The Department of Electrical and Computer Engineering has welcomed seven new faculty members, adding to the department's innovative learning environment. They are (l to r) Sangmin Yoo, Yiming Deng, Vaibhav Srivastava, Qi Hua Fan, Jeffrey Nanzer, Peng Zhang, and Ahmet Cagri Ulusoy.

The Department of Electrical and Computer Engineering is experiencing dynamic growth as seven new faculty members continue to diversify the world-class expertise at Michigan State University. Here are a few details on the newest Spartan Engineers.

Yiming Deng joined the department as an associate professor in August 2016. His research interests include nondestructive evaluation (NDE), structural health monitoring (SHM) for multi-scale damage diagnostics and prognostics, applied electromagnetics, acoustics, and computational modeling.

Before coming to MSU, he was an associate professor of electrical engineering, and director of the Laboratory of Electromagnetic and Acoustic Imaging and Prognostics (LEAP) at the University of Colorado, Denver, and the Anschutz Medical Campus. He was also a scientific staff member of the Colorado Translational Research Imaging Center (C-TRIC).

Deng earned a bachelor's degree in electrical engineering (2003) from Tsinghua University in Beijing, China, and a PhD in electrical engineering (2009) from MSU.

Qi Hua Fan joined the department as an associate professor in August 2016. His research focuses on plasma sources for large-area coatings, plasma processing of nanostructured materials for energy storage, and optoelectronic thin films and devices.

Prior to coming to MSU, Fan was a faculty member in the Department of Electrical Engineering and Computer Science at South Dakota State University. He received a bachelor's degree in electronic materials and devices and a master’s degree in magnetic materials and devices, both from the University of Electronic Science and Technology in China. He earned a PhD in applied physics from the University of Aveiro, Portugal.

Vaibhav Srivastava joined the department as an assistant professor in August 2016. His research focuses on complex networks and shared autonomous systems. His interests lie in design of shared human-robot autonomy, modeling human decision-making, distributed decision-making, distributed optimization, and animal locomotion.

He was previously an associate
Greetings from the Department of Electrical and Computer Engineering at Michigan State University.

As we continue to offer a top-tier research program and an innovative learning environment in both electrical and computer engineering, this past year we have witnessed significant growth with the hiring of seven new faculty members and the creation of two new research efforts: Connected and Autonomous Vehicles (CANVAS), and Millimeter-wave and Submillimeter-wave Electronic Systems.

They both will offer unique training opportunities for both undergraduate and graduate students, as well as interact closely with our industry partners in a variety of ways.

During the past year, our research program also expanded with three new major NSF awards: one on studying doping/defects in diamond electronics; a PFI:BIC grant on developing a smart human-centered system for enhancing college counseling services; and an RET grant on smart sensors and sensing systems.

Several of our faculty members and graduate students received major national and international awards continuing a long tradition of excellence for Spartan electrical and computer engineers.

I invite you to browse through the pages of this newsletter to better familiarize yourself with some of the recent activities and accomplishments of our department.

Go Green!

FROM THE CHAIR

John Papapolymerou

FROM PAGE 1

research scholar at Princeton University.

Srivastava earned a BTech in mechanical engineering from the Indian Institute of Technology, Bombay; and MS (mechanical engineering), MA (statistics), and PhD (mechanical engineering) degrees from the University of California, Santa Barbara.

Ahmet Cagri Ulusoy joined the department as an assistant professor in April 2016. His research interests are in the broad area of high-frequency integrated circuits and systems. His areas of specialization are BiCMOS front-end electronics for millimeter-wave systems, optoelectronic ICs for emerging Ethernet standards, and high-power amplifiers in SiGe and GaN technologies.

Prior to joining MSU, he was the group manager for broadband mixed-signal ICs at IHP Microelectronics in Germany. He is currently the associate editor of IEEE Microwave and Wireless Components Letters.

He earned his bachelor’s degree (2003) from Istanbul Technical University, Turkey, and his master’s (2008) and PhD (2012) degrees from Ulm University, Germany.

Sangmin Yoo joined the department as an assistant professor in March 2016. His research encompasses a wide range of topics in analog, mixed-signal, and RF circuits and systems that will enable innovations in the future.

Before joining the MSU faculty, he was a staff engineer at Qualcomm in San Jose, California. He also researched and developed analog/RF circuits and systems for wireless communication such as WiFi, Bluetooth, and GPS. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE).

Yoo received his bachelor’s degree (2000) and his master’s degree (2002), both in electronic engineering, from Sogang University, Seoul, South Korea; and his PhD (2011) in electrical engineering from the University of Washington, Seattle.

Peng Zhang joined the department as an assistant professor in August 2016. He has a broad interest in theoretical and computational research in nanoelectronics, electromagnetic fields and waves, plasmas, and accelerator technology, with a current focus on modeling of vacuum nanodevices, quantum tunneling plasticmonic junctions, ultrafast photoemission, and novel miniaturized light sources.

Prior to coming to MSU, Zhang was an assistant research scientist at the University of Michigan.

He earned a bachelor of engineering degree (2006) in electrical and electronic engineering, and a master of engineering degree (2008) in microelectronics, both from Nanyang Technological University, Singapore. He then earned master’s (2010) and PhD (2012) degrees, both in nuclear engineering and radiological sciences, from the University of Michigan.

Nanzer Named Nyquist Assistant Professor

Jeffrey Nanzer has been named the Dennis P. Nyquist Assistant Professor. The position honors the late ECE professor Dennis P. Nyquist, an award-winning professor who served as a faculty member from 1966 to 2002. Nyquist was named a fellow of IEEE in 1997.

Nanzer’s research is in the area of electromagnetics, specifically in microwave and millimeter-wave systems and antennas. A major thrust of his research focuses on the possibilities of coordinating the operations of distributed, mobile, wireless systems with coherence at the radio frequency level—called coherent distributed arrays—and the microwave and millimeter-wave technologies necessary to get there.

From distributed remote sensing on CubeSats for improved measurements of the Earth, to distributed UAV arrays for better soil moisture mapping in agriculture, to ad-hoc arrays of cell phones or personal radios for increased range and throughput, Nanzer works to develop technologies with significant potential for improvements in a broad range of wireless applications. His current work focuses on creating millimeter-wave technologies for high-precision, high-accuracy inter-node coordination between moving systems.

Prior to coming to MSU, Nanzer worked at the Johns Hopkins University Applied Physics Laboratory, where he developed and led the Advanced Microwave and Millimeter-Wave Technology group.


He received his bachelor’s degree (2003) from MSU and his master’s (2005) and PhD (2008) degrees from the University of Texas, Austin.
MSU Contributes to Autonomous-Vehicle Research

When it comes to the development of autonomous, or self-driving, vehicles, there’s a lot more to it than meets the eye. It takes a warehouse full of technology—cameras, radars and other sensors, and security and recognition technology, not to mention a trunkful of computers—to make it happen.

At MSU, researchers are involved in the work that will someday make self-driving vehicles not just a reality, but commonplace.

Working as part of a project known as CANVAS—Connected and Autonomous Networked Vehicles for Active Safety—the scientists are focusing much of their energy on key areas, including recognition and tracking objects such as pedestrians or other vehicles; fusion of data captured by radars and cameras; localization, mapping, and advanced artificial intelligence algorithms that allow an autonomous vehicle to maneuver in its environment; and computer software to control the vehicle.

“Much of our work focuses on technology that integrates the vehicle with its environment,” said Hayder Radha, ECE professor and director of CANVAS. “In particular, MSU is a recognized leader in computer vision, radars and antenna design, high-assurance computing, and related technologies, all areas that are at the core of self-driving vehicles.”

CANVAS is part of the larger MSU Mobility Studio initiative, consisting of CANVAS, smart infrastructure, and mobility management of autonomous and connected vehicles, pedestrians, and cyclists.

An important aspect of a future connected-and-autonomous vehicle is its ability to communicate with other vehicles and the infrastructure surrounding it. Such communications enable a car to detect other vehicles that are approaching an intersection and recognize whether the other vehicle is going to stop in time.

If a vehicle occupant is unable to drive, the technology can detect that and pull the car over to the side of the road.

MSU recently acquired a car that is equipped with a series of radars and LiDARs (laser radars), cameras, and accompanying software that will be tested on the MSU campus.

NSF Grant to Continue Research Experiences for Teachers

Teachers will be students again at Michigan State University thanks to a three-year, $600,000 National Science Foundation (NSF) grant that will extend MSU’s Research Experiences for Teachers (RET).

RET is part of MSU’s outreach in science, technology, engineering, and mathematics (STEM) and is led by Wen Li (principal investigator), associate professor of electrical and computer engineering; Drew Kim (project manager and co-PI), assistant to the dean for recruitment, scholarship, and K-12 outreach in the MSU College of Engineering; and Xiaobo Tan (senior personnel), MSU Foundation Professor of electrical and computer engineering.

The new RET program is Smart Sensors and Sensing Systems. It builds on the success of the last RET experience which was led by Tan and Kim—Robotics Engineering for Better Life and Sustainable Future.

“We will continue to develop a strong partnership between MSU and schools in the greater Lansing, Detroit, and Grand Rapids areas,” Li said. “Our goal is to train another cadre of leaders of middle and high school teachers in the STEM areas. We’ll recruit teachers from mid- and southeast Michigan who serve socioeconomically challenged populations and students from groups traditionally under-represented in science and engineering.”

The three-year project will train 11 teachers a year by involving them in cutting-edge research and other professional development activities at MSU.

Janelle Orange, a seventh-grade science teacher at MacDonald Middle School in East Lansing, is among the RET participants who have expanded their skills for teaching STEM subjects.
Mi Zhang, an assistant professor of electrical and computer engineering, is doing his part to make things safer for elderly people and those with chronic health conditions.

A booming problem, especially among the nation’s elderly, is unidentified and misidentified prescription pills, one that can have deadly consequences.

Zhang and his teammates won first place and the $25,000 prize in the 2016 National Institutes of Health National Library of Medicine Pill Image Recognition Challenge, a national competition designed to develop new methods of automatically identifying pills using mobile phones.

Their work will contribute to the creation of a system that can match photos taken by a smartphone to high-resolution images of prescription pills to give consumers a simple way to recognize mystery pills, help prevent medication errors, and reduce waste by identifying pills that otherwise might be discarded.

"Each prescribed pill is uniquely characterized by its shape, color, and imprints," Zhang said. "However, the color and shape of the pill could change when taking pictures of it under different light, background, angles, and even using different phones. This is the biggest challenge of this problem."

Another way Zhang is helping the elderly and the homebound is by exploring whether home WiFi systems can detect abnormal activities and events in their homes, while preserving their privacy.

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"The central idea is that different activities cause different changes in WiFi signals," Zhang explained. "By analyzing these changes, the activity that caused the change can be recognized. For instance, if an older adult isn’t moving around as much as usual, it may indicate that his or her health is deteriorating."

Also credited to Zhang’s work is the next generation of wearable technology, known as HeadScan, which is being developed in collaboration with researchers at Bell Labs.

"It uses wireless radio signals to sense the targeted activities and provides a non-intrusive and privacy-preserving solution that overcomes the drawbacks of current wearable technologies," said Zhang.

Radio waves from two small antennas, which can be placed on the shoulders, are bounced off the patient’s head, capturing movements of the mouth and head caused by eating, drinking, coughing, and speaking, information a health care provider could find useful in combating disease, asthma, or even depression. This information is then relayed to a health care professional who can analyze the data.

Additionally, Zhang and co-PI Jingbo Meng, an assistant professor of communication at MSU, will use an NSF grant of $1 million to develop a smart human-centered system for enhancing college counseling services. Known as iSee, the project is an innovative approach to using technology in the context of mental health treatment.

The researchers are also working with the MSU Counseling Center. Zhang said the technology leverages sensors inside smartphones and wristbands to monitor many of the student’s behaviors—such as physical activity, diet, sleeping habits, travel, and social behavior—all of which can be indicators of the student’s mental wellbeing. The technology also will help clinicians identify students with the most urgent needs.
News Briefs

Xiaobo Tan named IEEE Fellow

Xiaobo Tan, MSU Foundation Professor of electrical and computer engineering, has been named a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), the world’s largest professional organization for the advancement of technology.

The honor, which was effective Jan. 1, is the highest grade of membership in IEEE and is recognized by the technical community as a prestigious honor.

Tan was recognized “for contributions to modeling and control of smart materials and underwater robots.”

Improving Electrical Communication with the Brain

Erin Purcell, assistant professor of biomedical engineering, electrical and computer engineering, and neuroscience, will use a $413,000 grant from the National Institutes of Health to investigate why devices implanted in the brain lose their efficacy over time. The research could potentially aid patients suffering from the devastating effects of neurological injury and disease.

The NIH grant is one of the first awarded to MSU’s new Department of Biomedical Engineering. The department was approved at the state level in spring 2016 as a focal point at MSU for technological innovations applied to the medical needs identified by physicians, nurses, and health scientists in hospital, clinic, and home settings.

MSU William J. Beal Outstanding Faculty Award

Hayder Radha, ECE professor and associate chair for research, received the MSU William J. Beal Outstanding Faculty Award during MSU’s annual awards convocation in 2016. Radha is the director of the WAVES Lab at MSU. A fellow of the IEEE, he is also a recipient of the AT&T Bell Labs Ambassador Award, AT&T Circle of Excellence Award, the MSU College of Engineering Withrow Distinguished Scholar Awards (both as junior and senior faculty), and the Microsoft Research Content and Curriculum Award. His current research areas include compressed sensing and signal sparsification for BIGDATA; hyperspectral imaging and signal processing for environmental sustainability; signal processing of network graphs; analysis of social networks; and visual processing, coding, and communications. He has more than 200 peer-reviewed papers and 30 patents.

Faculty Promotions

Selin Aviyente has been promoted to full professor.

MSU Technology Transfer Achievement Award

Jes Asmussen, University Distinguished Professor of electrical and computer engineering, was honored at the sixth annual MSU Innovation Celebration with the 2016 MSU Technology Transfer Achievement Award. It recognized his work on microwave plasma machines and processes to produce synthetic diamonds.

Asmussen holds 26 U.S. and more than 20 international patents in the field of microwave technology and microwave processing. These methods have been critical to the advancement of the semiconductor industry. His design incorporates proprietary internal tuning and precise control of microwave mode and plasma conditions, which enable operation at the extremes for desired plasma applications. Asmussen’s microwave reactor technology was successfully licensed to Microwave Enterprises of Morrisville, N.C.

This advanced equipment is used in the deposition and growth of polycrystalline and single-crystal diamonds used in industrial, scientific, and gemstone applications.

Solving the Billion-Variable Optimization Problem

An unprecedented and staggering billion-variable real-world optimization problem has been solved for the first time—by Koenig Endowed Chair Professor Kalyanmoy Deb and his PhD students from the Computational Optimization and Innovation (COIN) Lab. They received recognition for their work at the Genetic and Evolutionary Computation Conference (GECCO-2016) in Denver in July. They won the Best Paper Award of Genetic Algorithms with their paper titled “Breaking the Billion-Variable Barrier in Real-World Optimization Using a Customized Evolutionary Algorithm.” They also won the Association for Computing Machinery SIGEVO Impact Award for a 2016 paper published in GECCO-2006 proceedings.

Celebrating their win for the Best Paper Award for Genetic Algorithms this summer are (l–r): Abhinav Gaur, Christie Myburgh (Principal Research and Development Engineer, Maptek), Professor Kalyanmoy Deb, Rayan Hussein, Zhichao Lu, Hailtham Seada, and Proteek Roy. The PhD students in MSU’s COIN Lab are Gaur; Hussein, Lu; Seada, and Roy.
Congratulations to the winners of the Electrical & Computer Engineering Prism Venture-Works for Capstone Design Projects, Spring 2016:

- Saleh Alghamdi, Justin Fecteau, Beiting Huang, Jacob Jones, Samuel Metevia, and Patrick Pomaville: Prism VentureWorks first prize for “Great Lakes Controls & Engineering: Aeroponic Control System for Efficient Growth”
- Barend Ungrodt, Joe Stephan, Angelica Minissale, Theo Chupp, and Chans Head: Prism VentureWorks second prize for “MotionControlShop.com: IntelliMotor”
- Haojun Wang, Ruowan Ji, Mark Zatorski, Yun Lou, and Jiawei Wu: Prism Venture-Works third prize for “ArcelorMittal: Conveyor Transfer System for Coils”

DoD SMART Scholarship
PhD student David Torres-Reyes (left, top) received a Science, Mathematics, and Research for Transformation (SMART) scholarship through the Department of Defense (DoD) to continue his research in micro mirrors. This prestigious scholarship is awarded to undergraduate and graduate students who have demonstrated excellent performance in STEM fields. Students receive full tuition and education-related fees, a $25,000 to $38,000 annual stipend, summer research opportunities and employment placement within the DoD after graduation. The program aims to increase the number of civilian scientists and engineers working at DoD laboratories. Torres-Reyes is spending 2016–17 with the Sensors Directorate at the Air Force Research Laboratories at Wright-Patterson Air Force Base, Dayton, Ohio. He will graduate in May 2017.

NSF Graduate Research Fellowship
PhD student Maria Castano (left, bottom) received a 2016 National Science Foundation (NSF) Graduate Research Fellowship to continue her work on the control system for Grace, MSU’s gliding robotic fish, and other small robotic fish being developed at MSU. The NSF’s Graduate Research Fellowship Program recognizes and supports outstanding graduate students who are pursuing research-based master’s and doctoral degrees in STEM education. This year’s awards went to 2,000 individuals out of 17,000 applicants. The program provides three years of financial support for graduate studies. Castano works with MSU Foundation Professor Xiaobo Tan, a professor of electrical and computer engineering whose research group is advancing the use of small robotic fish to improve the health of the Great Lakes by tracking invasive species.

MSU Scholar-Athlete Award
Baseball player Josh Buchalski, a senior in electrical engineering from Sanford, was honored during the 19th annual Spartan Academic Excellence Gala at the Breslin Center in April 2016. Scholar-Athlete Awards are presented to an individual from each team who has reached at least junior academic status, has received a minimum of one varsity letter, and while meeting these requirements, maintains the highest cumulative grade point average on their team.

ECE Graduate Students Receive FAST Fellowship
Two ECE graduate students, Jennifer Byford and Marisel Villafaña-Delgado, have been awarded the 2016–2017 Future Academic Scholars in Teaching (FAST) Fellowship. Byford is currently a doctoral student under the supervision of Premjeet Chahal, ECE associate professor, in the Terahertz Systems Laboratory. Prior to joining the group as a graduate student in spring of 2014 she earned a bachelor’s degree in electrical engineering from MSU, where she was also a member of the Honors College. Her research interests include metamaterials, millimeter/terahertz active and passive devices, reconfigurable antennas, sensors, biomedical applications for terahertz radiation, and engineering education.

Villafaña-Delgado is a third-year PhD student. She completed an MS in electrical engineering at the University of Maryland in 2015, a BS in electrical engineering from the University of Puerto Rico at Mayagüez in 2011, and a BS in electronics engineering technology from the University of Puerto Rico at Bayamón in 2008. Her current research, under the supervision of Selin Aviyente, ECE professor, focuses on the study of functional connectivity networks in the human brain. Her long-term goals include becoming a faculty member and continuing her work on the applications of signal processing to neuroscience as well as the development of effective teaching techniques.
2016 ECE Alumni Award

Rachel S. Hutter, PE, CSP, vice president of Worldwide Safety for Walt Disney Parks and Resorts, received the 2016 John D. Ryder Electrical and Computer Engineering Alumni Award at the 13th annual College of Engineering Alumni Awards Banquet last May.

Hutter graduated from MSU in 1993 with a bachelor’s degree in electrical engineering and a concentration in theater—the perfect combination for a Disney engineer.

Prior to working at Disney, her early career included such diverse roles as medical research with the Veteran’s Administration, facilities and construction management at General Motors, controls engineering at General Mills, and technical support for Allen-Bradley.

Since joining the Walt Disney World Resort in 1997, she has worked in many different roles, including: developing and opening Disney’s Animal Kingdom; leading technical services for the Walt Disney World Resort; starting the attractions engineering services and quality assurance teams; and leading the teams responsible for ensuring the safety, operability, and maintainability of new Disney resorts worldwide.

Her current position includes direct leadership of engineers and safety professionals based at Walt Disney World Resort and Disneyland Resort, and dual-reporting leadership of all worldwide safety teams including Disneyland Resort Paris, Hong Kong Disneyland, and Disney Cruise Line. Hutter and her teams are responsible for the safety of the hundreds of thousands of cast members around the world and the millions of guests who visit Disney each year.

Hutter holds U.S. and European patents for a ride safety system she created in 2003 that connects the Computerized Maintenance Management System with the Ride Control System of attractions to ensure that guests have access to ride attractions only after all critical work has been completed.

She lives with her husband and two children in Orlando, Florida.

Class Notes

Darius E. Adamczyk (‘88), Honeywell president and chief operating officer, will succeed Dave Cote as chief executive officer, effective March 31, 2017.

Paul M. Gurzo (’02) has been elected a partner at Harrity & Harrity, LLP, an intellectual property firm in Fairfax, Va. He has a wide range of expertise in many aspects of U.S. patent law, including strategic counseling, preparing and prosecuting applications, and portfolio development and management. He holds a JD from the Columbus School of Law at Catholic University of America in Washington, D.C.

Paul M. Gurzo (’02) has been elected a partner at Harrity & Harrity, LLP, an intellectual property firm in Fairfax, Va. He has a wide range of expertise in many aspects of U.S. patent law, including strategic counseling, preparing and prosecuting applications, and portfolio development and management. He holds a JD from the Columbus School of Law at Catholic University of America in Washington, D.C.

Krunali Patel (MS ’95) has been elected a vice president at Texas Instruments Inc. (TI). As vice president and general manager of TI’s centralized analog design services division, Patel is responsible for supporting common capabilities and infrastructure across all analog product teams.
Remembering Professor Dennis P. Nyquist

Dennis P. Nyquist, a retired and award-winning professor of electrical and computer engineering, passed away Dec. 9, 2016, in East Lansing. He was 77. Nyquist earned a PhD from MSU in 1966 and served as a faculty member from 1966 to 2002. Among his many honors were the MSU Teacher-Scholar Award in 1969 and the University Distinguished Faculty Award in 1997. He was named a fellow of IEEE in 1997. Known for his devotion to students and his university, his philanthropy included the Nyquist Professorship in Electromagnetics, the Lucille P. Nyquist Memorial Endowed Electrical Engineering Graduate Fellowship fund that honors his late mother, and the Dennis P. Nyquist Electromagnetic Research Discretionary Endowment Fund. Memorial services were hosted by his family on Dec. 11 and at MSU on Jan. 24.