ELECTRICAL ENGINEERING & COMPUTER SCIENCE

Electrical Engineering
& Computer Science
University of Missouri

2023-2024 Annual Report
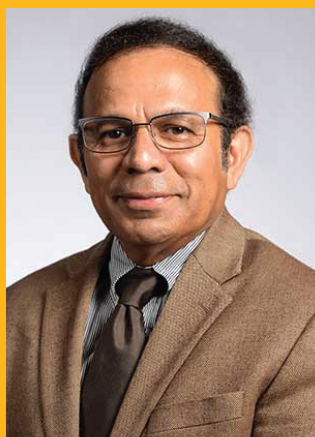
Dear Friends,

The Department of Electrical Engineering and Computer Science continues to lead Mizzou Engineering in research expenditures and awards. These awards are helping find new applications for AI in protein prediction and autonomous drones, developing sensors for quick detection of foodborne pathogens and more.

Over the past year, EECS has addressed issues in areas like artificial intelligence, energy, virtual reality, food safety and materials. Our collaboration with interdisciplinary partners has helped create new systems and processes aimed at driving meaningful change for a better future.

This fall, we launched a Bachelor of Science in Data Science, a multidisciplinary program in collaboration with Mizzou's College of Arts and Science, to better equip students with skills designed for the rapidly growing data science field.

Thank you for taking a moment to explore our work.

Syed Kamrul Islam
Chair, Professor
Electrical Engineering &
Computer Science

Scan to learn more!

Explore Mizzou Engineering

LET'S GO

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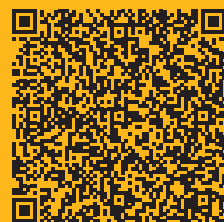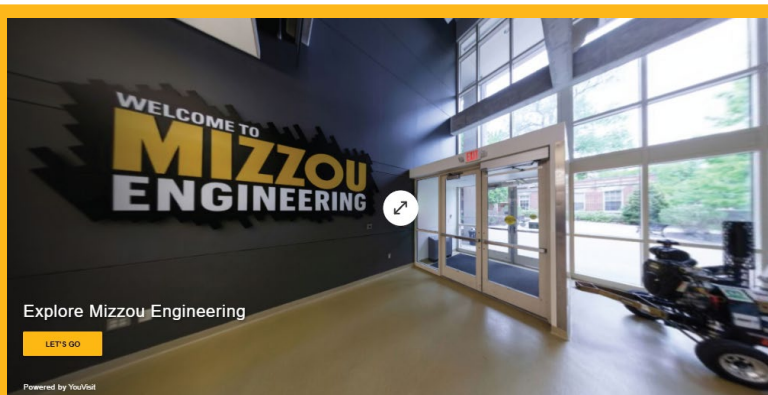
SCAN HERE TO TAKE A TOUR!

Step inside Mizzou Engineering with our 360° virtual tour of our classrooms, labs and student spaces. Learn about our degrees, extracurricular opportunities and support resources from the comfort of your home.

Show Me
THE NUMBERS

People in EECS ---------------------------------------•

1,164 Undergraduate Students

227 Graduate Students

45+ Faculty Members

Research Expenditures ---------------------------•

$15 Million in the year 2024

$57 Million in research proposals

20+	**Research Labs & Centers**
2	**Nationally Recognized Centers**

Tier I Research Institution • AAU Member

Research Areas -------------------------------------•

Applied Physics

Comm/Signal Processing

Computer Architecture/ Cyber Physical Systems

Nano/Micro Tech

Neural Engineering

Physical and Power Electronics

System Modeling, Control, Robotics

Cyber Security

AI, Machine Learning, Image and Video Processing, Computer Vision

Bioinformatics, Biomedical Imaging and Systems, Computational Biology

Cloud Computing, Networking, High Performance Computing

Database, Data Information Retrieval

Social Computing Human-Computer Interaction

Software Engineering, Programming Languages

Theory and Algorithms, Scientific Computing
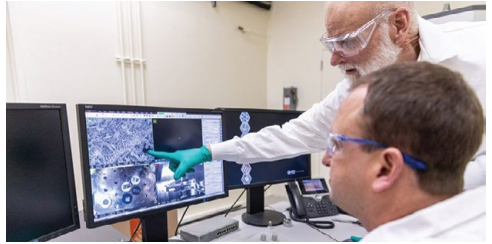
Research
HIGHLIGHTS

Peifen Zhu and her team are working on a cheaper way to mass produce higher quality, energy efficient lighting. In a recent paper, she outlined a process using 3D printing to simplify the manufacturing of solid-state lighting technology.

Qingyun Huang studies ways to improve the efficiency, density, cost and reliability of various kinds of power electronics converters, including solar inverters, datacenter power supplies, EV traction inverters and EV chargers.

Mert Korkali uses large-scale modeling and simulation to study the electrical grid and connected infrastructure to develop strategies that incorporate solutions such as microgrids, small-scale grids that use renewable energy and clean-energy generation units.

John Gahl and researchers at the MU Research Reactor (MURR) are using a scanning electron microscope (SEM) to characterize materials such as steel or nickel alloys after irradiation. This can help engineers select the optimal building materials when developing the next generation of commercial nuclear power plants across the country.

Prasad Calyam and collaborators concluded that chatbots powered by AI, like OpenAI's ChatGPT and Google's Bard, can pass a validated certified ethical hacking exam in a recent study. They found AI models cannot replace human cybersecurity experts but can provide baseline information for individuals or small companies needing quick assistance.

Mizzou Engineering used a nearly $1 million grant from the U.S. Army Engineer Research and Development Center to purchase a Nanoscribe Quantum X Shape 3D printer, the fastest and most accurate 3D printer for high-end microfabrication tasks on the market. Mizzou is one of just a few U.S. organizations to have the printer and one of fewer than 100 around the world.

Research
HIGHLIGHTS

Kannappan Palaniappan is developing software using smart algorithms powered by AI to allow drones to pilot themselves using visual landmarks. The research is supported by a $3.3 million grant from the U.S. Army Engineer Research and Development Center.


Prasad Calyam and interdisciplinary Mizzou collaborators are building USucceed, a platform to teach cybersecurity to those with autism, dyslexia, attention-deficit disorders and other neurodevelopmental differences with funding from the NSF.
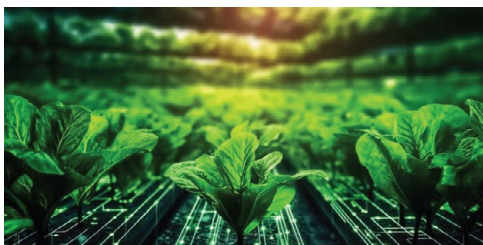
Dong Xu is using computational models to design biomolecules to develop non-toxic, biodegradable fungicides to give farmers a way to combat fungal diseases. The project has funding from the Technology Entrepreneurship and Commercialization Hub and the Ag-celerator for Agricultural Technologies at Mizzou.

Khaza Anuarul Hoque and a Mizzou research team proposed a groundbreaking privacy-preserving mechanism for deep learning (DL)-enabled cybersickness detection. The models are not only highly accurate in identifying when you might feel sick but also make it harder for anyone to misuse your personal information.
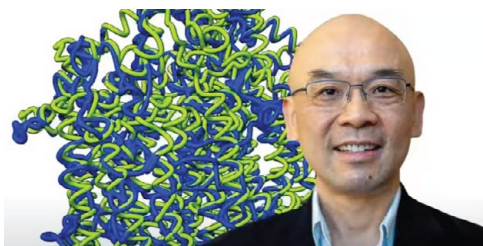

Jianlin "Jack" Cheng has developed CryoStruct, a tool that uses AI to build 3D models of atomic structure of large protein complexes. The models provide help in understanding how proteins function, giving researchers insights to better prevent, diagnose and treat cancer and other diseases.

Mahmoud Almasri is the lead PI on a team developing portable sensors to rapidly detect and mitigate salmonella and other foodborne pathogens throughout the entire poultry supply chain. The research is supported by a three-year, $5 million grant from the National Science Foundation's Convergence Accelerator program.

Student SUCCESS
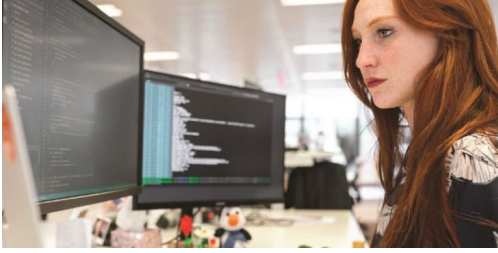
Mizzou launched *a new undergraduate degree in data science* in the fall of 2024. The program, a multidisciplinary degree created in partnership with the College of Arts and Science, is designed for the rapidly growing data science field.

A *Mizzou Engineering* team of four current students and two alumni earned a first-place award at MIT's 2024 Reality Hack for their development of a novel treatment that uses virtual reality to help young patients undergo electro-stimulation therapy.

EECS hosted two National Science Foundation Research Experiences for Undergraduates Sites (NSF REUs), in *Computational Neuroscience* and *Consumer Networking Technologies*. REUs help students conduct authentic research, receive mentoring, build knowledge and research skills and learn about career pathways in STEM.

Computer science major *Andrew Kruszka* and computer science minor *Isaac Harmon* were among 10 finalists of the Mizzou EntrepreneurQuest (EQ) Competition.

Jack Fels, a junior electrical engineering student, interned at Garmin over the summer to further is interest in computer hardware. At Garmin, he was involved with aviation electrical design with the sensors and actuators team.

TigerHacks, Missouri's largest student-run hackathon, was hosted by the Mizzou Computing Association. The event featured select workshops led by IT students and faculty. Over 36 hours, student teams worked on innovative projects around the theme of Food and Agriculture, competing for a share of the $7,500 prize pool.

Welcome
NEW FACULTY

Brendan Alvey
Assistant Research Professor
Research Areas: Artificial Intelligence and machine learning for explosive hazard detection and UAV autonomy.

Sazia Eliza
Assistant Teaching Professor
Research Areas: Modeling and optimization of wide bandgap semiconductor-based sensors and analog and digital circuit design.

Mohammad Haider
Associate Professor
Research Areas: Design, simulation and experimental validation of low-power analog and radio-frequency integrated circuits and systems.

J. Alex Hurt
Assistant Research Professor
Research Areas: Deep Learning Neural Networks, Computer Vision, Morphological NN

Taesic Kim
Associate Professor
Research Areas: Cyber-physical power and energy systems with an emphasis on cyber-physical security, secure and efficient AI, Quantum AI and optimization, cyber-secure power electronics and cyber-resilient power systems.

Jordan Malof
Assistant Professor
Research Areas: Application of advanced signal processing, computer vision, machine learning methods (especially deep learning) to real-world problems.

EECS ACCOLADES

Prasad Calyam, an internationally recognized expert in AI and cloud computing, was named a Curators' Distinguished Professor.

Jianlin "Jack" Cheng, was named a 2023 Fellow by the American Association for the Advancement of Science (AAAS) for contributions to the field of bioinformatics and computational biology.

Xiu-Feng "Henry" Wan was named to the 2024 AIMBE College of Fellows for pioneering machine learning in influenza vaccine strain selection and his contributions to influenza evolution and transmission.

Praveen Rao received a 2024 Outstanding Reviewer Award from the 40th Institute of Electronics and Electronics Engineers (IEEE) International Conference on Data Engineering (ICDE).

Shivika Prasanna received the Academic Achievement Award from Upsilon Pi Epsilon (UPE), the International Honor Society for Computing and Information Disciplines.

The Mizzou TIG-REX Team program finished second in the National Geo-Spatial Intelligence Agency's Geo-Hack for Humanity.

Computer science senior **Ahhyun Lee** and junior **Bhushan Sreekrishnavilas** received the Hesburgh Scholarship for their accomplishments in Mizzou's general education program.

Ashwin Dhakal, a doctoral student from Nepal who researches bioinformatics and machine learning, wrote a book about his experiences at Mizzou. "Diversity and Immigrants' Dream in America" offers wisdom about immigrants' and international students' struggles, challenges and opportunities in the U.S.

Alumni SPOTLIGHT

Alumnus **Nathaniel Kinsey (BS EE '11)** received the Mizzou R.A.H. Award for exceptional professional achievement along with a demonstrated record of volunteerism, both on campus and in his local community.