TEXAS A&M UNIVERSITY

2021

DEPARTMENT OF

ENGINEERING TECHNOLOGY & INDUSTRIAL DISTRIBUTION

LETTER FROM THE DEPARTMENT HEAD

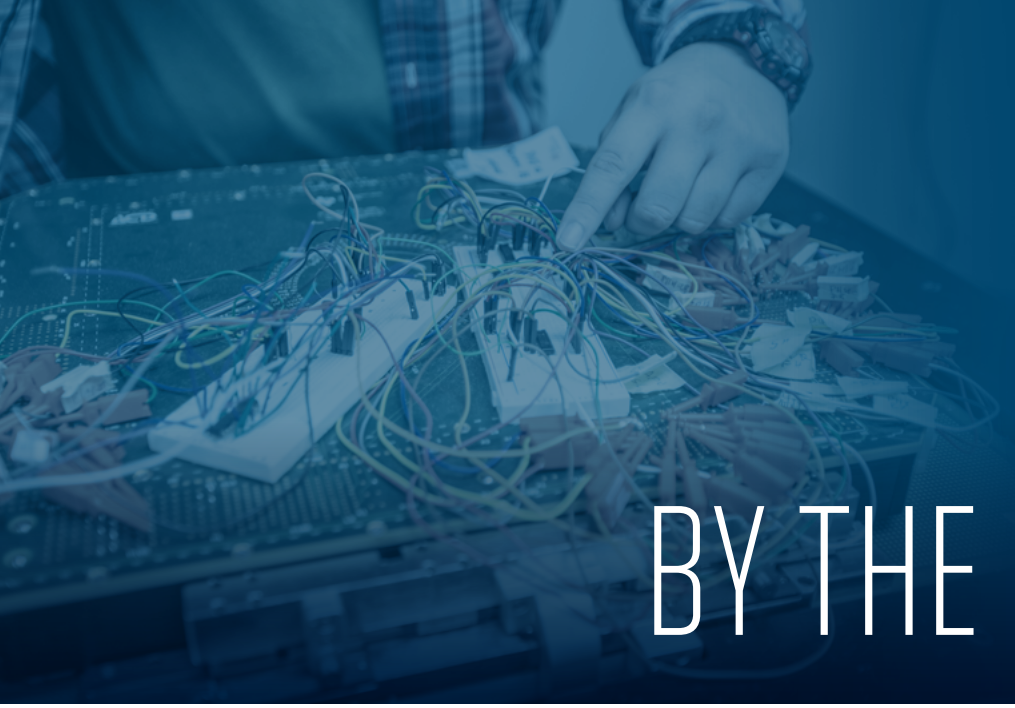
The Department of Engineering Technology and Industrial Distribution is highly recognized for its state-of-the-art undergraduate and graduate programs. We are proud of this reputation and, even more so, of our graduates who strive to solve significant problems in industry, the business world and in government agencies. However, we don't rest on our past accomplishments. We strive to enhance our programs to meet the changing needs of the world through a process of continuous improvement that is itself a reflection of our commitment to excellence.

Our distance education master's programs in industrial distribution and engineering technical management are two great examples of how we move forward to meet the needs of our constituents. Our mechatronics program is another example of meeting industry needs in the area of embedded, intelligent products that combine mechanical, electronic and software components. Our newest degree, a Master of Science in Engineering Technology, is yet another example of the department addressing industry needs for high-caliber engineering technology professionals with advanced degrees in intelligent systems and modern manufacturing processes.

As the professions we serve evolve, we continue to make knowledge more accessible, drive innovation and promote creative solutions that address industry needs. This is the mission of the department as it is evident in this brief brochure.

Sincerely,

Reza Langari, Ph.D.
J.R. Thompson Department Head
Professor



TEXAS A&M UNIVERSITY
Department of Engineering Technology & Industrial Distribution

BY THE **NUMBERS**

Texas A&M University's Department of Engineering Technology and Industrial Distribution programs are some of the top in the nation.

TOP 10

The department is part of the Texas A&M College of Engineering, one of the top 10 ranked engineering colleges in the nation.

ENROLLMENT* (FALL 2021)

**preliminary, 5th class day*

2,097 Undergraduate

202 Master's

FACULTY (FALL 2021)

33 Tenured/Tenure-track

50 Academic Professionals

DEGREES AWARDED (AY 2020-21) **preliminary*

630 Bachelor's

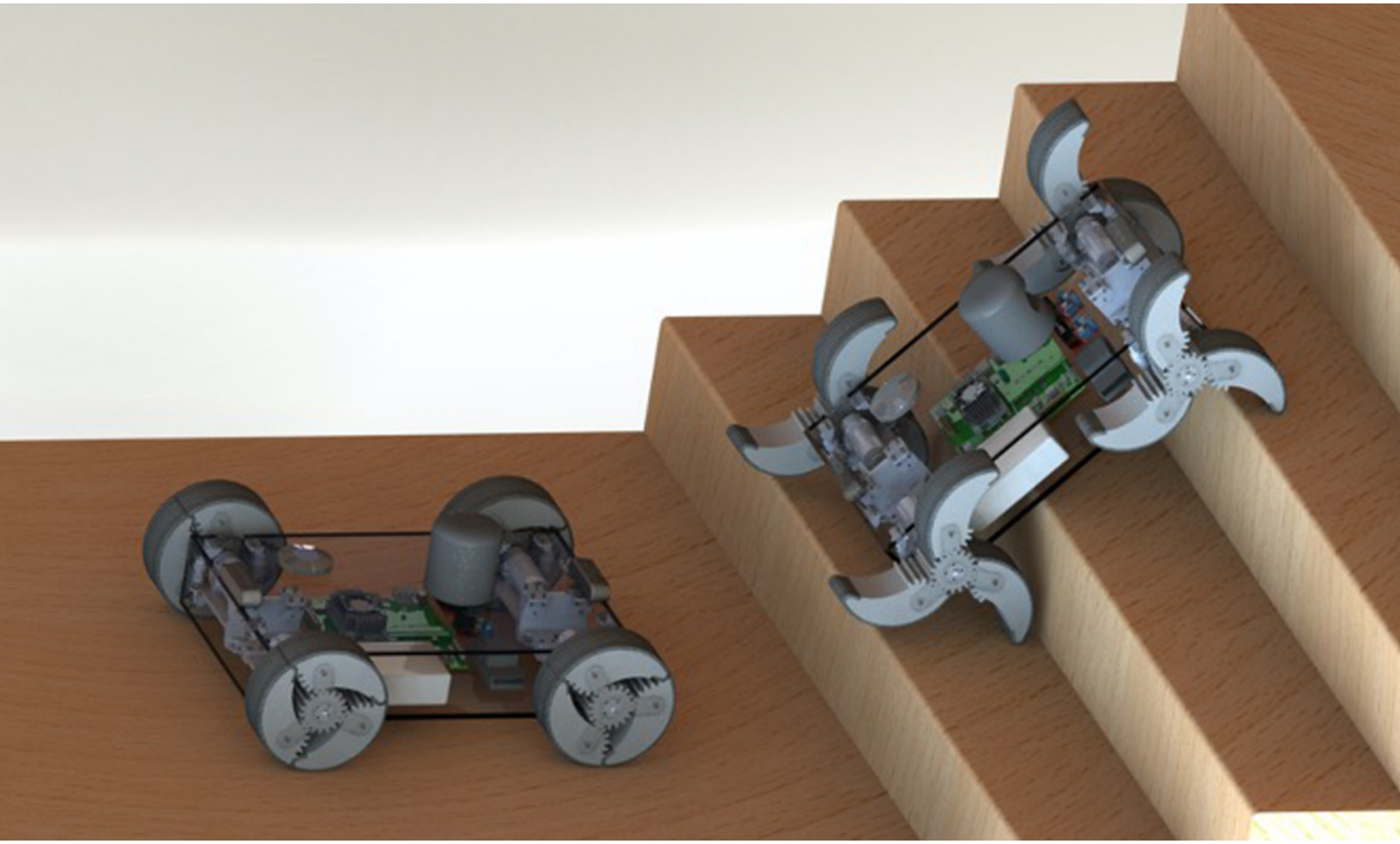
105 Master's

HANDS-ON LEARNING

75% of Student Learning is Experiential

25% of Student Learning is Traditional Classroom Lecture

TRANSFORMING ROBOTS
FOR MILITARY APPLICATIONS



A team of researchers is creating mobile robots for military applications that can determine, with or without human intervention, whether wheels or legs are more suitable to travel across terrains. DARPA has partnered with Dr. Kiju Lee at Texas A&M to enhance these robots' ability to travel through urban military environments self-sufficiently.

"Through this new project, I will develop unmanned ground vehicles with agile and versatile locomotive capabilities for urban military operations," Lee said.

Lee and her team are developing an adaptable Wheel-and-Leg Transformable Robot (α-WaLTR) that can traverse over varying surfaces, including staircases, more efficiently. The α-WaLTR will move with wheels or legs depending on their immediate need and will be able to decide for itself which to use.

"Legged locomotion is more versatile, but suffers from inherent structural, mechanical and control complexities," Lee said. "The proposed testbed will be equipped with novel wheel/leg transformable mechanisms, which can switch between the two locomotion modes actively adapting to its environment, but without needing any additional actuator."

Although created for military use, the team hopes this technology will transcend this field.

"While the current focus is on defense and other military applications, these types of adaptable mobile robots can be applied to many other areas, such as space, domestic service, surveillance and agriculture," said Lee.

FEATURED RESEARCHER

Dr. Kiju Lee

Associate Professor

DEVELOPING A RESILIENT GLOBAL SUPPLY CHAIN

Dr. Eleftherios "Lefteris" Iakovou is utilizing his years of expertise in supply chain research to bolster current, and develop new, resilient supply chain systems. He recently published an extensive look into supply chains and how to build a more robust system in the United States.

When one part of this delicately balanced network fails and disrupts the process, the rest of the supply chain — consumers, companies and the nation included — are directly affected.

Developing a resilient supply chain starts with understanding that one size does not fit all. Each has its own set of complications and strengths.

In the modern global economy, cost reduction has become nearly synonymous with outsourcing and offshoring the manufacturing of components for products. However, it is important for companies to still have home-based manufacturing plants that operate, even at a lower production rate, in case there is an issue with the offshored supply.

Iakovou said COVID-19 demonstrated the sole supplier model is out of business.

"Companies are pushing for low cost," he said. "Low cost itself is not sustainable. The federal government, on the other side, needs resilience and security for supply chains critical to the nation."

By transitioning companies away from a shareholder model and into a stakeholder model, private and government sectors would have to collaborate and consider not only shareholder value, but also workers and associated partners, society, national competitiveness and security, and the environment.

"That's a monumental shift that, if it happens correctly, would allow for new optimal trade-offs between cost efficiencies, resilience and sustainability," he said.

FEATURED RESEARCHER

Dr. Eleftherios Iakovou

Professor

TECHNOLOGY-BASED LEARNING

Through the Innovative Technology Experiences for Students and Teachers program, the NSF awarded a team of researchers a grant to design and implement a program for high school students in Career and Technical Education. This program is currently being implemented at the Bryan Independent School District in Bryan, Texas.

"This project will prepare students for the current and future digital economy," said Dr. Malini Natarajarathinam. "The future of work favors individuals who are flexible and innovative with a holistic understanding of a range of technologies."

The study's goal is to prepare students for a digitally forward future. Using the horizontal approach to learning through integration of knowledge, students will focus on practical learning and gaining relevant skills. Researchers will monitor students throughout the program to determine the impact of this learning experience.

During the first year, students will focus on learning operational knowledge such as digital fabrication, microprocessor electronics and programming, as well as tactical processes such as production and manufacturing. The second year will focus on production and deployment cycles leading to design. A part of this process is engaging in real-life scenarios with local schools and businesses to implement these lessons.

Once completed, the research team will test the program's effectiveness by testing and analyzing several different aspects of the program. The team hopes to show the strengths of a technology-based program.

FEATURED RESEARCHER

Dr. Malini Natarajarathinam

Associate Professor

AUTONOMOUS MILITARY VEHICLE CYBERSECURITY

During the Mad Hacks: Fury Code hackathon, teams were given a task by the National Security Innovation Network to develop technologies for the DOD. This task involved ensuring that human-controlled and autonomous vehicles can fight against cyberattacks without human intervention.

A team composed of six students, including two from Texas A&M University, was recognized as one of the top hackathon teams for their innovative solution called the PHC (picryption, HIVE, clutch) Defense.

Autonomous vehicles are, by nature, prone to hacking. When used for the military, they must be equipped with complex technologies to ensure safety from hackers.

PHC Defense is a multilayered blend of software and mechanical measures that can autonomously fight against breaches in cybersecurity.

The first layer is picryption — a twist on regular encryption software that responds through encrypted pictures sent from the user to the system. If a file is received from an unknown user, the software can alert someone inside the vehicle.

If the picryption is compromised, the "H," which stands for HIVE, takes over. The HIVE includes several layers of protection, but there is one that stands out — a radio, allowing users to speak through different radio frequencies.

The team understood that most autonomous vehicles run solely on software and programming. If these are hacked, how can the user operate the vehicle? Representing the "C," this level is called "the clutch." If the software fails, the driver can activate manual control.

The team is continuing to develop this solution for the DOD to help prevent these issues.

TEXAS A&M UNIVERSITY

Department of
Engineering Technology
& Industrial Distribution

engineering.tamu.edu/etid

DEPARTMENT OF ENGINEERING TECHNOLOGY & INDUSTRIAL DISTRIBUTION

PROGRAMS OF STUDY

UNDERGRADUATE

(Engineering Technology Accreditation Commission of ABET Accredited)

ESET | B.S., Electronic Systems Engineering Technology

IDIS | B.S., Industrial Distribution

MMET | B.S., Manufacturing and Mechanical Engineering Technology

MXET | B.S., Multidisciplinary Engineering Technology

- Mechatronics Focus
- STEM Education Focus
- Electro Marine Focus

GRADUATE

Distance Education

METM | Master of Engineering Technical Management

MID | Master of Industrial Distribution

Resident

MSET | M.S., Engineering Technology