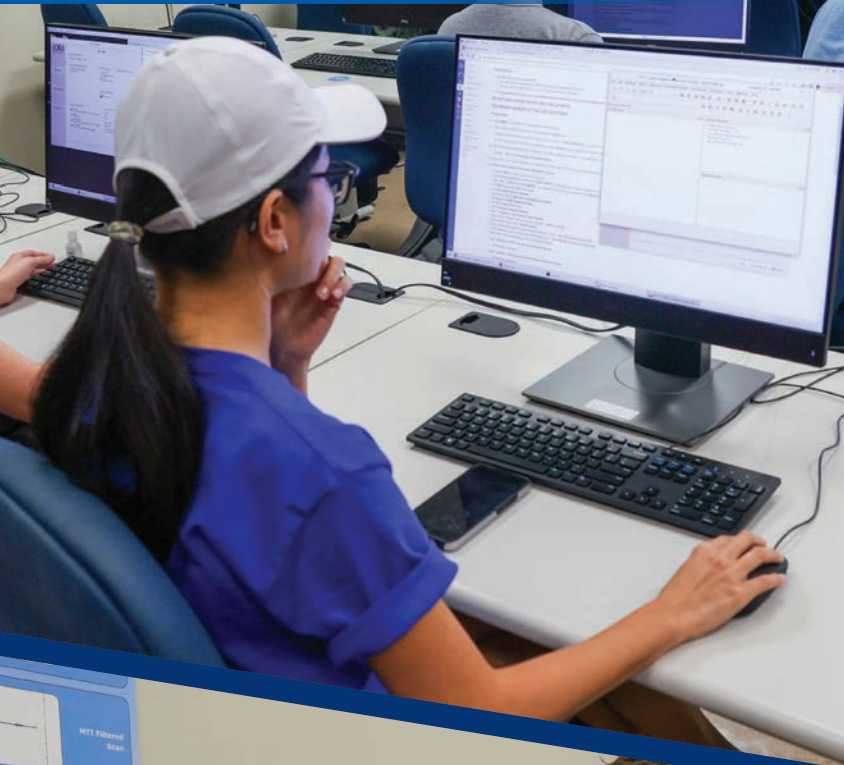


Department of **ELECTRICAL & COMPUTER ENGINEERING**





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CHAIR'S MESSAGE

Welcome to the 2025 edition of the Electrical and Computer Engineering Department Newsletter at the University of Alabama in Huntsville!

This past academic year has been one of growth, achievement, and continued momentum across all fronts—education, research, and community engagement. We're proud to share the progress we've made, the stories that define us, and the people who continue to elevate our department.

Our student body remains strong and dynamic, reflecting the strong interest in electrical, computer, and cybersecurity engineering. Based on commencement numbers from Fall 2024 and Spring 2025, 135 undergraduates received their B.Sc. degrees—56 in Electrical Engineering, 49 in Computer Engineering, and 30 in Cybersecurity Engineering. In addition, 45 students earned Master's degrees and 4 earned their Ph.D. degrees. With a Spring 2025 enrollment of nearly 840 students, the ECE Department at UAH continues to be the largest Electrical and Computer Engineering department in the state of Alabama.

We are excited to announce the launch of a new Certificate in *Artificial Intelligence for Engineers*, beginning in Fall 2025. This 12-hour, non-degree undergraduate certificate—open to all students in the College of Engineering—is designed to equip students with a solid foundation in AI principles, including core architectures, training methods, and real-world engineering applications. As part of this initiative, we introduced two new courses: *Machine Learning for Engineering Applications* and *Deep Learning for Engineering Applications*. Last summer, I also had the privilege of teaching *Introduction to Quantum Computing*—a course that marked a significant step in preparing our students to engage with the transformative potential of quantum technologies.

Our faculty and students continue to make national impact through cutting-edge research. We celebrated major milestones, including a \$300K NSF award to strengthen the resilience of intelligent controllers for cyber-physical systems, and contributions to Alabama's strategic initiatives in battery technologies. The department's visibility continues to grow through numerous journal and conference publications, patents, and collaborations.

We're also excited to recognize the accomplishments of our faculty and staff. Dr. Aubrey Beal was awarded tenure and promoted to Associate Professor. Several of our colleagues received prestigious awards, including Dr. Thomas Morris, Mr. Ron Bowman, Dr. Yuri Shtessel, and Dr. Avimanyu Sahoo, among others. We also welcomed new faculty member Jackson Lawrence, along with staff members Kathy Gray and Keiara Roberson, who bring fresh energy and ideas to our department.

This year's senior design projects were particularly inspiring—ranging from real-time camouflage detection on mobile devices to non-invasive blood sugar monitoring, and from electromagnetic field sensing to AI-powered intrusion detection. These projects not only demonstrate technical excellence, but also the creativity and social awareness of our students.

We honored the careers of two retiring members, Dr. Ravi Gorur and Ms. Angelia Heulett, and paid tribute to the life and legacy of Dr. Fat Duen Ho. Their contributions have shaped generations of engineers, and we are deeply grateful for their service.

Beyond the classroom and lab, our students engaged with the wider engineering community through events like ECE Research Seminars, Tech Talks hosted by Eta Kappa Nu, social events, and outreach activities. Our HKN chapter, led by Ethan Hobben, reached over 170 students with industry-led seminars on emerging technologies—from stealth systems to machine learning. Please take time to explore the rest of this newsletter. You'll find updates from our labs, highlights from ECE activities, and spotlights on our incredible alumni and graduate researchers. We hope these stories reflect the energy, dedication, and excellence that define our department.

To prospective students, we invite you to join our vibrant academic community. To alumni and friends, we welcome your continued connection and support—this is your home, and we look forward to hearing from you.

Go Chargers!

Sincerely,

Aleksandar Milenkovic,
Department Chair and Professor



ABOUT ECE

The ECE Department at UAH offers a comprehensive set of courses that span the Electrical and Computer Engineering disciplines. Our programs are designed to not simply train students to be users of current technology but to educate them in a manner so that they understand the underlying principles through which this technology is based. This allows them to be innovators throughout their lives and become active contributors to their ever-changing technological landscape. Our graduates can be found throughout the world actively impacting industry, government, and academia.

For more information about our department or to learn more about our degree programs, please visit uah.edu/eng/departments/ece/about.

Degrees Offered

Bachelor of Science in Computer Engineering (BSCPE)
Bachelor of Science in Electrical Engineering (BSEE)
Bachelor of Science in Cybersecurity Engineering (BSCBSY)
Master of Science in Computer Engineering (MSCPE)
Master of Science in Cybersecurity Engineering (MSCBSE)
(Jointly with Computer Science and the College of Business)
Master of Science in Electrical Engineering (MSEE)
Master of Science in Software Engineering (MSSE)
Doctor of Philosophy in Computer Engineering
Doctor of Philosophy in Electrical Engineering

INDUSTRY ADVISORY BOARD COMMITTEE

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UAH MEMBERS

David Coe, Ph.D.

Dennis Hite

Laurie Joiner, Ph.D.

Jackson Lawrence

UAH helps Alabama lead charge to meet surging battery needs

July 22, 2024 // Russ Nelson

With the number of electric vehicles (EVs) in the United States projected to skyrocket to 26.4 million by 2030, the need is great for not only producing, but improving, the safety and efficiency of the batteries that power them, as well as cell phones, autonomous unmanned vehicles and smart electronics. Researchers at The University of Alabama in Huntsville (UAH), a part of the University of Alabama System, are doing their part to ensure Alabama is leading the way to power this coming revolution.

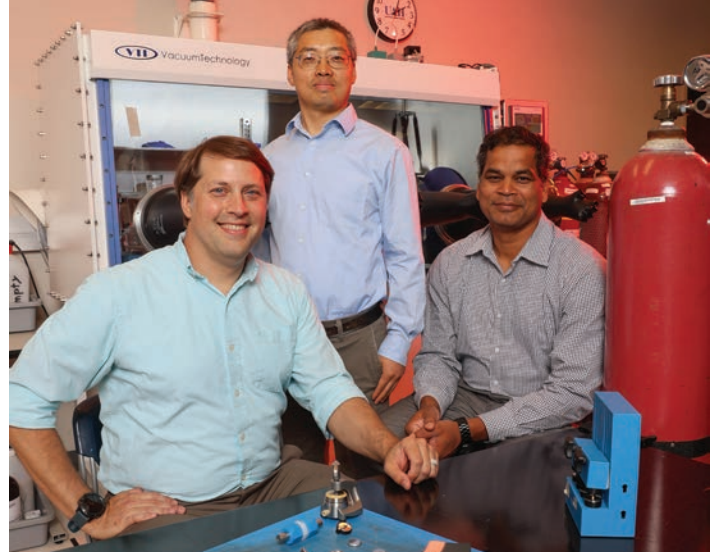
Central Alabama boasts the largest continuous vein of graphite in the entire country, and the state is set to open the nation's first graphite processing site in Coosa County, a 42,000-acre site that will process coated spherical graphite, the mineral that makes up roughly 50 percent of a lithium-ion battery. Set to open in late 2024, the plant will turn out 7,500 metric tons of graphite in its first year, ramping up to 40,000 tons by 2028. And when the batteries that use these raw materials come to the end of their lifespan, many will go to a recycling plant in Tuscaloosa, a facility capable of processing up to 10,000 tons of lithium-ion batteries per year.

With the "cradle" and "grave" aspects of the battery life-cycle covered to the south, UAH is fast helping to transform North Alabama into a national hub focusing on the heart of the battery technology timeline: making lithium-ion batteries safer and more efficient for users, both on land and sea. University research initiatives recently garnered nearly \$1.5 million in federal funding to bolster the vital middle prong of this burgeoning domestic industry.

Turning down the heat

News of sudden battery failures impacting EVs and airplanes, as well as smart electronics and utility-scale energy storage, drove Dr. Guangsheng Zhang to research a phenomenon called "thermal runaway," a condition where the lithium-ion cell enters an uncontrollable self-heating state, causing smoke, fire or even explosions. The researcher won a National Science Foundation Faculty Early Career Development (CAREER) Program award totaling \$598,181 to support his research, a five-year project slated to run through April 2028.

"I was shocked by news that lithium-ion batteries may



► Dr. George Nelson, department chair and professor, Mechanical & Aerospace Engineering; Dr. Guangsheng Zhang, assistant professor, Department of Mechanical & Aerospace Engineering; Dr. Avimanyu Sahoo, assistant professor, Department of Electrical & Computer Engineering.

suddenly fail energetically, all without warning," Zhang says. "What is most concerning is that, in some cases, the batteries caught fire when the devices or vehicles were not in use. Investigations have attributed many of those fires to thermal runaway caused by internal short circuit (ISC)."

Zhang focused his postdoctoral work on in situ studies of fuel cells to develop diagnostic methods to trigger and characterize ISC, a critical failure mechanism of lithium-ion cells. "There are still many unknowns," he notes. "What is the threshold of ISC causing thermal runaway? How does ISC form and slowly evolve to that threshold, in some cases after years of normal operation? How can ISC be prevented from reaching the threshold?"

Answering these questions is the goal of the current project. The researcher believes the insights gained will inspire engineers in battery-powered industries to derive innovative solutions to prevent thermal runaway. The project will also spark educational and outreach activities, such as seminars on energy storage, new courses on batteries and mentoring undergraduate research with hands-on workshops.

READ MORE at <https://www.uah.edu/news>

UAH researcher wins \$300K NSF award to characterize vulnerability of intelligent controllers for cyber-physical systems to safeguard smart grids, robotic swarms, autonomous vehicles

October 30, 2024 // Russ Nelson

Dr. Avimanyu Sahoo, a researcher at The University of Alabama in Huntsville (UAH), has been awarded a National Science Foundation (NSF) award totaling \$299,969 to characterize the vulnerability of the learning-based intelligent cyber-physical systems (CPS) and defend them. The CPS represents a symbiotic integration of physical systems, sensors, actuators and learning-based intelligent controllers through communication networks such as smart grids, robotic swarms and autonomous vehicles.

Sahoo is an assistant professor in the department of Electrical and Computer Engineering at UAH, a part of The University of Alabama System. The effort is a collaborative project with Dr. Vignesh Narayan, assistant professor from the Artificial Intelligence Institute at the University of South Carolina. The total funding for the project is \$600,000. The project is slated to run through June 2027.

In CPS, many systems are connected to each other via a communications network. Learning-based intelligent controllers are used for decision making, which upgrade the capabilities of CPS, providing numerous benefits, such as helping a system adapt to real-world environments and achieve optimal function. Like neuronal reward and decision signals in the human brain, intelligent controllers for CPS seeks to mimic how human learning systems process decision-making and reward signals.

However, “the introduction of a learning component adds an additional layer of security challenges, which adversaries can exploit via cyber attacks,” Sahoo explains. “By feeding manipulated reward signals, the adversary can subtly steer the controller into following an adversarial policy instead of its intended one.

“For instance, an autonomous vehicle may have a goal to travel from Huntsville to Nashville via I-65, but an adversary



► (Center) Dr. Avimanyu Sahoo, assistant professor of Electrical and Computer Engineering at UAH with his students in the Sahoo Lab. (L-R) Jessica Hamer, Mahican Door Shaman, Ariel Yousefian, Tiffany Lodge, Avimanyu Sahoo, MD Sazzad Hossen, Sofia Lopez and Salma Alam.

could manipulate the reward signals to discourage this route by providing negative rewards whenever the vehicle travels on I-65. As a result, the vehicle might take a longer, less efficient route, consuming more fuel – ultimately serving the adversary’s objectives.”

The goal is to identify attacks that manipulate a controller’s actions. “In a microgrid or power grid, all the power plants are connected,” the researcher notes. “If we attack one generating system, it will affect the others. Therefore, to systematically study this, we start by analyzing a single generator under attack, focusing on how different types of attacks can bias the controller’s decision-making.”

The overarching aim of the project is to understand the information patterns that adversaries can exploit to manipulate controller decisions through an approach called “reinforcement learning.”

READ MORE at <https://www.uah.edu/news>

UAH recognizes 11 inventors who received 9 patent awards during 2024-2025 year

May 22, 2025 // Ann Marie Martin

The University of Alabama in Huntsville (UAH) honored the significant achievements of 11 inventors from two colleges and four departments who have been awarded patents during the past year. The annual patent award recognition was held on May 1 during the 2025 University Awards for Excellence program in the Student Services Building. UAH is a part of The University of Alabama System.

"Innovation-minded inventors like these are making increasing contributions to UAH and to the marketplace through their innovations, which are proactively managed by the Office of Technology Commercialization (OTC)," said Kannan Grant, director of OTC.

"UAH's increased investment in its people has resulted in a significant increase in patenting activity. For the past two years, UAH has been listed in the Top 100 U.S. Universities Granted Utility Patents by the National Academy of Inventors. In the past five years at UAH, new technology disclosures have doubled; the number of patents filed has increased by 45%, and the number of patents issued has increased 150%. These plaques are a testament to the achievements of UAH innovators."

Grant and Dr. Robert Lindquist, vice president for Research and Economic Development, presented recognition plaques to the awardees.

The following patents – listed by U.S. Patent number, title, inventors, college and department – were awarded to UAH researchers from the College of Engineering and the College of Science:

11,872,080, "Multi-Modal Heart Diagnostic System and Method," Emil Jovanov (Engineering, Electrical and Computer Engineering)

12,001,053, "Systems and Methods for Processing Optical Signals," Robert Lindquist and Patrick Reardon (Engineering, Electrical and Computer Engineering)

12,006,373, "Identification and Evaluation of Novel Peptide



► The University of Alabama in Huntsville (UAH) presented 12 desk plaques to 11 inventors from two colleges and four departments at UAH in recognition of patents issued in the past year. The annual patent award recognition was held on May 1, 2025.

Ligands Specific to Human CD3," Kyung-Ho Roh and Armin Ahmadi (Engineering, Chemical and Materials Engineering)

12,042,819, "Systems and Methods for Forming Uniform Monolayers of Nanoparticles," Jeffrey Weimer (Science, Chemistry) and Jimmie Mitchell (Engineering, Chemical and Materials Engineering)

12,055,427, "Apparatus and Method for Determination of Liquid Mass," James Blackmon (Engineering, Mechanical and Aerospace Engineering)

12,078,154, "Microplasma-based Heaterless, Insertless Cathode," Gabriel Xu (Engineering, Mechanical and Aerospace Engineering)

12,111,419, "Systems and Methods for Detecting Objects," James Blackmon (Engineering, Mechanical and Aerospace Engineering)

12,148,136, "Systems and Methods for Determining Feature Resolution of Image Data," Joseph Indeck (Engineering, Mechanical and Aerospace Engineering)

12,159,053, "Flash-DNA: Identifying NAND Flash Memory Origins Using Intrinsic Array Properties," Aleksandar Milenkovic (Engineering, Electrical and Computer Engineering)

UAH expands program offerings in cyber, AI and game design

April 10, 2025 // Julie Jansen

New B.S. and certificate programs equip students with credentials in high-tech fields

The University of Alabama in Huntsville (UAH) announced today the addition of several courses of study. The new offerings include two new degree programs as well as a certificate program:

- Bachelor of Science degree in Cyber Operations Technology
- Bachelor of Science degree in Game Design
- Certificate in Artificial Intelligence for Engineers

"At UAH, we pride ourselves on being a high-tech university," said Dr. David Puleo, provost and executive vice president for academic affairs at UAH. "From integrating cutting-edge technologies and industry-relevant knowledge into the classroom to innovating creative programs of study to broaden student access to critical fields, we are committed to ensuring that our program offerings align with evolving workforce demands."

The University of Alabama System Board of Trustees approved the proposals at its meeting on April 4, 2025. UAH, a member of The University of Alabama System, will now submit the proposals to the Alabama Commission on Higher Education (ACHE) and the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) for final approval. While the certificate program is expected to launch in fall 2025, the two B.S. programs have a pending offer date of fall 2026, contingent upon approval by both ACHE and SACSCOC.



B.S. in Cyber Operations Technology

Housed in the College of Science, the Bachelor of Science degree in Cyber Operations Technology will help students develop skills related to the configuration, management, and maintenance of complex computer and network systems. In addition to assessing and managing cybersecurity devices, systems, and procedures, students will learn how to identify and investigate cyberattacks.

The program will build on a base of community college education and offer a pathway to obtaining a bachelor's degree by completing the last two years of coursework online. It will be offered in the fall 2026 semester.

B.S. in Game Design

UAH will soon offer a Bachelor of Science degree in Game Design. Housed in the College of Arts, Humanities and Social Sciences, the program will provide a comprehensive, multidisciplinary education that will prepare students for a multitude of careers in the growing industries of entertainment gaming and serious games.

The program will include coursework in the areas of art, animation, coding, sound, psychology, business and communications. In addition to hands-on, practical experience, the program will leverage local industry connections to provide and encourage internship opportunities for students. It will be offered in the fall 2026 semester.

Certificate in Artificial Intelligence (AI) for Engineers

In addition, UAH will soon offer a certificate in "Artificial Intelligence for Engineers." The 12-hour, non-degree undergraduate certificate will be offered by the Electrical and Computer Engineering Department in the College of Engineering beginning in fall 2025.

The new certificate will equip students to understand fundamental artificial intelligence architectures, training methods, and engineering applications, and to critically analyze social challenges associated with AI technologies. Students will gain proficiency in designing, developing, and optimizing machine-learning models.

Introduction to Quantum Computing



► The University of Alabama in Huntsville (UAH) presented 12 desk plaques to 11 inventors from two colleges and four departments at UAH in recognition of patents issued in the past year. The annual patent award recognition was held on May 1, 2025.

Quantum computing holds immense potential for the future, and our students are now equipped with the foundational knowledge to be at the forefront of this revolution. We explored the principles of quantum mechanics, quantum algorithms, and the potential real-world applications of quantum computing. This course marks a significant milestone for our department, showcasing our commitment to staying at the cutting edge of technology and providing our students with the knowledge and skills they need to shape the future.

Lab Updates



The Antenna Laboratory (AntLab)

- ▶ The Antenna Laboratory measures antenna radiation properties with aperture sizes as large as 0.45 m, over a wide frequency range from 0.65 GHz to 18 GHz for a variety of applications, including but not limited to, radars, unmanned aerial vehicles, global positioning systems, phased array systems, satellite communications, CubeSat, microwave remote sensing, and wireless communications.
- ▶ Facilities: A spherical near-field test range placed in a 2.44X2.44x2.44 m anechoic chamber covered by microwave absorbers + two Vector Network Analyzers up to 18 GHz and 20 GHz
- ▶ Spherical Near-Field Antenna Test Range located in OPB 413
- ▶ Contact Dr. Maria Pour for more information and possible usage of AntLab at maria.pour@uah.edu



deciBel Research Lab

- ▶ The deciBel Research Lab has had 6 additional Quanser Qube Servo 3 modules installed and were deployed this past Spring semester for a total of 12 modules. This lab supports course EE 386 Introduction to Control/Robotic Systems.



ECE Makers Space

- ▶ The ECE Makers Space has had new 3D printers installed with \$100K commitments for naming rights in Reymond B. Jones engineering building.

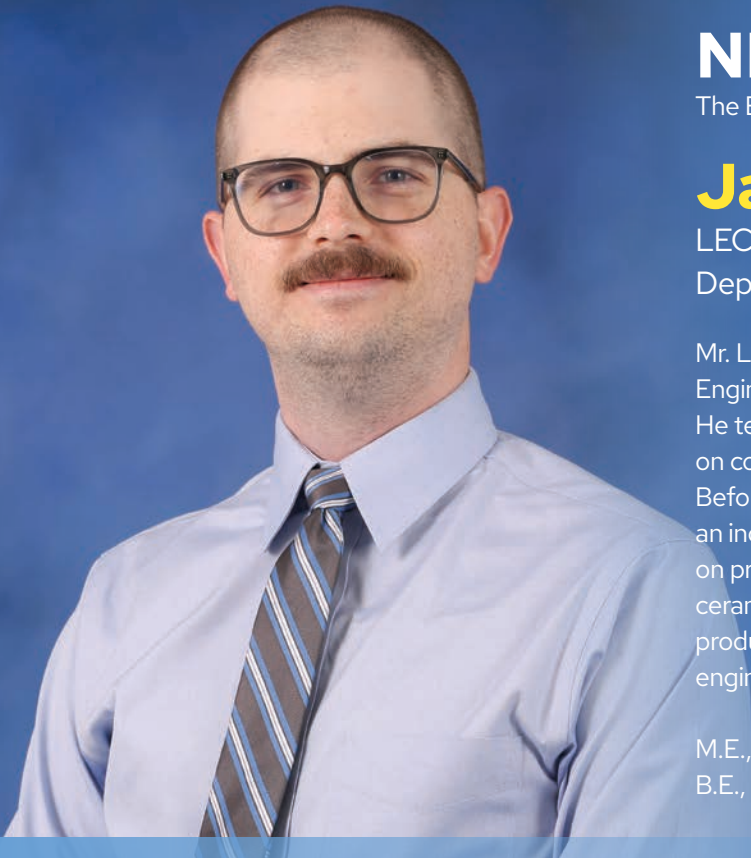


Energy Systems and Battery Testing Lab

- ▶ The Energy Systems and Battery Testing (ESBT) Laboratory is expanded and moved to ENG 209 for research in the areas of Intelligent Battery Management Systems (I-BMSs) and control of Cyber-Physical Systems (CPS). The ESBT laboratory is equipped with state-of-the-art Lithium-ion battery (LIB) testing equipment capable of testing battery cells and modules under various environmental conditions, along with a microgrid hardware-in-loop simulator for CPS. Specifically, the ESBT laboratory is equipped with an Arbin LBT21162-0 5V/5A 16-channel cell tester, an Arbin LBT22013-0 60V-100A, 2-channel module tester, and an ESPEC BTX-475 Benchtop Series Temp/Humidity Chamber capable of -20 °C. C to 100 °C temperature range and 10% to 95% RH per chat humidity range, Arbin 10" MZTC Multi Temperature Chamber with 8 fully independent mini-chambers, Gamry 1010E Electrochemical Impedance Spectroscopy (EIS), OPAL-RT OP4512 and OP5600 real-time simulator and microgrid simulator. All test equipment can communicate via CAN bus for a hardware-in-the-loop test bed for a

lithium-ion battery management system and a microgrid.

- ▶ **Arbin LBT21162-0 5V-5/0.5/0/0A-16CH-110VIP cell tester** is a 16-channel cycler capable of 5V/5A current per channel. Channels can be paralleled to support a maximum of 40A charge/discharge current. The tester has a PC supporting program test protocols and data logging.
- ▶ **Arbin LBT22013-0 60V-100/50/10/1A-2CH-208V3P battery module tester** is a high-power cycler capable of testing two modules simultaneously up to 60V/100A each. The channels can be paralleled to achieve a current up to 200A.
- ▶ **ESPEC BTX-475 Benchtop Series Temp/Humidity Chamber** to simulate various environmental conditions. The chamber's interior dimensions are 19.6" x 15" x 23.6" (W x D x H), and it can accommodate battery modules for testing. The chamber is capable of -20 °C. C to 100 °C temperature range and 10% to 95% RH per chat humidity range. The temperature chambers is integrated with Watlow controller and controlled using Arbin MITS Pro battery testing software.
- ▶ **Arbin 10" MZTC Multi Temperature Chamber** with 8 fully independent mini-chambers to isolate cells under test. The temperature range: (Ambient - 10) to 60 degC.
- ▶ **Gamry 1010E Electrochemical Impedance Spectroscopy (EIS)** (Potentiostat / Galvanostat / ZRA) capable of performing EIS from 10 μHz to 2 MHz, ±12 V Maximum Applied Potential, ±1 A Maximum Current, and 9 Current Ranges.
- ▶ **OPAL-RT OP4512 and OP5600** real-time simulator with 32-channel analog input, 32-channel analog output, and 32-channel digital IO with CAN/ MODBUS and microgrid simulator
- ▶ All test equipment can communicate via CAN bus for a hardware-in-the-loop test bed for a lithium-ion battery management system and a microgrid.



NEW ECE FACULTY

The ECE Department welcomed 1 new faculty member in 2025

Jackson Lawrence

LECTURER,

Department of Electrical and Computer Engineering

Mr. Lawrence joined the Department of Electrical and Computer Engineering as a lecturer in computer engineering in the Fall of 2024. He teaches computer engineering undergraduate courses with focuses on computer hardware, assembly language, and embedded systems. Before joining the university, he worked as a control systems engineer for an industrial automation systems integrator. During that time, he worked on projects for customers in various manufacturing industries including ceramic matrix composites, oil refining, and reverse osmosis membrane production. Mr. Lawrence will begin working on his Ph.D in computer engineering at UAH in the Fall 2025 semester.

M.E., Computer Engineering, University of Alabama in Huntsville, 2024
B.E., Chemical Engineering, Auburn University, 2018

WE WELCOME OUR NEWEST CHARGERS!

NEW ECE STAFF

Kathy Gray

SENIOR STAFF ASSISTANT

Kathy Gray, ECE's new Senior Staff Assistant, joined the department in April 2025 from UAH Housing. With over eight years of experience in higher education, Kathy brings a passion for student support, operational excellence, and team collaboration. She has a talent for streamlining processes, managing complex schedules, and keeping both students and staff on track. Originally from Alabama, she enjoys life here with her husband, an engineer, and their two children. Outside of work, she enjoys spending her free time thrifting for unique finds and building creative Lego projects. She's excited to bring her creativity and experience to the ECE team.





NEW ECE STAFF

Keiara Roberson

SENIOR STAFF ASSISTANT

Keiara Roberson has brought her talents to UAH's ECE. Although excited to be taking on the role of the Senior Staff Assistant, Keiara is grounded in finance, contracts, and higher education. In her new position, she's making all her former roles work for her at UAH. Managing budgets, forecasting revenue and expenses, and analyzing financial data, all while attending to faculty's needs. Whilst a little shy, Keiara is better at written communication; focusing on the exact issue and being able to resolve it.

THANK YOU AND CONGRATULATIONS ON
YOUR PROMOTION 🏆



Dr. Aubrey Beal

Congratulations on
his award of **TENURE**
and promotion to
**ASSOCIATE
PROFESSOR**

RETIREEES

Dr. Ravi Gorur

A bittersweet farewell
and Happy Retirement!



THANK YOU AND CONGRATULATIONS TO
OUR NEWEST RETIREEES!

Ms. Angelia Heulett

A bittersweet farewell
and Happy Retirement!



IN MEMORIAM

REMEMBERING **Prof. Fat Duen Ho**

Dr. Fat Duen Ho, a longtime professor of electrical and computer engineering (ECE) at UAH, died unexpectedly on January 9, 2025. His UAH career spanned more than 44 years: Dr. Ho was appointed assistant professor in the ECE Department at UAH in 1980 and attained the rank of full professor in 1991.

A brilliant educator, Dr. Ho focused on the intersection of microelectronic devices, circuits and materials. His recent research centered on device modeling for IC design, metal ferroelectric semiconductor field effect transistors, and modeling RF circuits for wireless communication systems. Dr. Ho had over 70+ journal publications in his areas of expertise, and most recently served as principal investigator for a NASA/MSFC grant for Optimization of Ferroelectric Ultra-Capacitor for Energy Storage. A senior member of the Institute of Electrical and Electronics Engineers (IEEE), Dr. Ho earned recognition as an Outstanding Educator from the IEEE, Huntsville Section.

Dr. Ho taught a number of graduate and undergraduate electrical engineering courses including power amplifiers, RF circuits for wireless communications, electric circuit analysis, VLSI circuits, and solid state fundamentals. He took a lot of pride in mentoring his PhD students, and he supervised over 30 MSE theses and PhD dissertations at UAH.

"He was dedicated to his students, and I know that he was most energized while teaching and engaging with students," says Dr. Shankar Mahalingam, dean of the College of Engineering. "He will be deeply missed by generations of our students, alumni, current and former faculty and his colleagues across UAH."

"Dr. Ho's unwavering dedication to UAH over his remarkable 44-year tenure has left an enduring legacy, shaping generations of engineers and leaving an indelible mark on the university community," says Dr. Aleksandar Milenković, department chair and professor of electrical and computer engineering.



ECE Department Awards 2024-2025

"The Annual ECE Awards Ceremony is not just an occasion to recognize remarkable achievements of our peers, but also a celebration of the collective spirit, hard work, and dedication that define our Department.

- Dr. Aleksandar Milenkovic

Dr. Thomas Morris
UAH College of Engineering
Outstanding Faculty



Mr. Ron Bowman
Dr. Joseph C Dowdle
Outstanding ECE Faculty



Mr. Cliff Bell
Linda Mauldin Hooper
ECE Outstanding Service Award



Dr. Aaron Werth
ECE Outstanding Adjunct Instructor



Mr. William Current
Iliana Martin Chittur
Outstanding Graduate Student Award



Honors Day Recognition



Charles Gould
2025 Outstanding
Computer Engineering
Undergraduate

Jonathan Shreve
2025 Outstanding
Electrical Engineering
Undergraduate

Nicholas Whisenant
2025 Outstanding
Cybersecurity Engineering
Undergraduate

2025 Huntsville Engineering Week

Award Winners



Dr. Yuri Shtessel

Lifetime Achievement
Award

Elijah Moore

Outstanding
CPE Student

Nicholas Whisenant

Outstanding
CBSY Student

Charles Bernhard

Outstanding
EE Student

Dr. Avimanyu Sahoo

Outstanding
Junior Faculty

MD SAZZAD HOSSEN

Outstanding Graduate Student

DR. MARIA POUR

IEEE Huntsville Section
Outstanding Educator

WILL GOINS V.

IEEE Huntsville Section
Outstanding Student

FEATURED SENIOR DESIGN PROJECTS



Battery Health and Wellness System (BHWS) (EE)

Team Members: Taylor Cox, Youri Ferraro, Eli Hiebert, Camden Renner, and Samantha Quartuccio

Abstract: The Battery Health and Wellness System (BHWS) serves as a custom solution to increase the safety and usability of the LiPo battery integration with the ASTRA rover, a competition vehicle developed by the Space Hardware Club. While Lithium Polymer batteries provide high energy discharge capabilities, they can pose safety issues, particularly when used over long time frames if not managed properly. The BHW system addresses these issues by directly monitoring battery and cell activity, supporting balancing and charging of the ASTRA battery solution. In addition, BHW aims to provide functionality designed to protect the battery from excess use by providing alternate power sources during testing and implementing automatic switches in case of excess discharging. This, along with an easily interactable interface, aims to extend the life of the LiPos and allow ASTRA team members to better manage their batteries.

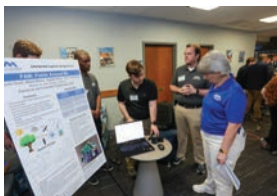


CaReNN—Camouflage Reveal Neural Network (CBSY)

Team Members: Christian Boldin, Nathan Ogden, Barrett Peterson, Lilly Redmond, Olivia Tucker

Mentor: Dr. David Coe

Abstract: CaReNN leverages a refined You Only Look Once (YOLO) architecture to enable effective camouflage detection across a range of Android devices. Optimized for edge computing, it operates entirely offline with a latency of approximately 400ms. The app processes real-time camera input, drawing bounding boxes around concealed threats—including humans, vehicles, and weapons. By incorporating configurable detection thresholds, CaReNN significantly enhances camouflage detection in the field. This contributes to improved situational awareness and faster decision-making, showcasing the capability to deploy advanced convolutional neural networks on lightweight edge devices.



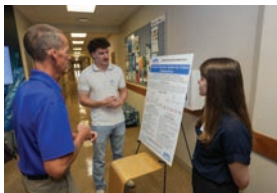
FAM: Fields Around Me (CPE)

Team Members: Jacob Dodd, Albert Moore, Hayden Rose, Tyler Tankersly

Advisor: Prof. Emil Jovanov

Sponsor: UAH Office of Technology Commercialization

Abstract: It has been observed in multiple studies that Electromagnetic Fields affect the autonomous functions of human bodies. This includes increased heart rate and other factors attributed to stress responses which negatively affect a person's health. The human body on Earth constantly interacts with Electromagnetic Fields such as Schumann Resonance. This project implements a device that measures the effects of these Electromagnetic Phenomena using Tree biopotentials that can then be related to humans. By understanding better how exposure to these persistent low-frequency electromagnetic fields affects other living organisms a correlation may be established to how these electromagnetic fields may affect us.



Intrusion Detection for Critical Infrastructure (CBSY)

Team Members: Subhankar Baidya, Jonathan Biffle, and Justin Edwards

Mentor: Mohammad E. Alim

Abstract: Critical infrastructure is responsible for several essential services; however, critical infrastructure remains vulnerable to cyber attacks due to the usage of legacy systems and the rising frequency and sophistication of cyber attacks. This project addresses these issues by creating an open-source intrusion detection system trained on faster-than-real-time digital twins of critical infrastructure that emulate critical infrastructure under normal conditions and cyber attacks. The intrusion detection system utilizes the data to detect cyber attacks against critical infrastructure and suggests mitigation plans for the detected cyber attack.



noBS: Non-invasive Blood Sugar Monitoring (CPE)

Team Members: Caleb Doughty, Charles Gould, Elijah Moore, Garrett Sutton, Alex Thomas

Mentor: Prof. Emil Jovanov

Abstract: Our task for our senior design project was to create an At present, there is no way to measure blood glucose without invasive methods. noBS is a noninvasive monitor capable of detecting blood glucose using a combination of bioimpedance (bioZ) analysis and multi-wavelength spectroscopy(mPPG) fed through a machine learning model. The monitor stores the data it collects remotely on its own server which displays the data via a specially designed application to allow both health professionals and users to view glucose data and make informed decisions about treating chronic metabolic disorders.



Real-Time Hand Gesture Recognition with GPU Acceleration and Neural Networks (EE)

Team Members: Tyler Edge, Logan Self, Ian Livingston, Katie Dellinger, and Brody Carroll

Mentor: Dr. Junpeng Guo

Abstract: This project was completed over the course of a single semester and included the proposal, design, troubleshooting, implementation, and finalization of a GPU accelerated gesture recognition device. The device uses a NVIDIA Jetson Orin Nano GPU along with a high frame rate camera to recognize hand gestures via a neural network and use them as software inputs.



Paul Michael Salmon Engineering Design Award

Endowment fund is established in 2007 in memory of Paul Michael Salmon, our beloved student of Computer Engineering.

"The Paul Michael Salmon Engineering Design Award shall be conferred on the individual ECE student or the team of ECE students judged to have devised, completed, and submitted the best design project, in terms of meeting economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability requirements."

Congratulations to the 2025 Paul Michael Salmon Engineering Design Award Winners



1st place - TIE

NoBS: Non-invasive Blood Sugar Monitoring

- Caleb Doughty
- Charles Gould
- Elijah Moore
- Garrett Sutton
- Alex Thomas



1st place - TIE

Battery Health and Wellness System (BHWS)

- Taylor Cox
- Youri Ferraro
- Eli Hiebert
- Camden Renner
- Samantha Quartuccio



2nd place

Real-Time Hand Gesture Recognition with GPU Acceleration and Neural Networks

- Tyler Edge
- Logan Self
- Ian Livingston
- Katie Dellinger
- Brody Carroll



3rd place

CaReNN—Camouflage Reveal Neural Network (CBSY)

- Christian Boldin
- Nathan Ogden
- Barrett Peterson
- Lilly Redmond
- Olivia Tucker

ECE Halloween Student/Faculty Social



ECE Mardi Gras Student/Faculty Social

Don't Fail Fridays

Tech Talks

Hosted by IEEE-UAH Theta Eta chapter - Eta Kappa Nu



The UAH Theta Eta chapter of Eta Kappa Nu (HKN) had an eventful year!

The HKN Tech Talk series, our flagship initiative, is where our HKN Chapter brings in impactful guest lecturers from industry to introduce and discuss highly relevant topics with UAH students. This year, HKN hosted 7 Tech Talks, the titles of which were:

1. **"Introduction to Guidance, Navigation, and Control"**

Presented by Cummings Aerospace Engineer and UAH grad student Sean Mitchell

2. **"Introduction to Stealth Technology"**

Presented by Northrop Grumman Engineer and UAH grad student Ethan Hoben

3. **"Introduction to Machine Learning"**

Presented by Cummings Aerospace Engineer and UAH grad student Sean Mitchell

4. **"Introduction to Vision Based/Machine Learning Navigation"**

Presented by Cummings Aerospace Engineer and UAH grad student Sean Mitchell

5. **"Introduction to Electronic Warfare"**

Presented by Northrop Grumman Engineer and UAH grad student Ethan Hoben

6. **"Introduction to Automatic Target Detection, Recognition, and Tracking"**

Presented by Cummings Aerospace Engineer and UAH grad student Sean Mitchell

7. **"Stealth Design Principles"**

Presented by Northrop Grumman Engineer and UAH grad student Ethan Hoben

This year, HKN had the pleasure of introducing a total of 170+ UAH students to these topics, and they all had the chance to engage in Q/A and discussion with our industry speakers! Next semester, we have an ambitious 8 talks planned, 1 every other week, and we have a roster of experts from local industry who are excited to speak about their passions with our

students! The following are quotes from students who attended the talks:

"Honestly everything seems like a very cool topic. It makes me want to research more about stealth and how we use it daily."

"Imaging/detection and things of that nature are very interesting to me so I would like to know (as someone who doesn't know much as of now) how to get started/head in the right direction of potentially working in this field."

"I would really like to learn more about target-like jamming techniques as well as beamforming and how these concepts interact in real applications."

"Kalman filters, and their usefulness in especially linear system estimations; as well as some good examples of how to practice it with my own time."

HKN is proud to bring together industry experts and our UAH students, particularly when it sparks the curiosity of our students and drives them to learn and grow!

The following is a quote from one of our start speakers, Sean Mitchell, a Software lead at Cummings Aerospace and UAH electrical engineering graduate student:

"As a speaker, the highlight of the HKN Tech Talks is the opportunity to both teach curious minds but also learn from their questions. These impactful conversations further drive our understanding in these fields."

HKN also grew its ranks this semester, as the world's premiere Electrical and Computer Engineering honor society, it is our pleasure to initiate new members into our ranks to carry on the good work we do, and this semester we initiated 13 new members!

CONGRATULATIONS TO ALL!

ECE DEPARTMENT FALL 2024 PH.D. & MASTER'S GRADUATES ►

DOCTOR OF PHILOSOPHY (PH.D.) GRADUATES

DARREN BOYD, Electrical Engineering

Dissertation: "Lightweight Thin Film-Based Passive Deployable Antennas for Space Applications"

Advisor: Dr. Maria Pour

UMESHWARNATH SURENDRANATHAN, Electrical Engineering

Dissertation: "Exploring the Impact of Ionizing Radiation on Security and Reliability in Modern Semiconductor Memories"

Advisor: Dr. Biswajit Ray

MASTER'S GRADUATES

WILLIAM M. CURRENT, Electrical Engineering

Thesis: "Grating Lobe Suppression Techniques in Sparse Linear and Planar Phased Array Antennas with Reconfigurable Phasor Elements"

Advisor: Dr. Maria Pour

AUSTIN DAVIS, Electrical Engineering

Thesis: "Generation of True Random Numbers with a First Order Chaotic Circuit"

Advisor: Dr. Aubrey Beal

SOWMIK KANTI DEB, Electrical Engineering

Thesis: "A Study of the Quantum Edge Extraction Technique using Bitplane-Based Quantum Boolean Image Processing Algorithm"

Advisor: Dr. David Pan

ZACHARY COOPER HELTON, Electrical Engineering

Thesis: "Enhanced Suppression of Stimulated Brillouin Scattering in High Energy Fiber Laser through Novel Chaotic Phase Modulation"

Advisor: Dr. Aubrey Beal

FARZANA HOQUE, Electrical Engineering

Thesis: "Data Remanence Vulnerabilities in Embedded SRAM at Low Temperature"

Advisor: Dr. Biswajit Ray

MD SAZZAD HOSSEN, Electrical Engineering

Thesis: "Multilabel Defect Classification using Graph Neural Networks for Autonomous Visual Inspections"

Advisor: Dr. Avimanyu Sahoo

Jackson G. Lawrence, Computer Engineering

Thesis: "Characterizing a Web Server in a Lightweight Kubernetes Cluster in an IoT Computing Environment"

Advisor: Dr. David Coe



JONATHAN CARL MARQUARDT, Electrical Engineering

Thesis: "A Novel Dual-Band Outline Elliptical Dipole Antenna for Passive Energy Harvesting"

Advisor: Dr. Maria Pour

CHAD MICHEAL AUSTIN, Electrical Engineering

JARED COLTON BOGG, Computer Engineering

ROBERT ALLEN BROWN, Electrical Engineering

MACKENZIE DAVID CAMPBELL, Electrical Engineering

WESLEY A. CROUCH, Software

MITCHELL DAVIS, Electrical Engineering

STEVEN GALLAGHER, Electrical Engineering

CHRISTOPHER GEORGE, Electrical Engineering

JOSEPH GLIDEWELL, Electrical Engineering

ANDREW SHELBY HOLMAN, Electrical Engineering

HAYDEN LONG, Electrical Engineering

MITCHELL MADDIX, Electrical Engineering

LAKSHMI VAISHNAVI MANCHALA, Computer Engineering

JAMES GRANT ROLLINS, Cybersecurity

TANNER TINDALL, Electrical Engineering

NOAH DAVIS WAGNON, Computer Engineering

JONATHAN N. WATERS, Electrical Engineering

JOSHUA JOHN ZAITER, Electrical Engineering

CONGRATULATIONS TO ALL!

ECE DEPARTMENT SPRING 2025 PH.D. & MASTER'S GRADUATES ►

DOCTOR OF PHILOSOPHY (PH.D.) GRADUATES

SHAWN RICHARD GERMAN, Electrical Engineering

Dissertation: "The Effects of an ADC on SCR Improvement When AGC in a Radar Receiver Captured by Signal Power and ADC is Modeled Using an Equivalent Noise"

Advisor: Dr. Laurie Joiner

TRENT COLBY SHELTON, Electrical Engineering

Dissertation: "Radar Range Improvements Using Reference Target Sliding Method in Range Doppler Matrix"

Advisor: Dr. Laurie Joiner

MASTER'S GRADUATES

MATTAN TSENG, Electrical Engineering

Thesis: "Nonlinear Dynamics and Data-Driven Modeling"

Advisor: Dr. Aubrey Beal

JONATHAN WATERS, Electrical Engineering

Thesis: "Dual-Mode Phased Array Antennas for Monopulse Radars"

Advisor: Dr. Maria Pour

JEEVAN ADHIKARI, Cybersecurity

DANIEL ALDENBERG, Cybersecurity

DYLAN BREWER, Computer Engineering

EVAN CALL, Electrical Engineering

BENJAMIN L. CURTHS, Software Engineering

STEPHEN DOUD, Cybersecurity

ROY GAITER, Electrical Engineering

CAMERON T. JONES, Electrical Engineering

SEAN MONGEON, Electrical Engineering

TONY NGUYEN, Computer Engineering



RICHARD OMENYO, Computer Engineering

MATTHEW PUTNAM, Electrical Engineering

EMMANUEL MORALES RAMIREZ, Software Engineering

JOSHUA SACHAR, Electrical Engineering

JING W. TENG, Computer Engineering

JOSEPH WARNDORF, Electrical Engineering

JOSEPH HUNTER WILHAM, Computer Engineering

GRANT WINFREE, Electrical Engineering

ALUMNI SPOTLIGHT

At the heart of programs in the ECE department at the University of Alabama in Huntsville is a vibrant community of innovators, problem solvers, and leaders who are shaping the future of technology and engineering. Our alumni, hailing from diverse backgrounds and cultures, have embarked on remarkable journeys, transforming challenges into opportunities and making significant contributions across a wide spectrum of industries and research areas. The ECE Alumni Spotlight is more than just a celebration of individual success stories; it's a testament to the enduring impact of a solid foundation in engineering education. More stories can be found at uah.edu/eng/departments/ece/ece-alumni-spotlight.

PETER J. LANDERS, BS EE & MS EE

August 27, 2024 // Arron DePorter

Peter J. Landers graduated from the UAH ECE department with his bachelor's in Electrical Engineering in 2004 and later went on to earn his Master's of Engineering in Electrical Engineering in 2008. During his time in his master's program, Peter specialized in digital communication and code structures. Peter currently is a Program Director at Lockheed Martin, an aerospace and defense manufacturer that aims to innovate the industry while prioritizing their customers' safety. At Lockheed, Peter is responsible for procurements to allies of the United States.



Amanda Clark

SEP 20, 2024 // Ann Marie Martin

Amanda Clark is director, Missile Defeat Directorate, U.S. Army Space and Missile Defense Technical Center. She recalls success, failure and fun in the UAH Optics Building.

"My favorite memories of UAH are working in the labs trying to make a laser and instead melting a lot of glass – and Dr. Don Gregory's Fourier Optics class. The class would plan wild questions for the lesson to see if we could get him off track. He finally caught on to our tricks, and it was very funny."

UAH has been an important part of Clark's life since she first arrived on campus as a student.

"I have gone from freshman to graduate student, Army employee working in labs on campus, to now a director in the Army with employees that I lead working in labs on campus. Many of the professors and research staff have taught me science, but also helped me grow professionally."



Publications

2024 - 2025

Journals

► Dinh C. Nguyen, Viet Quoc Pham, Seyyedali Hosseinalipour, Zehui Xiong, Tuan M Hoang Trong, and Yonina Eldar, "Guest Editorial: Federated Learning for Industrial Internet of Things", IEEE Internet of Things Magazine, vol. 7, no. 5, pp. 12-13, Aug. 2024. doi: 10.1109/MIOT.2024.10644030

► Chandra S. Pappu, Aubrey N. Beal, Jonathan N. Blakely, Ned J. Corron, "Analytic range-Doppler ambiguities for nonautonomous solvable chaos," Chaos, Solitons & Fractals, Volume 197, 2025, 116434, doi:10.1016/j.chaos.2025.116434.

► Chandra S. Pappu, Sonny Grooms, Dimitriy Garmatyuk, Thomas L. Carroll, Aubrey N. Beal, Saba Mudaliar, "Interference Resilient Integrated Sensing and Communication Using Multiplexed Chaos," in IEEE Transactions on Radar Systems, vol. 3, pp. 26-43, 2025, doi: 10.1109/TRS.2024.3513293.

► Amaury Hayat, Arwa Alanqary, Rahul Bhadani, Christopher Denaro, Ryan J. Weightman, Shengquan Xiang, et al. "Traffic Smoothing Using Explicit Local Controllers: Experimental Evidence for Dissipating Stop-and-go Waves with a Single Automated Vehicle in Dense Traffic.", IEEE Control Systems Magazine, February 2025. <https://doi.org/10.1109/MCS.2024.3503402>

► Jonathan W. Lee, Han Wang, Kathy Jang, Amaury Hayat, Rahul Bhadani, Matthew Bunting, Arwa Alanqary, William Barbour et al. "Traffic Control via Connected and Automated Vehicles: An OpenRoad Field Experiment with 100 CAVs", IEEE Control Systems Magazine, February 2025. <https://doi.org/10.1109/MCS.2024.3498552>

► Shaba Shaon, Van-Dinh Nguyen, Dinh C. Nguyen, "Latency Optimization for

Wireless Federated Learning in Multihop Networks", IEEE Transactions on Vehicular Technology, page 1-6, 09 Jun. 2025. doi: 10.1109/TVT.2025.3577530

► Umeshwarnath Surendanathan, Abishek S. Vellankanni, Aleksandar Milenkovic, Ujjval Guin, Biswajit Ray, "Ionizing Radiation-Induced Data Imprinting Effects in SRAM Arrays," IEEE Transactions on Nuclear Science, Vol. 72, No: 4, April 2025, pp. 1252-1258. doi: doi.org/10.1109/TNS.2025.3543233.

► Jonathan Marquardt, Maria Pour, and Curtis Hill, "An Interleaved Dual-band Outline Elliptical Dipole Antenna," Progress In Electromagnetics Research C, vol. 152, 19-24, 2025, doi:10.2528/PIERC24081403.

Conferences

► Farzana Hoque, Izak Halseide, Aleksandar Milenkovic, Biswajit Ray, "Data Remanence Vulnerabilities in Commercial SRAM at Low Temperature," in the Proceedings 2024 IEEE Physical Assurance and Inspection of Electronics (PAINE), November 12-14, 2024, Huntsville, AL, USA, pp. 1-7, doi: 10.1109/PAINE62042.2024.10792674.

► D. G. Tindall, A. N. Beal and T. Morris, "Overview of PUFs and Emerging Chaotic Structures," 2024 IEEE Physical Assurance and Inspection of Electronics (PAINE), Huntsville, AL, USA, 2024, pp. 1-7, doi: 10.1109/PAINE62042.2024.10792741.

► W. M. Current and M. Pour, "Reduction of Grating Lobes in Scanning Planar Phased Array Using Reconfigurable Element Spacing Synthesis Technique," 2024 IEEE International Symposium on Antennas and Propagation and INC/USNC

► URSI Radio Science Meeting (AP-S/INC-USNC-URSI), Firenze, Italy, 2024, pp. 2265-2266, doi: 10.1109/AP-S/INC-USNC-URSI52054.2024.10686782.

► Jonathan Waters and Maria Pour*, "Dual-Mode Antenna Element with Application in a Linear Monopulse

Phased Array," in the 2024 IEEE International Symposium on Phased Array Systems and Technology, Boston, MA, October 15-18, 2024. DOI: 10.1109/ARRAY58370.2024.10880334.

► William Current and Maria Pour*, "Grating Lobe Reduction in Sparse Scanning Phased Array Through Generation of a Widened Null," in the 2024 IEEE International Symposium on Phased Array Systems and Technology, Boston, MA, October 15-18, 2024. DOI: 10.1109/ARRAY58370.2024.10880382

► Josue Ndeko, Shaba Shaon, Aubrey N. Beal, Avimanyu Sahoo and Dinh C. Nguyen, "Federated Split Learning for Human Activity Recognition with Differential Privacy," 2025 IEEE 22nd Consumer Communications & Networking Conference (CCNC), Las Vegas, NV, USA, 2025, pp. 1-2, doi: 10.1109/CCNC54725.2025.10976058

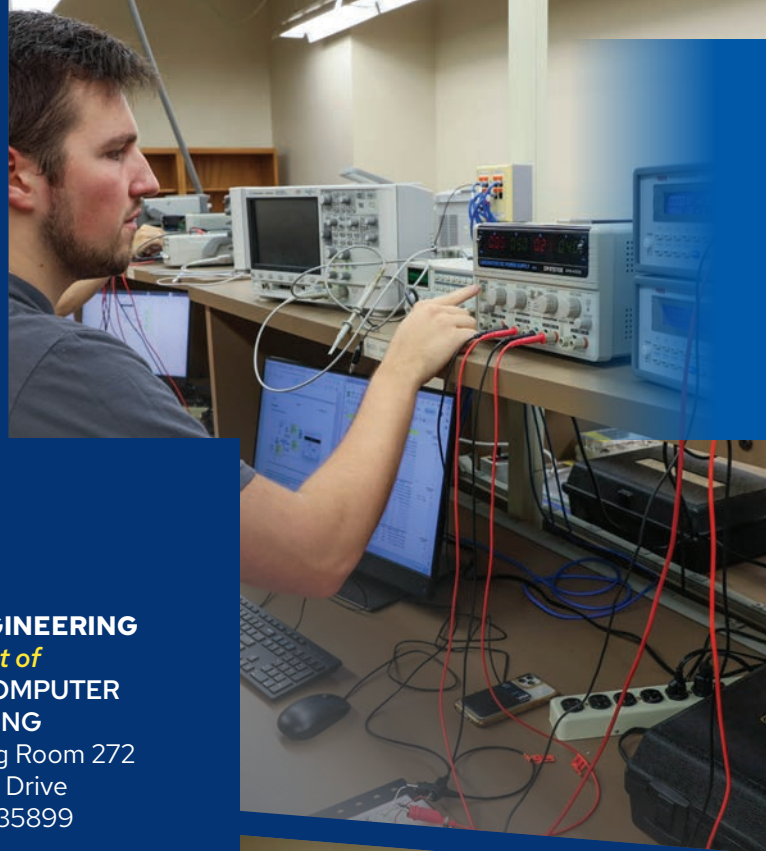
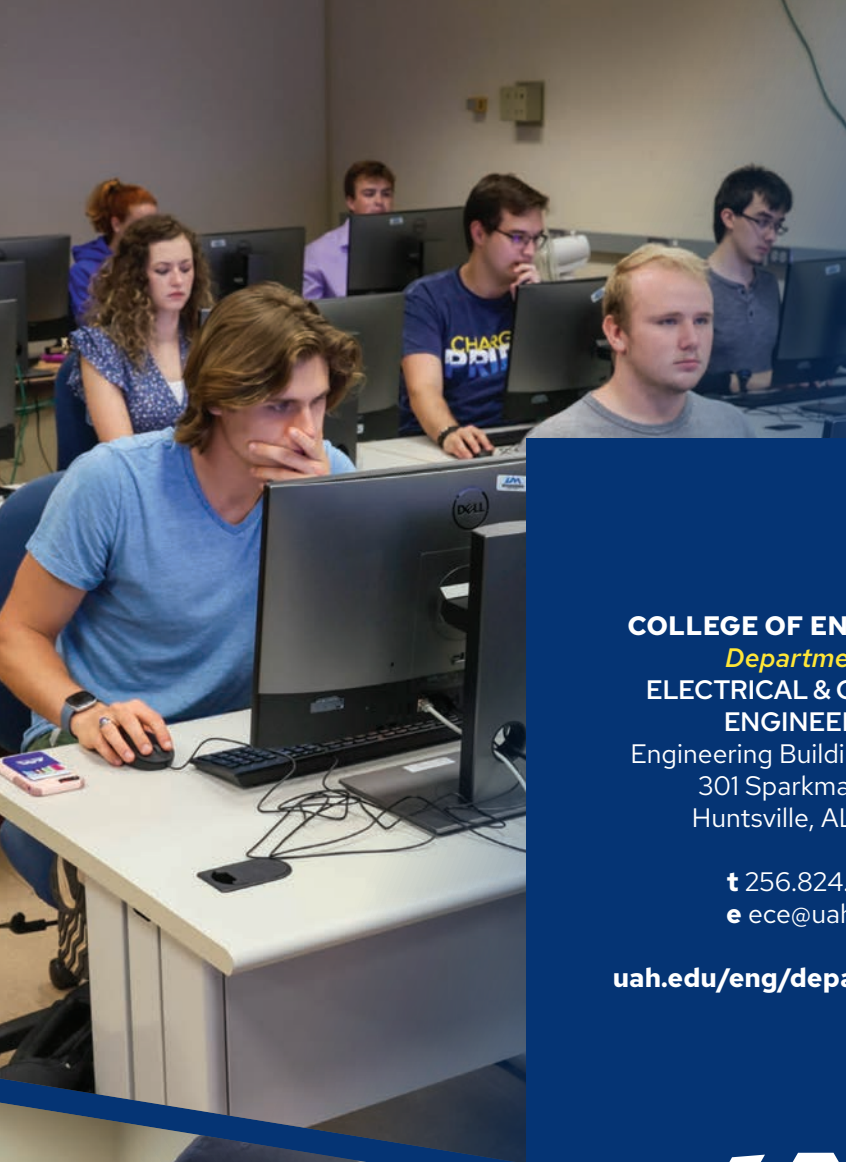
► Sai Radavaram, Luka Dimitrijevic, Sean Gillam, and Maria Pour, "A Low-Profile, Closely-Spaced 1x4 MIMO Array with Low Mutual Coupling," in the 2025 IEEE International Workshop on Antenna Technology (iWAT), Cocoa Beach, FL, Feb. 19-21, 2025, 10.1109/iWAT64079.2025.10931212. (selected as one of the six finalists)

► Daniel J. Matyas, Mattan S. Tseng, Zachary C. Helton, Samuel P. Bingham, Christopher N. Vincent, and Aubrey N. Beal, "Enhanced suppression of stimulated Brillouin scattering (SBS) in high energy fiber lasers through novel chaotic phase modulation", Proc. SPIE 13452, Laser Technology for Defense and Security XX, 1345208 (30 May 2025); <https://doi.org/10.1117/12.3055564>

Patents

► Biswajit Ray, Aleksandar Milenkovic, "Systems and methods for Identifying Counterfeit Memory," USPTO 12,159,053, December 03, 2024.

► Biswajit Ray, Aleksandar Milenkovic, "Systems and methods for improving radiation tolerance of memory," USPTO No. 12237032 February 25, 2025.



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