DEPARTMENT OF

# ELECTRICAL & COMPUTER ENGINEERING

MISSISSIPPI STATE UNIVERSITY™

# ECE DEPARTMENT HEAD LETTER

Last year marked a historic milestone for the Department of Electrical and Computer Engineering (ECE) at Mississippi State University:

***Research:*** ECE achieved record-breaking success with $14.69M in research expenditures and over 100 journal articles published.

***Education:*** The department welcomed its largest student body with 723 students across undergraduate and graduate programs, highlighting its commitment to preparing future engineers.

***Graduation:*** ECE celebrated its largest graduating class with 135 degrees conferred, setting graduates up for success in engineering and technology.

ECE's achievements position it as a leader in progress and innovation, both within the university and beyond. The department recognizes and celebrates the contributions of its staff and faculty through internal awards and external accolades.

ECE provides state-of-the-art learning environments, including the Charles Hudnall ECE Makerspace and the SEL Power System Protection Laboratory, fostering innovation and hands-on experience.

The 2023-24 inductees to our prestigious "ECE Wall of Fame" (Frank Gallaher) and "Distinguished Alumni" (Abdul N. Mohamed) programs highlight the remarkable achievements of alumni, inspiring current students and showcasing the diverse career paths an ECE degree can unlock.

ECE invites alumni to engage with current students and faculty, recognizing that alumni involvement is crucial to its continued success. As the department prepares to celebrate its 125th anniversary in 2025, alumni engagement will be pivotal, with exciting events planned to commemorate this milestone.

To stay connected and informed, join ECE on social media platforms like Facebook, LinkedIn, and Instagram. These platforms showcase groundbreaking research, innovative teaching methods, and inspiring stories.

**Hail State!**

Samee U. Khan, Ph.D.

*ECE Department Head, Professor, and James Worth Bagley Chair*

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## *ECE* BY THE NUMBERS*

**109** JOURNAL ARTICLES PUBLISHED BY FACULTY

**82** CONFERENCE PAPERS PRESENTED BY FACULTY

**OVER 700** Undergraduate and Graduate Students

**27 FACULTY** Members including **7 ENDOWED PROFESSORS**

**110** UNDERGRADUATE DEGREES AWARDED

**97 CO-OP STUDENTS**

**113@4.0** Fall ECE Students

Approximately **100 PH.D. STUDENTS**

**$14.69 MILLION** in Research Expenditures

*2023 DATA

## CONNECT WITH US

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ECE AT MISSISSIPPI STATE UNIVERSITY

WWW.ECE.MSSTATE.EDU

## VISIT US

406 Hardy Road, 216 Simrall Hall
Mississippi State, MS 39762

## UNDERGRADUATE STUDENT SPOTLIGHT

### YASMIN CHAMBERS

**MAJOR:** Computer Engineering

**CLASSIFICATION:** Senior

**HOMETOWN:** Jackson, MS

**INVOLVEMENT:** Alumni Delegates, Army ROTC, Bagley Ambassadors, Black Student Association, Bridges Undergraduate Research, IDEAL Woman, TRiO, and VICEROY

**WHAT IS YOUR FAVORITE CLASS AND WHY?**

My favorite Electrical and Computer Engineering class is Electronics 1 because it offers a deep understanding of components and how devices function and interact.

**WHY DO YOU LIKE BEING INVOLVED IN MSU'S CAMPUS AND ENGINEERING ACTIVITIES?**

I like being involved in a variety of activities because it allows me to broaden my perspective and build intentional connections.

**WHAT IS YOUR FAVORITE PART ABOUT MSU AND YOUR MAJOR?**

My favorite part about MSU is the welcoming campus life and cowbells! The wide spectrum of research is why I like my major of computer engineering.

MSU ECE Alum Cliff Weems

# ALUMNUS SPOTLIGHT Q&A: **CLIFF WEEMS**

**Lockheed Martin**

**Sustaining Lunar Development Propulsion Test Engineer / Ground System CPE**

ECE Alumnus Cliff Weems recently participated in the department's "Ask an Alum" session for undergraduate students. He was able to share his insight with the content ranging from being an electrical engineering student at Mississippi State to his work in industry.

Most recently, Weems has extensive experience with Lockheed Martin, Orion, and the Artemis program, especially with the upcoming Artemis II and V missions. He is currently on the Propulsion Team on Sustaining Lunar Development, building humanity's first cislunar transporter - a liquid hydrogen, liquid oxygen refueler for Blue Origin's Blue Moon (MK2) Lander. He is also pursuing a master's degree in aerospace sciences.

In addition to discussing his work, MSU involvement, co-op experience, and challenges, Weems also answered student questions and provided a short Q&A.

## WHY DID YOU CHOOSE MSU'S ELECTRICAL ENGINEERING PROGRAM?

As a community college transfer student, it was important for me to know that the classes would transfer. With MSU's articulation agreement in place with Northeast Mississippi Community College, I had nothing to worry about. Second, MSU has a highly ranked engineering school and is well respected in both academia and by major corporations. Overall, MSU is a great value for an even better engineering experience.

## WHAT IS THE GREATEST IMPACT THAT YOUR WORK WITH ORION AND SLD WILL HAVE?

It is humbling to know that my role and my work directly affect what hardware and software will fly on future Artemis missions. For Artemis II, understanding and helping test how crew will be using the displays and controls to fly the mission is critical. And going forward, with Artemis V, having an opportunity to help develop the future of cislunar travel and a human mission to the Moon's surface is so exciting. No doubt there is a huge team supporting both missions, but I am proud to have a unique part in ensuring that what flies matches the customer's strict standards.

## HOW DID YOUR UNDERGRADUATE EDUCATION AND WORK EXPERIENCE IMPACT YOUR DECISION TO FURTHER YOUR KNOWLEDGE IN GRADUATE SCHOOL?

My undergraduate experience in ECE really prepared me for anything. The rigor of the engineering experience there impacted my decision to pursue further education by giving me the confidence that I not only had the "real world" experience necessary to excel, but also a solid foundation of fundamentals that would extend to any engineering coursework.

The full Q&A with Weems is available on the ECE website ***www.ece.msstate.edu.*** ●

Dr. Qian "Jenny" Du

# DU NAMED SEC FACULTY ACHIEVEMENT AWARD WINNER

Bobby Shackouls Endowed Professor Qian "Jenny" Du was named MSU's 2023 Southeastern Conference Faculty Achievement Award winner.

Du is recognized as a leader in the field of remote sensing, where she has made significant advancements in hyperspectral image exploitation.

"Dr. Du epitomizes all the qualities of the exceptional teacher-scholar for which this award has been established," MSU President Mark E. Keenum said. "Her research productivity is off the charts. Her international, national, regional and local influence is unequaled. She is a renowned scholar, author, teacher, mentor and leader who has significantly impacted the lives of her students and the field of remote sensing."

The SEC's Faculty Achievement Awards annually recognize 14 faculty members from the SEC universities for outstanding teaching accomplishments and nationally or internationally recognized scholarship.

Du has published more than 350 journal articles and 250 conference papers. Her research covers remote sensing image processing and analysis, including the detection of specific targets, anomalies, changes and other key elements. In addition to being ECE's graduate coordinator, she has maintained a commitment to teaching by modifying courses to incorporate the most recent advances in big data, machine learning and deep learning techniques, ensuring students are on the cutting edge of their field. ●

Dr. Yong Fu

## PROFESSOR'S TEAM WINS *DEPARTMENT OF ENERGY COMPETITION*

ECE Professor Yong Fu's group YongOptimization placed first in the Department of Energy's Grid Optimization (GO) Competition Challenge 3.

The competition saw 18 teams battle for the net prize of $3 million. Fu's team ranked first place in six categories of the competition and received a prize award of $645,000. The prize money can be utilized to advance the team's technologies further to be field-ready for adoption.

"Mississippi State University is well known for its work in supporting the electrical power industry. This latest set of awards to Dr. Yong Fu shows that our impact is being recognized as some of the best in the nation. We are proud of Dr. Fu and his students," Jason Keith, Dean of the Bagley College of Engineering, said.

The DOE GO Competition is a battleground for power system engineers, operations research engineers and high-performance computing experts. The third of four challenges, Challenge 3, focused on identifying transformational and disruptive software solutions for critical power system operation problems that will accelerate the development and adoption of emerging technologies in power grids.

"Today's power grid is becoming more diverse and integrated with high-level distributed energy resources and smart control technologies that are creating a new set of grid management challenges in terms of large-scale, nonlinear, and non-convex problem modeling, complex and time-consuming computation, as well as difficult uncertainty handling," Fu said. "A complex knowledge of the problem field and industry practice is essential to the GO Competition, and our approach was to explore parallel optimization algorithms for complex and realistic power system models and develop fast, efficient, and robust grid optimization solutions on the high-performance computing platform."

Fu said how proud he was of his team and the hard work they put in to make the competition a success.

"The great work with my Ph.D. students - Yehong Peng, Fasiha Zainab and Komal Naz made the success of our innovative solution methodology and advanced programming technology in the GO Competition," Fu said.

The GO Competition was created by Advanced Research Projects Agency-Energy (ARPA-E) to accelerate the development of transformational and disruptive methods for solving the most pressing power system problems. The GO Competition is staged as a series of challenges in power systems to address emerging needs and new technologies on the grid. ●

## ECE FACULTY MEMBER AMONG TEAM AWARDED **$5 MILLION NSF GRANT**

ECE Associate Professor Vuk Marojevic was among the group of five NSF-funded teams awarded a total of $25 million to advance technologies and communications to operate securely through 5G networks.

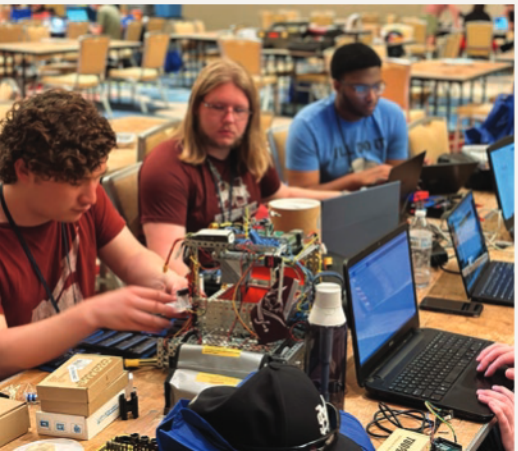
Marojevic, a co-PI for the project entitled Zero Trust X, said the team's project will address 5G security at different layers and components of the network, specifically at the 5G UE, 5G RAN and 5G Core.

"This project is exciting yet very complex. Our team proposed to prototype and demonstrate about 10 different security solutions which, if successful, can have a huge value to society, military operations and business," he said. "What most people don't know is that NSF has a lot of non-research requirements, such as 2-semester curriculum development, for this program, and DoD already started proposing new development directions and testbed demonstrations for our team."

The project, led by the University of Kansas' Taejoon Kim, who serves as the primary investigator, was awarded $5 million as part of NSF's Phase 2 of NSF Convergence Accelerator Track G: Securely Operating Through 5G Infrastructure. It aims to enable enhancements to end devices — such as smartphones and tablets — and augment 5G wireless infrastructure, providing capabilities to military, government and critical infrastructure operators to operate through public 5G networks while meeting security and resilience requirements. The convergent track supports the development of technologies to secure 5G and permit the secure use of non-secure networks.

The project aims to develop Zero Trust Chain software that enables military squads to securely share situational awareness in their operations using high-performance, yet often untrusted, 5G networks. The software solution leverages the flexibility of the 5G standard. It implements innovative security solutions to detect malicious entities quickly and establish communication mechanisms to prevent access to or control DoD traffic. ●

Dr. Vuk Marojevic

## *ECE GRADUATE* STUDENT AWARDEES

**2023-2024 ECE Best Graduate Researcher**
Md Mehedi Farhad
*(Major Professor: Ali Gurbuz)*

**2023-2024 ECE Research Symposium Awardee**
Yehong Peng
*(Major Professor: Yong Fu)*

**2023-2024 ECE Best Teaching Assistant**
Daegan Appel
*(Major Professor: Ali Gurbuz)*

## *GRADUATE DEGREES AWARDED* SPRING 2023

**PH.D. DISSERTATIONS:**
STUDENT: JAMES EARNEST
Major Professor: Robert Moorhead
Title: Eddy Current Defect Response Analysis Using Sum of Gaussian Methods

STUDENT: MD KHURSHEDUL ISLAM
Major Professor: Seungdeog Choi
Title: Design of High-Power Ultra-High-Speed Permanent Magnet Machine

STUDENT: AKANSHA JAIN
Major Professor: Masoud Karimi
Title: Mitigating Adverse Impacts of Increased Electric Vehicle Charging on Distribution Transformers

STUDENT: XINGYU LI
Major Professors: Qian Du and Bo Tang
Title: Secure and Efficient Federated Learning

STUDENT: ALI ZAKERIAN
Major Professor: Masoud Karimi
Title: Relaxing dc Capacitor Voltage of Power Electronic Converters to Enhance their Stability Margins

**M.S. THESIS:**
STUDENT: REBECCA GARCIA
Major Professor: Samee Khan
Title: Unmanned Aerial System Integration Safety and Security Technology Ontology

**NON-THESIS M.S.:** SHAYA ABOU JAWDEH, COLBERT LEHR, MILTON LEWIS, MD ASIF SYED

## SUMMER 2023

**PH.D. DISSERTATIONS:**
STUDENT: ALY ABDALLA
Major Professor: Vuk Marojevic
Title: Physical Layer Security with Unmanned Aerial Vehicles for Advanced Wireless Networks

STUDENT: DYLAN BOYD
Major Professor: Mehmet Kurum
Title: Exploring Bistatic Scattering Modeling for Land Surface Applications Using Radio Spectrum Recycling in the Signal of Opportunity Coherent Bistatic Simulator

**M.S. THESES:**
STUDENT: ERIK BROWN
Major Professor: Jean Mohammadi-Aragh
Title: Determining Student Attentiveness by Use of Heart Rate Measurement Using a Wearable Device

STUDENT: AMNA SHAHID
Major Professor: Samee Khan
Title: Resource Optimization of Edge Servers Dealing with Priority-based Workloads by Utilizing Service Level Objective-aware Virtual Rebalancing

**NON-THESIS M.S.:** EDGAR NACIANCENO, AARON URAM

## FALL 2023

**PH.D. DISSERTATIONS:**
STUDENT: MARK DIDAT
Major Professor: Seungdeog Choi
Title: Improved Methodology and Characterization for Conducted EMI Assessment of Power Electronics

STUDENT: TINGJUN LEI
Major Professor: Chaomin Luo
Title: Safety-Aware Autonomous Robot Navigation, Mapping and Control by Optimization Techniques

STUDENT: JOHN ROGERS
Major Professor: John Ball
Title: Neural Networks for Improved Signal Source Enumeration and Localization with Unsteered Antenna Arrays

STUDENT: JING YANG
Major Professor: Yu Luo
Title: Network Layer Reliability and Security in Energy Harvesting Wireless Sensor Networks

**M.S. THESIS:**
STUDENT: MAHFUZUR RAHMAN
Major Professor: John Ball
Title: Traffic Light Detection and V2I Communications of an Autonomous Vehicle with the Traffic Light for an Effective Intersection Navigation using MAVS Simulation

**NON-THESIS MS:** ROBERT CAIN, YI CHEN, AVERY FISHER, SADIA ALAM SHAMMI


*Dr. Jean Mohammadi-Aragh (ECE undergraduate program coordinator and associate professor) with the Wall of Excellence recipients Kyler Smith (computer engineering), Ryan Harper (electrical engineering), Chiedo Atuegwu (electrical engineering) and Garrett Bradshaw (electrical engineering)*

*Timothy Sellers (BCOE Hall of Fame inductee, graduate student) with Dr. Jason Keith (BCOE Dean)*

*Ryan Harper (BCOE Hall of Fame inductee, undergraduate student) with Dr. Jason Keith (BCOE Dean)*

## ECE INITIATES ITS FIRST *UNDERGRADUATE WALL OF EXCELLENCE RECIPIENTS*

Four undergraduate students in Mississippi State University's Department of Electrical and Computer Engineering have been named to the inaugural class of the department's Wall of Excellence.

The Wall of Excellence is an annual award created to recognize students who have demonstrated a commitment to their academics and involvement at Mississippi State. They have an established record of leadership, service and contributions within the department, the Bagley College of Engineering and the university.

"We have many amazing undergraduate students in our department, so it is important for us to recognize some who have shined bright during their time at MSU," ECE Undergraduate Program Coordinator and Associate Professor Jean Mohammadi-Aragh said.

In addition to the recipients being honored at a lunch ceremony, the awardees have their names displayed on the second floor of Simrall Hall. ●

## ECE STUDENTS NAMED TO THE BAGLEY COLLEGE OF ENGINEERING'S HALL OF FAME

Two ECE students were inducted to the 2023 Bagley College of Engineering Hall of Fame. They have an established record of high academic achievements and contributions within the university. BCOE Dean Jason Keith recognized the students during the Distinguished Engineering Recognition Banquet.

Timothy Sellers, a fourth-year Ph.D. student majoring in electrical and computer engineering, was inducted into BCOE's Hall of Fame for his extensive campus involvement and work in his field of study. In addition to teaching in the department and working on research, he has also been involved with robotics, IEEE and the Society of Black Voices.

Ryan Harper, a graduating senior in electrical engineering, was inducted to the Hall of Fame for his participation in campus activities, including being a Bagley Ambassador, a member of IEEE, and serving in the Student Association. He has worked in ECE's Paul B. Jacob High Voltage Laboratory and participated in two internships while an undergraduate student. ●

MISSISSIPPI STATE UNIVERSITY
JAMES WORTH BAGLEY COLLEGE OF ENGINEERING

Department of Electrical and Computer Engineering
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## MAKE AN IMPACT

Through the generosity of alumni and donors, the Department of Electrical and Computer Engineering (ECE) continues to grow its legacy in the James W. Bagley College of Engineering. The generosity of those who give is influencing the next generation of leaders. Individuals wishing to invest have many opportunities, including scholarships, endowments, named awards, and facility enhancements. Please visit ***www.ece.msstate.edu/giving/*** or contact us directly to discuss the impact that you can make on the department and its students:

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