

#### DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

TEXAS TECH Whitacre College of Engineering

#### **Newsletter**



Fall 2024

# CONTENTS











04 RESEARCH SPOTLIGHT



10 FACULTY UPDATES

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Message from the Chair

Dear Alumni and Friends,

I am pleased to welcome you to the Department of Electrical & Computer Engineering (ECE) at Texas Tech University. Our department serves approximately 800 undergraduate and 150 graduate students, offering ABET-accredited bachelor's degrees in electrical and computer engineering, along with Master's and PhD programs. We also offer accelerated pathways for undergraduates to take graduate-level coursework. With more than \$8 million in endowments for scholarships, we ensure financial support for many of our students.

Currently our faculty consists of 25 full-time members, including 7 Fellows of major organizations like IEEE and the American Physical Society, 3 Paul Whitfield Horn Professors, and 7 endowed chair holders. In 2024, we attracted nearly \$10 million in research funding, with several renowned research centers supporting our mission.

I am delighted to share the ECE Department will get a large share of additional faculty positions from the Texas University (TUF) Fund. The Texas University Fund is a voter approved multi-billion-dollar endowment created from the state surplus, the National Research University Fund and charitable contributions. This initiative will provide one of the largest growth opportunities for the ECE Department since its founding. A total of 9 new faculty positions have been approved in the exciting research areas of:

- · Human Molecular Aging Al Bioinformatics
- · Critical Infrastructure Security
- · Pulsed Power / Electromagnetic Pulse Research
- · Telecommunications

Research in the bioinformatics is poised to open new horizons in the field of personalized medicine. The faculty in Critical Infrastructure Security and Pulsed Power thrusts will significantly enhance our national security posture. All planned hires will have a home in existing centers of excellence and will be synergistically contributing to the research mission of the ECE Department, the Whitacre College of Engineering, and Texas Tech University. For example, the Telecommunications faculty will contribute to telecom infrastructure (cyber-defense/cyber-physical) – anti-jamming, encryption, 6G protocols and thereby enhance the research in the other focus areas.

Dr. Michael Giesselmann Interim Chairperson Electrical and Computer Engineering



#### Texas Tech Partnership Earns \$2.5 Million Grant for Cybersecurity Program

#### Ashlyn Grotegut

The U.S. Department of Defense aims to spur a research and training ecosystem at three Texas universities to tackle challenges in cybersecurity for defense applications.

Texas Tech University, along with the University of Texas at San Antonio and Angelo State University, are the recipients of a \$2.5 million grant from the U.S. Department of Defense (DOD) to develop a comprehensive research and workforce development program in cybersecurity that will address relevant defense problems.

The proposed program unites a multi-disciplinary team of Texas Tech researchers that includes Executive Director of the Institute for Critical Infrastructure Security, Stephen Bayne, and Ranadip Pal, with the Department of Electrical & Computer Engineering; associate professor Abdul Serwadda and assistant professor Tommy Dang with the Department of Computer Science; and Argenis Bilbao, senior director of the Global Laboratory for Energy Asset Management and Manufacturing (GLEAMM).



## Pal Presents to the Al Advisory Council



Professor Ranadip Pal from the Texas Tech University ECE Department recently presented to the Artificial Intelligence Advisory Council during the 88th session of the Texas Senate. He highlighted TTU's research strengths in Al, particularly in medicine, cybersecurity, agriculture, and education.

The council, created by Texas House Bill 2060, monitors AI systems in state agencies and explores the need for an AI code of ethics in state government. Pal addressed questions and concerns from the council regarding the role of AI in research and education.

#### Wu Publishes Research on Magnetic Nanoparticles in Nanomedicine

In June 2024, Elsevier published Magnetic Nanoparticles in Nanomedicine, co-edited by Kai Wu and Jian-Ping Wang. The book is divided into five sections. The first section covers the material properties, synthesis, modification, and characterization techniques of magnetic nanoparticles. The second section explores the medical applications of magnetic nanoparticles, including magnetic hyperthermia, drug/gene delivery, and neural stimulation. The third section introduces in vitro disease diagnosis, particularly focusing on emerging magnetic biosensors in recent years. The fourth section focuses on in vivo disease diagnostic imaging technologies, such as magnetic resonance imaging (MRI) and magnetic particle



imaging (MPI). The fifth section discusses the biocompatibility of magnetic nanoparticles, considering aspects such as immunotoxicity and cellular uptake.

Invited by the publisher at Nanotechnology, IOP Publishing, Wu led the writing of a roadmap on the future of magnetic nanoparticles in nanomedicine. With the support of many leading experts in the field, this roadmap was published online in October 2024: https://iopscience.iop.org/article/10.1088/1361-6528/ad8626 It represents a collaborative effort from 42 authors across 23 institutions in 6 countries: the U.S., U.K., China, France, Japan, and Spain. Some of the participating institutions include: The Ohio State University, University of California-Berkeley, Harvard Medical School, University of Cantabria, National Institute of Advanced Industrial Science and Technology, University of Birmingham, Birmingham Biomedical Research Centre, South China University of Technology.



#### TTU Research in Bio-Modeling Secures over \$1 Million in DOD Grants for Bio-Effects and Theraputic Studies



Faculty in the Electrical & Computer Engineering Department at Texas Tech University have been awarded over \$1 million in grants from the Department of Defense, including funding from the Office of Naval Research (ONR), Army Research Laboratory (ARL), and DEFENSEWERX. The research focuses on numerical modeling to better understand bio-responses to electromagnetic fields, with potential applications in health and safety, including pain management, wound healing, and cancer treatments.

The interdisciplinary project, led by Ravi Joshi and Mary Baker from the Department of Electrical & Computer Engineering, collaborates with Alexander Idesman (Mechanical Engineering), Bijoy Ghosh (Mathematics), and John Lawrence from TTU Health Science Center. This research offers unique training opportunities for students in both engineering and health sciences.



#### Lin and Jiang Secure \$3 Million Grant from DOE to Improve Reliability and Resiliency of America's Power Grid

#### **Allen Ramsey**

Texas Tech University professors Jingyu Lin and Hongxing Jiang were awarded \$3,070,735 from the U.S. Department of Energy (DOE) to develop a photoconductive semiconductor switching device.

The DOE announced the Texas Tech team as one of 15 research groups across the country to receive funding as part of a \$42 million commitment to improve the power grid and accelerate the development of clean energy resources.

Managed by DOE's Advanced Research Projects Agency-Energy (ARPA-E) and funded by DOE's Unlocking Lasting Transformative Resiliency Advances by Faster Actuation of power Semiconduc-



tor Technologies (ULTRAFAST) program, the projects are designed to enable a more secure and reliable grid while allowing it to utilize more solar, wind and other clean energy.

Lin and Jiang, both Horn Distinguished Professors and co-directors of the Center for Nanophotonics in the Edward E. Whitacre Jr. College of Engineering, will use advanced ultrawide-bandgap (UWGB) materials to create the photoconductive semiconductor switching device, which will enable improved control of the grid.

The new switching devices, made from novel UWBC semiconductors, will support higher voltage and current than legacy semiconductor materials. "The Center for Nanophotonics at Texas Tech focuses solely on the development of UWBG semiconductor materials and devices," Lin said. "In fact, some of our unique capabilities are a result of ARPA-E's continued support."

"For this project," Jiang explained, "we will focus on developing laser-triggered power switches made from UWBG semiconductors to support high-speed, high-voltage and high-power operation."



# TEACHING AWARDS

The ECE Awards Committee is Proud to Congradulate the Following Faculty and Staff for Awards and Nominations



Molly Dickens Awarded: Rawls Distinguished Undergraduate Educator Award Brian Nutter Awarded: Rawls Distinguished Educator Award Derek Johnston Awarded: Rawls Distinguished Undergraduate Educator Award



Jenny Erdmann Awarded: Matador Distinguished Staff Award



#### AWARD NOMINATIONS



Jacob Stephens Nominated: President's Excellence in Teaching Award & George T & Glady Abell Hanger Teaching Award



Brian Nutter Nominated: Butler Distinguished Educator Fellowship Award



**Rui He** Nominated: President's Excellence in Teaching Award



Jennifer Maddox Nominated: President's Excellence in Advising Award



Andrew Vanderpool Nominated: President's Excellence in Advising Award



Jenny Erdmann Nominated: President's Excellence in Advising Award



## FACULTY

## UPDATES

## **Pereira Joins ECE Faculty Fall 2024**

We would like to welcome Emily Pereira as our newest Assistant Professor in the Electrical & Computer Engineering Department at Texas Tech University. Pereira's research interests span across control systems, cyber-physical systems, dynamic network systems, and neurological disease. Prior to joining the faculty here at Texas Tech, she was a post-doctoral fellow at Johns Hopkins University, where she developed

techniques to control for epilepsy in a clinical setting. Pereira completed her PhD in Electrical Engineering at the University of Southern California, where she focused on developing control-theoretic properties for long-range memory dynamical networks. In her spare time, she enjoys reading and running.



#### **Future TUF Position Openings**

Assoc Professors Human Molecular Aging – Al Bioinformatics

2nd Asst / Assoc Professors Critical Infrastructure Security

2 Professors (Open Rank) Electromagnetic Pulse (EMP) Research

4 Professors (Mid Career) Telecommunications Strategic Security Initiative Synergy with Other National Security Related TUF Hires



## FACULTY UPDATES

#### Bayne Appointed to Lead Newly Established Institute for Critical Infrastructure

#### George Watson

Stephen Bayne, the former chair of the Department of Electrical & Computer Engineering in the Edward E. Whitacre Jr. College of Engineering, has been appointed the inaugural executive director for the newly created Institute for Critical Infrastructure and vice chancellor for innovation and collaboration.

The appointment, which was made Aug. 1 and announced at last week's Texas Tech University System (TTU System) Board of Regents meeting, will take Bayne out of his current role as chair and into the institute, where he is charged with examining critical infrastructure vulnerability. The institute will look at ways to clarify and mediate that vulnerability by applying infrastructure design, threat intelligence, cyber analytics and research capacity.

Bayne will help grow the institute by leading strategic recruitment efforts for new faculty hires to fill current research gaps in critical infrastructure capacity. He also will market the institute's regional, state and national significance to secure state and federal support and develop strategic partnerships with federal agency leaders.

He will identify, develop and oversee research collaborations and develop strategic partnerships with industry in research, innovation and workforce development throughout the TTU System. The institute will collaborate with research offices throughout the System to pursue large grants and contracts. Bayne has been an instrumental leader within the Whitacre College of Engineering, the National Wind Institute (NWI) and the Global Laboratory for Energy Asset Management & Manufacturing (GLEAMM). He has established a reputation of excellence in research and workforce development and as a mentor to faculty, staff and students.

He joined the Texas Tech faculty in 2009 and was named department chair in 2021. He also has served as interim dean of the Whitacre College of Engineering and is responsible for more than \$32 million in research funding coming to Texas Tech.

"I am very excited to serve in the dual role at Texas Tech," Bayne said. "Focusing on critical infrastructure is very important to the Lubbock community and the nation. I look forward to working with the team of faculty, staff and students to investigate and come up with unique solutions for protecting the critical infrastructure. I also look forward to joining the Chancellor's team and working with the other universities within the System." - Stephen Bayne





## FACULTY UPDATES

### Li Appointed to Associate Dean of Research & Graduate Programs

The Edward E. Whitacre Jr. College of Engineering has announced Changzhi Li as the new Associate Dean of Research and Graduate Programs, effective Sept. 1, 2024.



"This appointment means a new opportunity for me to serve the Whitacre College of Engineering," said Li. His appointment as the Associate Dean of Research and Graduate Programs is exciting news for everyone associated with the college. His leadership is expected to bring a fresh perspective to our programs and to enhance the overall research activities within the college while promoting excellence and cultivating a supportive research environment. His extensive background in research will undoubtedly invigorate our current projects and attract new ventures.

Li will support and maintain the high-quality standard of graduate programs, including admissions, curriculum development and student experience. This vision means our students will be better prepared to meet the challenges of the modern world. It's a move that promises to bolster both the stature and the innovative output of our college.

#### About Dr. Changzhi Li:

A distinguished member of our faculty, Li currently has served as a professor in the Department of Electrical & Computer Engineering since 2009. His journey in the field of engineering is both inspiring and instructive.

Li's appointment as the new Associate Dean of Research and Graduate Programs at the Edward E. Whitacre Jr. College of Engineering marks the beginning of an exciting chapter. His impressive track record, commitment to excellence and vision for the future position him as an ideal leader to advance our college's research and educational missions.



#### FACULTY RECRUITMENT

## **Chair Position Open for Application**

The Department of Electrical & Computer Engineering (ECE) in the Edward E. Whitacre Jr. College of Engineering at Texas Tech University invites applications for a full-time, 12-month, tenured Professor to begin September 1, 2025. The successful candidate will be an innovative, dynamic, collaborative, and entrepreneurial Chair of the ECE Department, providing intellectual and strategic leadership for teaching, research, service, and outreach and engagement endeavors in the ECE Department.

Among other duties, the Chair will manage departmental personnel; budget and allocate department resources; administer the undergraduate and graduate programs with the assistance of Associate Department Chairs; help student recruitment efforts; develop and sustain connections with related professional entities to promote teaching, research, development, and outreach; further enhance the department's reputation and research expenditures; effectively represent the department to internal and external entities; support and promote the success of the faculty, staff, and students in the department; and strengthen alumni relationships and fundraising efforts. The Chair will also serve as a departmental faculty member with expectations to conduct high quality teaching and research.

The anticipated start date for this position is September 1, 2025.



#### Acknowledgements:

Jenny Erdmann, Managing Editor Andrew Vanderpool, Managing Editor Kohen Yoakum, News Editor and Creator



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