The Regents Professor Award honors individuals at the rank of professor or equivalent whose distinguished performance in teaching, research and service have been exemplary. The award is the highest honor bestowed by the A&M System on faculty members.
Texas A&M University researchers are part of an international collaborative project studying germanium for dark matter research that has received the National Science Foundation’s Partnerships for International Research Education (PIRE) award.

Dr. Rusty Harris, associate professor in the Department of Electrical and Computer Engineering and the Department of Physics and Astronomy, is representing Texas A&M as co-principal investigator in the GEMADARC (Germanium Materials and Detectors Advancement Research Consortium) project.

He is joined by Dr. Rupak Mahapatra, professor, and Dr. Nader Mirabolfathi, associate research professor in the Department of Physics and Astronomy in the College of Science.

PIRE is an NSF-wide program that supports high-quality projects in which advances in research and education could not occur without international collaboration.

The GEMADARC project aims to advance germanium (Ge) materials for developing Ge detectors and technologies aiding direct detection of dark matter and neutrino properties. It consists of six domestic universities, two national laboratories and four international institutes from Canada, China, Germany and Taiwan.

“Germanium is a spectacular material and was used to make the first transistor in the 1950s. We know how to make large chunks of germanium with near crystalline perfection,” said Harris. “At the same time, it happens to be the element that is most likely to interact with particles and produce small vibrations, essentially quantum mechanical heat.”

“Germanium provides the unique combination of interaction and electronic properties that allows for the sensitive exploration of nature’s fundamental properties,” said Dr. Dongming Mei of the Department of Physics at the University of South Dakota and principal investigator of the GEMADARC project.

“GEMADARC connects state-of-the-art technology development with leading-edge physics research,” said Mei. “This is an exciting opportunity for students, faculty and researchers to build cross-disciplinary international alliances.”

“The PIRE program gives us the tools to develop a diverse, globally engaged U.S. scientific and engineering workforce,” said Harris. “We can now provide international exposure to undergraduate and graduate students, K-12 teachers and postdoctoral fellows so that they become well-rounded future educators and scientists. This is an exciting opportunity provided to these burgeoning scientists so that they may actually visit and conduct research at international facilities.”

In August, Hurricane Harvey caused unimaginable devastation to homes and infrastructure in Texas, and communities are now working tirelessly to rebuild neighborhoods. Restoring power after a major natural disaster is a significant step toward recovery. Many areas would take weeks or even months to fully restore the power infrastructure.

Researchers in the Department of Electrical and Computer Engineering at Texas A&M University are on a mission to help develop a bank of knowledge about electricity needs in the areas affected by Hurricane Harvey and technology to quickly reconfigure power electronics interface at the network edge (PINE).

Dr. Le Xie, associate professor in the electrical and computer engineering department, along with Dr. Prasad Enjeti, TI Professor III in Analog Engineering and associate dean for academic affairs, and Dr. P. R. Kumar, College of Engineering Chair in Computer Engineering and Distinguished Professor, received a Rapid Response Research (RAPID) grant from the National Science Foundation for their project titled, “RAPID: Powering Through the Hurricane: Self-organizing Power Electronics Intelligence at the Network Edge.”

They aim to collect initial data and develop novel power electronics interface at the end-users level so that communities can restore at least portions of the critical power needs with distributed energy resources before the main power infrastructure is restored.

“Electricity is the lifeblood of modern civil society and it has not been fully restored in many neighborhoods yet,” said Xie. “It takes a long time to repair the bulk of the power infrastructure.”

The RAPID project’s goal is to enable end users to quickly restore prioritized electric loads during the recovery phase. The researchers will collect data about the shortage of power in communities affected by Hurricane Harvey. Then, based on the data, they will formulate and compute energy-constrained microgrid scheduling. Lastly, they will design and test the power-limiting control of power electronics interface at the end-user level.

“Almost half of the students at Texas A&M’s main campus and all of the Texas A&M at Galveston campus were affected by Hurricane Harvey,” said Enjeti. “This project will provide direct benefits to the students and their families in this rebuilding phase.”

“This project will also provide relief to many remote areas, which may have to wait for weeks or even months before the full restoration of the bulk power infrastructure,” he said.

The researchers believe their project is well aligned with the statewide Rebuild Texas Initiative led by Texas A&M University System Chancellor John Sharp.
Alfredo Costilla-Reyes, a graduate student in the Department of Electrical and Computer Engineering at Texas A&M University, has been named the 2017-18 Kirchner Food Fellow. The Kirchner Food Fellowship is an innovative, hands-on impact investment program that harnesses the power of millennials to find, fund and assist promising socially responsible agricultural businesses. The program is competitive and gives students an opportunity to learn entrepreneurial leadership skills to invest money into agriculture-oriented businesses that offer the promise of a sustainable solution for the future.

This is the first time a Texas A&M student has been awarded this honor. Previous fellows have represented institutions such as Columbia University, Harvard University and the Massachusetts Institute of Technology. Costilla-Reyes was awarded the fellowship for demonstrating his academic research and entrepreneurial initiative in BitGrange, a startup company that he founded last year. The company is an educational platform that connects agriculture to the internet via smartphone applications. At BitGrange, Costilla-Reyes has developed an intelligent prototype that combines electrical engineering and the internet of things in agriculture to grow vegetables and flowers indoors.

Costilla-Reyes collaborated with Dr. Edgar Sánchez-Sinencio, Distinguished Professor, TI Jack Kilby Chair Professor and leader of the Analog and Mixed-Signal group in the electrical and computer engineering department; and Dr. Kim Dooley, associate dean for academic operations in the College of Agriculture and Life Sciences at Texas A&M.

“Alfredo is a very bright student and his hands-on approach to solve problems and innovate is his forte,” said Sanchez-Sinencio.

“Alfredo has exhibited a superior understanding of innovation and design, creating a prototype to provide education and access to primary food sources in any living condition,” said Dooley. “As a Ph.D. student in the College of Engineering, he has brought his technical knowledge together with his passion to make a difference.”

Costilla-Reyes will be awarded $10,000 to support his research in energy-efficient power management circuits and energy harvesting systems for agriculture and bioelectrochemical process applications in emerging agricultural technologies during his tenure as a Kirchner Food Fellow. As a fellow, he will also gain venture capital and merchant banking leadership skills necessary to drive positive global sustainability efforts for future generations. “It still amazes me how a small project that I sketched during the College of Agriculture and Life Sciences’ Grand Challenges Challenge Competition (GC3) has helped me to go to places I never thought I would be able to go,” said Costilla-Reyes. “I got the opportunity to be a part of an elite group of individuals who care about solving the world’s most challenging issues in food and agriculture.”

The Grand Challenges Challenge Competition is a team-based competition in the College of Agriculture and Life Sciences that tasks teams of interdisciplinary Aggies to develop a solution to one of its five grand challenges. Costilla-Reyes was recruited to represent a team in the competition to help identify an innovative solution to a difficult problem.

Costilla-Reyes attributes his success and desire to develop a sustainable solution to world’s agricultural needs through engineering to his participation in the Thought for Food Challenge in Amsterdam. “Through GC3 and Thought for Food challenges, I got the opportunity to meet with leaders and entrepreneurs from around the world who were committed to solving the world hunger problems through creative solutions,” he said. “I learned how the way we communicate our engineering ideas and projects are as valuable as the research itself.”

Entrepreneurship is nothing new to Costilla-Reyes. In 2009, an undergraduate Costilla-Reyes co-founded Microtecnologias CReA where he led the design and development of an electronic tablet to improve production processes for small and medium business in the Toluca Area in México. Costilla-Reyes received his bachelor’s degree in electronics engineering from Universidad Autónoma del Estado de México in 2010, and began working toward his doctoral degree at Texas A&M in 2013.

Recently, Costilla-Reyes was nominated for the Mexico National Youth Award in the Entrepreneurial Ingenuity category.

FIRST AGGIE NAMED KIRCHNER FOOD FELLOW
RISING SENIORS AT A GLANCE

NASAN TSENGEG

Nasen Tsengeg is the 2017-18 president of the Texas A&M chapter of the Student Engineers’ Council (SEC). The SEC hosts the nation’s largest student-run career fair every semester attended by almost 400 recruiters wanting to hire more than 10,000 Aggie engineering students. Tsengeg has been actively involved in undergraduate research since his freshman year. He worked in the Nuclear and Mechanical Engineering Thermo-hydraulics Lab led by Dr. Yassin Hasan, department head and Sallie & Don Davis ’61 Professor in the Department of Nuclear Engineering. During his junior year he was one of the only two undergraduate students to have presented his research at the 2016 American Nuclear Society Conference. Tsengeg will graduate in 2018.

RISING SENIORS AT A GLANCE

STEPHANIE WILCOX

Stephanie Wilcox is leading the Institute of Electrical and Electronics Engineers (IEEE) student chapter at Texas A&M as the vice technology officer this year. She has helped lead the organization’s technical education committee in organizing several C++, micro controllers, 3-D printing workshops and a miniMAKE Hackathon. In 2015, she received an Undergraduate Student Research Grant to help develop a microfluidic screening platform for studying the synergistic effect of temperature on microalgal growth for microalgal biofuel applications. Wilcox will graduate in 2018.

FACULTY PROFILES

Robert S. Balog
Ph.D., University of Illinois, Urbana-Champaign, 2006
Associate Professor

Balog’s research interests include power electronics applied to renewable energy sources such as residential-scaled photovoltaic systems, reliability in power electronics, advanced inverter topologies, etc.

tx.ag/balog

Miroslav M. Begovic
Ph.D., Virginia Polytechnic Institute and State University, 1989

Begovic’s research interests include power electronics, advanced control systems and applications, high voltage power conversion, and active filters.

tx/mbegovic

Shankar P. Bhattacharyya
Ph.D., Illinois Institute of Technology, 1971

Bhattacharyya’s research interests include automatic control systems, multivariable control system analysis and design, computer aided control system design, and robust stability and control theory and applications.

tx/ag/bhattacharyya

Ulisses Braga Neto
Ph.D., The Johns Hopkins University, 2002

Braga-Neto studies optimal state and parameter estimation for boolean dynamical systems and applications in cancer proteomic biomarker discovery and validation, in addition to applications in modeling infectious disease processes.

tx/ag/braganeto

Karen Butler-Purry
Ph.D., Howard University, 1994
Professor · Associate Dean for Graduate Studies

Butler-Purry studies computer and intelligent systems application to power distribution in addition to systems, distribution, automation and management of fault diagnosis.

tx/ag/butlerpurry

Pierce Cantrell, Jr.
Ph.D., Georgia Institute of Technology, 1981
Senior Associate Professor

Cantrell’s research interests are in the general area of computer networking, including high-speed networks, TCP error detection, videoconferencing with multilayer coding and network modeling.

tx/ag/cantrell

Jean-Francois Chamberland
Ph.D., University of Illinois at Urbana-Champaign, 2004
Associate Professor · Associate Department Head

Chamberland’s research interests are probability theory, statistical methods and their applications to control and communication systems excitation.

tx/ag/chamberland

Kai Chang
Ph.D., University of Michigan, 1976

Chang studies microwave integrated circuits, antennas and phased arrays, active antennas and power combining, microwave power transmission and wireless communications.

tx/ag/chang

Gwan Choi
Ph.D., University of Illinois at Urbana-Champaign, 1994
Associate Professor

Choi studies fault-tolerance, verification simulation, high-performance VLSI circuits, radiation testing, design for dependability and software engineering.

tx/ag/choi

Robert M. Kennedy
Ph.D., University of Illinois, Urbana-Champaign, 1965
Robert M. Kennedy ’26 Professor II

Kennedy’s research interests include automatic control systems, multivariable control system analysis and design, computer aided control system design, and robust stability and control theory and applications.

tx/ag/kennedy
Aniruddha Datta  
Ph.D., University of Southern California, 1991  
Professor  
evans.eecs.tamu.edu  
Datta's research interests include adaptive control, parametric robust control and genomic signal processing and control.

Katherine Davis  
Ph.D., University of Illinois at Urbana-Champaign, 2011  
Assistant Professor  
evans.eecs.tamu.edu  
Davis studies the operation and control of power systems, interactions between computer networks and power networks and security-oriented cyber-physical analysis techniques.

Edward R. Dougherty  
Ph.D., Rutgers University, 1974  
Professor  
evans.eecs.tamu.edu  
Dougherty studies genomic signal processing such as gene-expression-based cancer classification and image analysis, which includes mathematical morphology and nonlinear signal processing.

Nick Duffield  
Ph.D., University of London, 1987  
Professor  
evans.eecs.tamu.edu  
Duffield's research focuses on data and network science, particularly applications of probability, statistics, algorithms and machine learning to the acquisition, management and analysis of large datasets in communications networks.

Mehrdad Ehsani  
Ph.D., University of Wisconsin-Madison, 1981  
Robert M. Amory '26 Chair Professor  
evans.eecs.tamu.edu  
Ehsani's research interests include power electronics, motor drives, electric and hybrid electric vehicles, and sustainable energy engineering.

Paul Gratz  
Ph.D., The University of Texas at Austin, 2000  
Associate Professor  
evans.eecs.tamu.edu  
Gratz studies security, power, reliability and performance in multicore and distributed computer architectures in addition to processor memory systems and on-chip interconnection networks.

Costas N. Georgiades  
D.Sc., Washington University, 1985  
Debra A. Whittaker Endowed Chair Professor  
evans.eecs.tamu.edu  
Georgiades studies statistical communication theory, distributed source coding, interference rejection techniques and multicarrier modulation.

Sebastian Hoyos  
Ph.D., University of Illinois at Chicago, 2004  
Associate Professor  
evans.eecs.tamu.edu  
Hoyos studies mixed-signal processing for high-speed, high-bandwidth, high-dynamic range and low-power applications in addition to communication theory and wireless communications.

Mohsen Razavi  
Ph.D., University of California at Berkeley, 1983  
Robert M. Amory '26 Chair Professor  
evans.eecs.tamu.edu  
Razavi's research interests include design and implementation of high-performance, high-speed signal processing systems and embedded systems.

C.-selection

Jiang Hu  
Ph.D., University of Minnesota, 2001  
Professor  
evans.eecs.tamu.edu  
Hu studies optimization for energy-efficient VLSI circuits, on-chip communication fabrics, dynamic power management and adaptive circuit design.

Garng M. Huang  
Ph.D., Washington University, 1980  
Professor  
evans.eecs.tamu.edu  
Huang studies modeling, monitoring and control of power systems, distributed state estimation, stability margin assessment, distributed database for online monitoring and control, auxiliary service and auction-based dispatch.

Gregory Huff  
Ph.D., University of Illinois at Urbana-Champaign, 2006  
Associate Professor  
evans.eecs.tamu.edu  
Huff's research interests include novel high-frequency antennas, waveform distortion from radiating structures on fixed and portable platforms for wireless applications.

Kalafatis' interests lie in computer architecture and server systems as applied to memory subsystem optimization as well as robotic and sensor system solutions in aerospace, robotics, automotive manufacturing and agriculture.
Dileep Kalathil  Ph.D., University of Southern California, 2014

Lasslo B. Kish  Ph.D., University of Szeged, 1984

Mi Lu  Ph.D., Tsinghua University, 1987

Krishna Narayanan  Ph.D., Georgia Institute of Technology, 1991

Jun Kameoka  Ph.D., Cornell University, 2002

P.R. Kumar  D.Sc., Washington University, 1977

Christi K. Madsen  Ph.D., Rutgers University, 1996

Robert D. Nevels  Ph.D., University of Massachusetts, 1979

Aydin Karsilayan  Ph.D., Portland State University, 2000

Peng Li  Ph.D., Carnegie Mellon University, 2003

Krzysztof Michalski  Ph.D., University of Kentucky, 1981

Cam Nguyen  Ph.D., University of Central Florida, 1990

Mladen Kezunovic  Ph.D., University of Kansas, 1988

Pao Tai Lin  Ph.D., Northwestern University, 2009

Scott L. Miller  Ph.D., University of California, 1981

Thomas Overbye  Ph.D., University of Wisconsin, 1991

Sunil Khatri  Ph.D., University of California, Berkeley, 1999

Tie Liu  Ph.D., University of Illinois at Urbana-Champaign, 2006

Oscar Moreira  Ph.D., Texas A&M University, 1996

Sam Palermo  Ph.D., Stanford University, 2007

P. R. Kumar  College of Engineering Chair in Computer Engineering

Kish’s research interests include noise-based logic and computing, unconditionally secure computers, hardware, memories and algorithms, and fluctuation-enhanced chemical sensing.

Narayanan studies multi-terminal information theory, joint source and channel coding for wireless communications, design and analysis of codes and decoders for applications in wireless communications, and data storage and optical communications.

Kameoka’s research interests include bio-nano machining, nanostructure science and engineering, nanosensors and molecular manipulation, micro and nanofluidics, and bio-nano hybrid devices for medical applications.

Kumar’s research is currently focused on wireless networks, secure networking, automated transportation, unmanned airspace traffic management and cyber-physical systems.

Madsen studies photonic signal processing, integrated optics, optical filters, microwave photonics, polarization optics, optical-ring resonators, and dispersion and high speed optical signals.

Nevels’ research interest are antennas, electromagnetics, nano photonics and electromagnetic scattering.

Karsilayan studies analog integrated circuits, amplifiers, filters, automatic tuning and self-calibration, CMOS RF communication circuits, power amplifiers, GaAs circuit design, sensor interface circuits and power harvesting.

Li works on integrated circuits and systems, VLSI computer-aided design, brain-inspired computing and computational brain modeling.

Michalski studies electromagnetic field theory, microstrip antennas and circuits, fields in layered media, application of genetic algorithms in electromagnetics and array antenna design.

Nguyen’s research interests are radar and sensor systems, electromagnetics, interconnects, interferences and wave propagation, wireless communications sensors and sensor networks.

Kezunovic’s long-term research interest is in protective relaying, substation automation, power grids, and digital simulators for relay testing, and application of intelligent techniques.

Li’s research interests include mid-infrared integrated photonics, biomedical sensors on a chip, multiscale fabrication technologies, nonconfigurable materials, and nanophotonics and metamaterials.

Miller’s primary research interests include statistical communication theory and its applications.

Overbye studies power system analysis and simulations, visualization of power system information, big data and cybersecurity applied to power systems, power system aspects of geomagnetic disturbances and EMP.

Khatri works in the areas of VLSI computer-aided design, VLSI design, radiation tolerant and radiation detection circuits, genomics, and algorithm acceleration using new hardware and software platforms.

Liu’s research interests are information theory, statistical information processing and machine learning.

Moreira studies analog circuit design, power management, analog to digital conversion and digital signal processing.

Palermo Analog and mixed signal circuits, high-speed electrical and optical interconnect circuits and RF Photonics.
Departments of Electrical Engineering

Peter Rentzepis
Ph.D., University of Cambridge, 1984
Assistant Professor

Rentzepis’s primary research interest is lasers and their application to science and technology.

Sung II Park
Ph.D., Stanford University, 2014
Assistant Professor

Park is interested in developing implantable optoelectronic stimulation and recording platforms for wireless biosignals, and analytical studies of wireless power transmission into biological tissue.

Raffaella Righetti
D. Eng., Università degli Studi di Firenze, Italy, 2005
Assistant Professor

Righetti’s primary research interest is elastography and therapeutic ultrasound.

B. Don Russell
Ph.D., University of Oklahoma, 1975
Engineering Research Chair Professor · Distinguished Professor

Russell studies distribution system fault anticipator and locator, and detection of high impedance faults on distribution lines.

Edgar Sanchez-Sinencio
Ph.D., University of Illinois at Urbana-Champaign, 1974
Regents Professor · Irma Runyon Chair Professor

Sanchez-Sinencio studies medical electronics, RF and wireless circuits, power management and energy harvesting, and wireless power and non-conventional active filters.

Erchin Serpedin
Ph.D., University of Virginia, 1999
Professor

Serpedin studies signal processing for wireless communications, computational statistics, statistical signal processing and information theory, and bioinformatics and genomics.

Jose Silva-Martinez
Ph.D., The Katholieke Universiteit Leuven, 1992
Associate Professor

Silva-Martinez studies design and fabrication of integrated circuits for communication and biomedical applications.

Chanan Singh
Ph.D., University of California, 1972
Associate Professor · Iowa Regener/Bain Professor

Singh’s interests include power system reliability, production costing, power quality and design for quality.

Weiping Shi
Ph.D., Cornell University, 2005
Professor

Shi’s research interests include modeling, simulation and engineering of biomolecules and biomolecular systems, computational molecular biology, structural prediction of protein interactions, drug design and computational systems biology.

Chao Tian
Ph.D., Cornell University, 2005
Associate Professor

Tian’s research interests include data storage systems, information theory, data communication and networks and signal processing.

Josep F. Lloret
Ph.D., Universitat Politècnica de Catalunya, 1989
Professor

Lloret studies design and development of new electronic systems and devices for the future Internet.

Hamid A. Toliyat
Ph.D., University of Wisconsin-Madison, 1991
Regents Professor · IMS Regener/Bain Professor

Toliyat’s main research interests include analysis and design of electrical machines, variable speed drives for traction and propulsion applications, fault diagnosis of electric machinery and sensorless variable speed drives.

Xiaoning Qian
Ph.D., Yale University, 2005
Assistant Professor

Qian studies bioinformatics, analysis and intervention in biological networks, biomedical image processing and analysis, and image segmentation and robust boundary finding.

Yang Shen
Ph.D., Brown University, 2008
Assistant Professor

Shen’s research interests are modeling, simulation and engineering of biomolecules and biomolecular systems, computational molecular biology, structural prediction of protein interactions, drug design and computational systems biology.

Serap Savari
Ph.D., Massachusetts Institute of Technology, 1996
Professor

Savari’s research interests include information theory, data compression, network coding, and computing and communication systems.

Hamid M. Taghirad
Ph.D., University of California at Los Angeles, 1989
Professor

Taghirad studies sensor systems, complex networks, and robustness of grid systems.

Hangue Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is a Postdoc Research Associate at the Department of Electrical and Computer Engineering, Georgia Institute of Technology.

Rajendran studies hardware security, computer security and emerging technologies.

Sung Il Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is interested in developing implantable optoelectronic stimulation and recording platforms for wireless biosignals, and analytical studies of wireless power transmission into biological tissue.

Hangue Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is a Postdoc Research Associate at the Department of Electrical and Computer Engineering, Georgia Institute of Technology.

Rajendran studies hardware security, computer security and emerging technologies.

Sung Il Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is interested in developing implantable optoelectronic stimulation and recording platforms for wireless biosignals, and analytical studies of wireless power transmission into biological tissue.

Hangue Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is a Postdoc Research Associate at the Department of Electrical and Computer Engineering, Georgia Institute of Technology.

Rajendran studies hardware security, computer security and emerging technologies.

Sung Il Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is interested in developing implantable optoelectronic stimulation and recording platforms for wireless biosignals, and analytical studies of wireless power transmission into biological tissue.

Hangue Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is a Postdoc Research Associate at the Department of Electrical and Computer Engineering, Georgia Institute of Technology.

Rajendran studies hardware security, computer security and emerging technologies.

Sung Il Park
Ph.D., Georgia Institute of Technology, 2017
Assistant Professor

Park is interested in developing implantable optoelectronic stimulation and recording platforms for wireless biosignals, and analytical studies of wireless power transmission into biological tissue.
Karan L. Watson  
Ph.D., Texas Tech University, 1982  
Professor  
tx.ag/watson  
Watson’s research interests are in engineering education, leadership, entrepreneurship, and VLSI design.

Mark H. Weichold  
Ph.D., Texas A&M University, 1981  
Regents Professor – Senior Associate Dean for Academic Affairs  
tx.ag/weichold  
Weichold’s main research interest is solid state device physics and fabrication.

Steven M. Wright  
Ph.D., University of Illinois, 1984  
Royce J. Wiseman Professor  
tx.ag/wright  
Wright’s primary research interests are methodology and instrumentation for magnetic resonance imaging.

Le Xie  
Ph.D., Carnegie Mellon University, 2006  
Associate Professor  
tx.ag/xie  
Xie’s research interests include modeling and control of power systems, smart grids, and application in support of renewable energy integration and electricity markets.

Zixiang Xiong  
Ph.D., University of Illinois at Urbana-Champaign, 1996  
Professor  
tx.ag/xiong  
Xiong studies distributed source coding for sensor networks, data hiding and network information theory.

Byung-Jun Yoon  
Ph.D., California Institute of Technology, 2007  
Associate Professor  
tx.ag/yoon  
Yoon studies biomedical imaging and genomic signal processing.

Peng Yu  
Ph.D., The University of Texas at Austin, 2009  
Assistant Professor  
tx.ag/pengyu  
Yu’s primary research interests are bioinformatics and systems biology.

Xi Zhang  
Ph.D., The University of Michigan, 2001  
Professor  
tx.ag/chang  
Zhang’s research interests include edge computing, distributed caching, offloading over 5G mobile wireless networks and wireless cognitive radio networks.

Jun Zou  
Ph.D., University of Illinois at Urbana-Champaign, 2002  
Professor  
tx.ag/zou  
Zou studies micro sensors, micro actuators and microsystems, and microoptical and acoustic devices and systems for non-destructive sensing and imaging.

The External Advisory and Development Council provides support and counsel to the department head with the purpose of helping maintain the highest level of academic excellence so that its graduates remain at the forefront of the electrical and computer engineering professional practice.

Leadership  
James Klein ’86  
Chairman  
Michael Chaddock ’77  
Subcommittee Chair for Marketing  
David Genzer ’83  
Subcommittee Chair for Service  
Charles Schroeder ’93  
Subcommittee Chair for Fundraising & Development  

Our Members  
G. Van Andrews ’85  
The Raytheon Company  
David W. Gent ’75  
SoftSet Designs  
Greg Baker ’88  
MacDcor  
David Genzer ’83  
Biomedical Micro Systems Engineering Inc.  
Brad Boyer ’85  
Lonestar Mfg., Inc.  
Keith Hawkins ’79  
Samsung R&D Center  
J. David Cabello ’73  
Blank Rome LLP  
Scott Herrington ’83  
Integrated Device Technology  
Brad Caldwell ’00  
Caldwell, Cassady, and Curry  
Carolyn Kelley ’86  
PhysCo  
Michael Chaddock ’77  
Aggarwal, GP, LLC  
James L. Klein ’86  
Opcon  
Steve Clarke ’91  
Jacobs  
Matt Moore ’94  
Powell Electrical Systems, Inc.  
B. Tod Cox ’90  
Stetson University  
Julio Navarro ’87  
Boeing  
Clay Daigle ’00  
Silicon Laboratories  
Stephen T. Norman ’82  
ExemplarE  
Kyle Flessner  
Texas Instruments  
Kevin Nowka  
IBM  
Tom L. Frey, Jr. ’55  
Lockheed Martin Aeronautics Co.  
Arthur Peake ’86  
Dell  
Darrell Petty ’90  
Waterfield Energy  
David Gent ’75  
SoftSet Designs  
Guillermo Ponce ’93  
Applied Materials  
Tim Pylyant ’84  
Cadence  
Scott Ramsey ’97  
Dell  
Charles Schroeder ’93  
National Instruments  
Matthew B. Shoemake ’93  
PeriTech LLC  
Dan Spence ’95  
GE Healthcare  
Darrell Petty ’90  
Waterfield Energy  
Ken Stroud  
L3 Communications Mission Integration  
Amy Suhl ’86  
Shell Oil  
Charles Schroeder ’93  
National Instruments  
Kevin Williams ’90  
KRW Technologies, Inc.  
Kevin Yung ’85  
Priority Power Management LLC

Our Members  
G. Van Andrews ’85  
The Raytheon Company  
Greg Baker ’88  
MacDcor  
Brad Boyer ’85  
Lonestar Mfg., Inc.  
J. David Cabello ’73  
Blank Rome LLP  
Brad Caldwell ’00  
Caldwell, Cassady, and Curry  
Michael Chaddock ’77  
Aggarwal, GP, LLC  
Steve Clarke ’91  
Jacobs  
B. Tod Cox ’90  
Stetson University  
Clay Daigle ’00  
Silicon Laboratories  
Kyle Flessner  
Texas Instruments  
Tom L. Frey, Jr. ’55  
Lockheed Martin Aeronautics Co.  
Arthur Peake ’86  
Dell

Darrell Petty ’90  
Waterfield Energy

G. Van Andrews ’85  
The Raytheon Company

Greg Baker ’88  
MacDcor

Brad Boyer ’85  
Lonestar Mfg., Inc.

J. David Cabello ’73  
Blank Rome LLP

Brad Caldwell ’00  
Caldwell, Cassady, and Curry

Michael Chaddock ’77  
Aggarwal, GP, LLC

Steve Clarke ’91  
Jacobs

B. Tod Cox ’90  
Stetson University

Clay Daigle ’00  
Silicon Laboratories

Kyle Flessner  
Texas Instruments

Tom L. Frey, Jr. ’55  
Lockheed Martin Aeronautics Co.

Arthur Peake ’86  
Dell
In 2013, Texas A&M University’s College of Engineering embarked on a transformational program called 25 by 25. As a response to the national call for more engineering graduates, and with our engineering advisory board’s strong support of the program, 25 by 25 is designed to increase access for qualified students to pursue engineering education at Texas A&M and increase our total enrollment to 25,000 students by 2025.

The 25 by 25 initiative is not just about increasing numbers; we are focusing on enhancing the quality of our students’ educational experience and the excellence of Texas A&M’s engineering program.

The 25 by 25 initiative is positively recognized by our academic peers and overwhelmingly supported by our former students and industry. In fact, we have raised more than $250 million in gifts in support of 25 by 25.

Q. How does the College of Engineering plan to grow?
A. The majority of future student growth from 25 by 25 will occur through the retention of our incoming students, growth at our branch campus locations and statewide engineering academies, and through the expansion of our online graduate programs.

Q. How is the college enhancing education?
A. We are improving the educational experience for our students through active learning, smaller class sizes, unique learning experiences and improved first-year engineering classes. We are expanding our learning facilities, including the 525,000 sq. ft. Zachry Engineering Education Complex. We are also growing our faculty. Our college has 578 top faculty scholars and professors of practice.

Q. Are you lowering your admission standards?
A. No. In fact, the admission standards to the College of Engineering have been enhanced. For students admitted for Fall 2017, the average SAT math score is 709, which is significantly higher than the average math score of 683 in fall 2016. And once students are admitted into Texas A&M, they now undergo a holistic review process to be admitted into the college.

For the latest information about the initiative, please see engineering.tamu.edu/25by25.

To get involved and support our program, contact Andy Acker at a-acker@tamu.edu or 979-458-4493.
GIFT AND ENDOWMENT OPPORTUNITIES

Gifts and endowments help attract and educate outstanding students, reward and retain top quality faculty and promote the growth of the department. We would be delighted to meet with you to discuss how you can make a gift or establish an endowment in your name or in the name of a loved one. Endowments may also take the form of naming a laboratory or the department.

Gifts of any size may also be made to the Electrical and Computer Engineering Development Fund to help further support the growth of the department.

Your gift can enhance one of four areas in the department:

Students
Support Texas A&M electrical and computer engineering students through scholarships and fellowships. Donors may contribute to existing programs or design a scholarship/fellowship based on their own criteria.

Faculty
Top faculty members attract not only other superb professors but also the best-quality students. Invest in the potential of one faculty member and you affect the lives of hundreds of students.

Department
An endowed discretionary gift allows the department head to decide how to best use your gift. This is especially valuable and can help shape the future of your department.

Facilities
The construction and maintenance of our facilities is critical to accommodate our growth and continue to attract the best and brightest students and faculty. The Zachry Engineering Education Complex will be the new home of the undergraduate engineering program at Texas A&M. This modern, technology-enabled facility will help us transform how we educate students to better prepare them for the workforce.

Please contact us for more information.

Julie Barkman
Assistant Director of Development
Electrical and Computer Engineering, Computer Science and Engineering
(979) 845-8873
jbarkman@txamfoundation.com

Miroslav Begovic
Department Head
Department of Electrical and Computer Engineering
(979) 845-7408
begovic@tamu.edu
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

MS 3128
TEXAS A&M UNIVERSITY
COLLEGE STATION, TX 77843-3128

engineering.tamu.edu/electrical