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.

Texas A&M University
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OUR RESEARCH GROUPS

Analogue & Mixed Signal

Analogue 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 analogue circuit design; analog mixed-mode fault diagnosis of integrated circuits, power management and biomedical circuits and systems.

Contributing Faculty: Karim Entesar, Sebastian Hayes, Aydin Karsilayan, Oscar Moreira, Sam Palermo, Edgar Sanchez-Sinencio, Jose Silva-Martinez

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 Borges Neto, Aniruddha Datta, Edward Dougherty, Arum Han, Jim Ji, Hang Park, Sung Il Park, Xiaoning Qian, Raffaella Righetti, Yang Shen, Byang Jun Youn, Peng Yu

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, Karim Entesar, Gregory Hoff, Krzysztof A. Michalski, Robert D. Nevels, Cam Nguyen, Steven Wright

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: Xiang Hu, Pierce Cantrell, Gwan Cho, Nick Duffield, Paul Gazz, I-Hong Hou, Stavros Kalafatis, Sunil Khatri, P.R. Kumar, Peng Yu

Device Science & Nanotechnology

The device science and nanotechnology program encompasses a wide range of research topics from electrophysics to quantum computing. The electrophysics 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 Hammer, James Biard, Ghanasim Eknayan, Rusty Harris, Jun Kameoka, Laihao Khi, Pao-Tai Lin, Christi K. Madan, Peter Renzepis, Fred Streiter, Chin B. Su, Haiyan Wang, Mark H. Weichold, Jun You

Information Science & Systems

Research activities in the information science and systems program 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: Shankar Bhattacharyya, Jean-Francois Chamberland, Aniruddha Datta, Cande Xie, Pei Jiang, Mladen Kezunovic, Thomas Overbye, Dan P. Russell, Chanan Singh, Hamid Toyyy, Le Ke

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.


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Contributing Faculty: Shankar Bhattacharyya, Jean-Francois Chamberland, Aniruddha Datta, Cande Xie, Pei Jiang, Mladen Kezunovic, Thomas Overbye, Dan P. Russell, Chanan Singh, Hamid Toyyy, Le Ke
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.
**GUT MICROBIAL BIOMARKERS OF COLON CANCER**

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 critical 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 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 Arrie 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. Dr. Mladen Kezunovic, director of the Smart Grid Center and Regents Professor in the department, along with Regents Professor Dr. Chanan Singh and department head Dr. Miroslav Begovic, will participate in a joint initiative between the U.S. Department of Energy and India's Ministry of Science and Technology to develop more reliable and affordable access to energy in the Asian country.

To help support the U.S.–India Collaborative for Smart Distribution System with Storage initiative, the Department of Energy will award a $7.5 million grant for the five-year project, bringing its total funding to $30 million, along with the financial contributions from its Indian partners.

Kezunovic said the project is particularly timely thanks to its focus on such topics as renewable energy sources and energy storage — the latter of which, he said, could be a game changer.

"With [energy] storage, it becomes much easier to control a system," Kezunovic said. "It will change everything once it penetrates to a larger scale [of use]."

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 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.

“Any kind of environmental data that has some relevance to the power system can be fed into this prediction framework.”

Data such as a utility company’s operational records, weather forecasts, altitude and vegetation around the power systems can be used to customize the applications of the model.

The model is flexible and can process a variety of data despite differing formats and data sources. The researchers say processing such data is a demanding task they have been able to solve. Every source of data and its presentation is different and multifaceted. Based on the goals, they select a large amount of input data from several sources and perform a risk analysis.

Such comprehensive data analytics makes the power system and its operations more reliable.

“The first and foremost goal of utility companies is to assure uninterrupted service,” said Chen. “By improving reliability, we can predict outages. If we can prevent outages with historical and close-to-real-time data, we can save millions of dollars since the outages may be mitigated.”

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.

“Overall the risk analysis helps predict the probability of events happening in the near future and then adds the financial impact allowing development of an optimal action plan for the utility operators to execute,” said Chen.

“When outages happen, utility companies lose millions of dollars in just repairs,” said Dokic. “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 is also director of the Texas A&M Engineering Experiment Station’s Smart Grid Center. The research was supported by CenterPoint Energy, the National Science Foundation (NSF) Center for Ultra-Wide Area Resilient Electric Energy Transmission Networks and in part by NSF Power Systems Engineering Research Center and NSF Smart Grid Big Data Spoke grants.
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 intelligence 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.
RISING SENIORS AT A GLANCE

NASAN TSENSEG

Nasan 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.

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++, microcontrollers, 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.

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

Begovic's research interests include wide area monitoring, protection and emergency control using smart grid apparatus, sustainable and resilient energy infrastructures, and managing large assets in energy infrastructure.

Shankar P. Bhattacharyya
Ph.D., IIT Delhi, 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.

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.

Karen Butler-Purry
Ph.D., Howard University, 1994
Professor – Associate Provost 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.

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.

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

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

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.

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.
Aniruddha Datta
Ph.D., University of Southern California, 1991
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
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
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., the University of London, 1987
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.

Prasad Enjeti
Ph.D., Concordia University, 1988
Enjeti’s research involves advanced power electronic converters for utility interface of solar/photovoltaic/fuel cell/battery energy storage power systems.

Costas N. Georghiades
D.Sc., Washington University, 1985
Georghiades studies statistical communication theory, distributed source coding, interference rejection techniques and multicarrier modulation.

I-Hong Hou
Ph.D., University of Illinois at Urbana-Champaign, 2011
Hou’s research interests include wireless networks, wireless sensor networks, real-time systems, distributed systems and vehicular ad hoc networks.

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

Mehrdad Ehsani
Ph.D., University of Wisconsin-Madison, 1981
Ehsani’s research interests include power electronics, motor drives, electric and hybrid-electric vehicles, and sustainable energy engineering.

Ohannes Eknayan
Ph.D., Columbia University, 1975
Eknayan’s primary research interest is integrated optics and solid state research.

Kamran Entesari
Ph.D., University of Michigan, 2005
Entesari’s research interests are RF and mm-wave integrated circuits, microwave chemical and biochemical sensing, RF MEMS.

Paul Gratz
Ph.D., The University of Texas at Austin, 2000
Gratz’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.

Stavros Kalafatis
M.S.E.E., University of Arizona, 1991
Kalafatis’s 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.

Robert M. Kennedy ‘26 Professor II

J.W. Runyon, Jr. ’35 Professor II

Ehsani’s research interests include adaptive control, parametric robust control and genomic signal processing and control.

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

J. Rusty Harris
Ph.D., Texas Tech University, 2003
Harris studies materials integration, novel electrical and physical devices and materials characterization, self-assembled nanotechnology, supercritical fluid processing and deposition.

H. Rusty Harris
Ph.D., Texas Tech University, 2003
Harris’ 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.

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

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.

I-Hong Hou
Ph.D., University of Illinois at Urbana-Champaign, 2011
Hou’s research interests include wireless networks, wireless sensor networks, real-time systems, distributed systems and vehicular ad hoc networks.

Sebastian Hoyos
Ph.D., University of Illinois at Urbana-Champaign, 2004
Hoyos’ research interests include wireless networks, wireless sensor networks, real-time systems, distributed systems and vehicular ad hoc networks.

Philip Hemmer
Ph.D., Massachusetts Institute of Technology, 1984
Hemmer’s research interests include solid materials for quantum optics, especially “dark resonance” excitation, materials and techniques for resonant nonlinear optics, and phase conjugate-based turbulence aberration and compensation.

Hoyos’ research includes wireless networks, high-speed, high-bandwidth, high-dynamic range and low-power applications in addition to communication theory and wireless communications.

Jiang Hu
Ph.D., University of Minnesota, 2001
Hu’s research focuses on optimization for energy-efficient VLSI circuits, on-chip communication fabrics, dynamic power management and adaptive circuit design.

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.

I-Hong Hou
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Hou’s research interests include wireless networks, wireless sensor networks, real-time systems, distributed systems and vehicular ad hoc networks.

Sebastian Hoyos
Ph.D., University of Illinois at Urbana-Champaign, 2004
Hoyos’ research includes wireless networks, high-speed, high-bandwidth, high-dynamic range and low-power applications in addition to communication theory and wireless communications.

Philip Hemmer
Ph.D., Massachusetts Institute of Technology, 1984
Hemmer’s research interests include solid materials for quantum optics, especially “dark resonance” excitation, materials and techniques for resonant nonlinear optics, and phase conjugate-based turbulence aberration and compensation.

Hoyos’ research includes wireless networks, high-speed, high-bandwidth, high-dynamic range and low-power applications in addition to communication theory and wireless communications.

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Dileep Kalathil
Ph.D., University of Southern California, 2014

Kalamath studies statistical learning, control theory, game theory, intelligent transportation systems, renewable energy systems and cyber-physical systems.

Lasslo B. Kish
Ph.D., University of Szeged, 1964

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

Ph.D., University of Kansas, 1980

Mladen Kezunovic

Professor

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.

Jun Kameoka
Ph.D., Cornell University, 2002

Kameoka studies bio-nano machining, nanostructure science and engineering, nanosensors and molecular manipulation, micro- and nanofluidics, and bio-nano hybrid devices for medical applications.

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

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

Ph.D., Portland State University, 2000

Ayadin Karsilayan

Associate Professor, Director of Undergraduate Programs

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.

Peng Li
Ph.D., Carnegie Mellon University, 2001

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

Ph.D., University of California, 1988

Mladen Kezunovic

Associate Professor

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.

Ph.D., University of Kentucky, 1981

Krzyzsotf Michalski

Associate Professor

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

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

Christi K. Madsen

Professor

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

Ph.D., Rice University, 1987

Mi Lu

Professor

Lu's research interests are in parallel computing, distributed processing, parallel computer architectures and algorithms, computer networks and VLSI algorithms.

Ph.D., Texas A&M University, 1987

Krishna Narayanan

Professor

Narayanan studies multiterminal 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.

Ph.D., Georgia Institute of Technology, 1998

Robert D. Nevels

Professor

Nevels's research interest are antennas, electromagnetics, nanophotonics and electromagnetic scattering.

Ph.D., University of Manchester, 1979

Sam Palermo

Associate Professor

Palermo studies analog and mixed-signal circuits, high-speed electrical and optical interconnect circuits and RF Photonics.

Ph.D., Stanford University, 2007

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

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

Ph.D., University of Wisconsin, 1991

Thomas Overbye

Professor

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

Ph.D., University of Washington, 1991

Cam Nguyen

Professor

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

Ph.D., University of Central Florida, 1990

Ph.D., University of Mississippi, 1979

Mike Lu

Professor

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Ph.D., Texas A&M University, 1987

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Hangue Park  
Ph.D., Georgia Institute of Technology, 2017  
Assistant Professor  
Ph.D., University of Illinois at Urbana-Champaign, 1990  
Assistant Professor  
Electrical nerve stimulation, biomedical system & IC design, rehabilitation neuro-prosthesis and wireless intracortical device.

Peter Rentzepis  
Ph.D., University of Cambridge, 1964  
Distinguished Research Professor  
Rentzepis’s primary research interest is lasers and their application to science and technology.

Erchin Serpedin  
Ph.D., University of Virginia, 1999  
Professor  
Serpedin studies signal processing for wireless communications, computational statistics, statistical signal processing information theory, and bioinformatics and genomics.

Chanan Singh  
Ph.D., University of Saskatchewan, 1972  
Agilent Professor - Analog Design  
Singh's interests include power system reliability, production costing, power quality and design for quality.

Sung Il Park  
Ph.D., Stanford University, 2015  
Assistant Professor  
Park is interested in developing implantable optoelectronic stimulation and recording platforms for wireless biotelemetry, and analytical studies of wireless power transmission into biological tissue.

Raffaella Righetti  
D. Eng., Università degli Studi di Firenze, Italy, 2015  
Assistant Professor  
Righetti’s primary research interest is elastography and therapeutic ultrasound.

Srinivas Shakkottai  
Ph.D., University of Illinois at Urbana-Champaign, 2007  
Assistant Professor  
Shakkottai's research interests include content distribution systems, pricing approaches to network resource allocation, game theory, congestion control, and the measurement and analysis of internet data.

Xiaoning Qian  
Ph.D., Yale University, 2015  
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., Boston University, 2008  
Assistant Professor  
Shen's research interests are modeling, simulation and engineering of biomolecules and biological systems, computational molecular biology, structural prediction of protein interactions, drug design and computational systems biology.

Jeyavijayan “JJ” Rajendran  
Ph.D., New York University, 2013  
Assistant Professor  
Rajendran studies hardware security, computer security and emerging technologies.

Jose Silva-Martinez  
Ph.D., The Katholieke Universiteit Leuven, 2002  
Professor  
Silva-Martinez studies design and fabrication of integrated circuits for communication and biomedical applications.

Hamid A. Toliyat  
Ph.D., University of Wisconsin-Madison, 1991  
Regents Professor · Irma Runyon Chair 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.

B. Don Russell  
Ph.D., University of Oklahoma, 1975  
Engineering Research Chair Professor - Aspects Professor  
Russell studies distribution system fault anticipator and locator, and detection of high impedance faults on distribution lines.

Yang Shang  
Ph.D., Boston University, 2008  
Assistant Professor  
Shang’s research interests are in data storage systems, information theory, data communication and networks and signal processing.

Jeda Hansraj  
Ph.D., University of Illinois at Urbana-Champaign, 2015  
Assistant Professor  
Hansraj's research is in the general area of communication networks with a focus on wireless network coding, distributed storage and software defined networks.

Weiping Shi  
Ph.D., University of Illinois at Urbana-Champaign, 1992  
Professor  
Shi’s main research interests are in electronic design automation including layout synthesis, parasitic extraction and testing.

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.

Narasimha Reddy  
Ph.D., University of Illinois at Urbana-Champaign, 1993  
Associate Design for Research - Associate Agency Director for Strategic Innovation and Awards (A. Baggen, J. J. F.)  
Reddy's research interests are in networks, LNO systems and computer architecture.

Jose Silva-Martinez  
Ph.D., Massachusetts Institute of Technology, 1996  
Assistant Professor  
Silva-Martinez's research interests include information theory, data compression, network coding, and computing and communication systems.
Karan L. Watson
Ph.D., Texas Tech University, 1982
Research Professor
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
Weichold’s main research interest is solid state device physics and fabrication.

Steven M. Wright
Ph.D., University of Illinois, 1984
Royce E. Wisenbaker Professor II
Wright’s primary research interests are methodology and instrumentation for magnetic resonance imaging.

Le Xie
Ph.D., Carnegie Mellon University, 2009
Associate Professor
Xie’s research interests include modeling and control of power systems, smart grids application in support of renewable energy integration and electricity markets.

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

Byung-Jun Yoon
Ph.D., California Institute of Technology, 2007
Assistant Professor
Yoon studies biomedical imaging and genomic signal processing.

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

Xi Zhang
Ph.D., The University of Michigan, 2001
Professor
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
Zou studies micro sensors, micro actuators and microsystems, and microoptical and acoustic devices and systems for non-destructive sensing and imaging.

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

LEADERSHIP

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

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National Instruments
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Premier LLC
Dan Spence ’95
GE Healthcare
Ken Stroud
L3 Communications Mission Integration
Amy Suhl ’86
Shell Oil
Kevin Williams ’80
KRK Technologies, Inc.
Kevin Yung ’85
Priority Power Management LLC
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 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
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A still from the Center for Bioinformatics and Genomic Systems Engineering, a multidisciplinary research avenue that combines bioinformatics, computational and systems biology.