



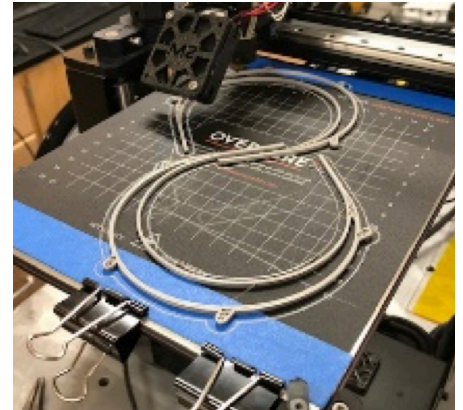
ENGINEERING TECHNOLOGY UPDATE

MIDDLE
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COVID-19—MEETING THE CHALLENGE

COVID-19 and its impact changed education in America, and the MTSU Engineering Technology and Mechatronics Engineering programs were no exception. Steps taken this spring, summer, and fall to mitigate the effects of the pandemic on our students, faculty, and staff included:

- Faculty redesigning class lectures and labs to be presented online via Zoom web conferencing
- Student teams and individuals completing their senior capstone projects in home shops and garages
- Establishing home offices to continue management and administrative needs remotely
- A True Blue spirit of collaboration to work together and complete the semester virtually
- Teaming with the Walker Library MakerSpace in applying 3D printing technology to fabricate face shield frames.



EVP ROVER TEAM CAPTURES NASA DESIGN AWARD

This year's NASA Human Exploration Rover Challenge competition at Huntsville was canceled because of the pandemic. Despite being unable to compete in person, our Experimental Vehicles Program Rover Team 2 was recognized for its vehicle design and was awarded the American Institute of Aeronautics and Astronautics Neil Armstrong Best Design Award for "outstanding engineering and vehicle design" in a virtual awards ceremony in April. This is the second such honor our MTSU EVP Rover team has earned at this competition since 2014.

FACULTY UPDATE

Dr. Walter Boles

The longtime Engineering Technology Department chair retired in January 2020, completing an 18-year tenure with the department. In his years as department chair, Dr. Walter Boles worked with a local industry advisory board to promote our programs and develop a curriculum that provides our students with the tools needed for modern industry. He also guided the establishment of Mechatronics Engineering, the first four-year engineering program offered at the MTSU campus. We thank Dr. Boles for his many years of service, leadership, and dedication to the Engineering Technology program, and wish him a long and fulfilling retirement.



Dr. Kathy Mathis

Another distinguished faculty member who retired this year is Dr. Kathy Mathis.

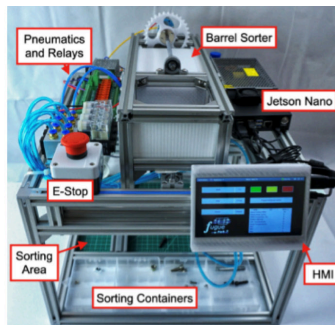
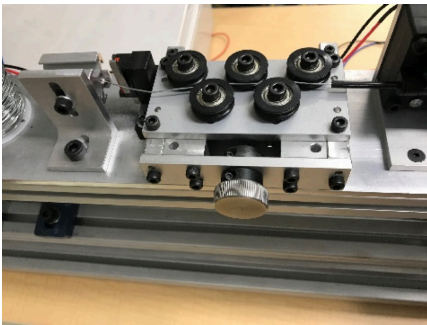
Mathis joined the engineering department in 1985, when the department was known as Industrial Studies. She served with her husband, the late Dr. Bill Mathis, who was also part of the Engineering Technology faculty for many years. Kathy Mathis taught Environmental Science and Technology, and in 2009 was awarded a \$300,000 grant to raise public awareness of lead hazards in the home. In addition to being a valued instructor, she will be fondly remembered by faculty and staff for her kindness in hosting our annual department holiday luncheon each December. We thank her for her contribution to MTSU and the Engineering Technology Department, and wish her all the best.

MECHATRONICS CAPSTONE SENIOR PROJECTS

COVID-19, social distancing, and remote fabrication were just a few of the many hurdles experienced by our seniors. Despite unprecedented challenges this year, they managed to leverage available resources and work safely together to design, build, test, and complete their projects. It was very tough, but they got it done. The following is a brief overview of the 2020 capstone projects.

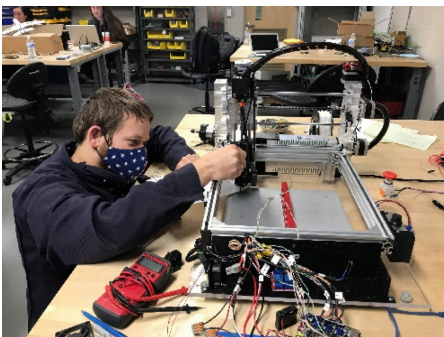
Spring 2020 Mechatronics capstone projects

- **Illuminator:** automated system to remove and replace ceiling lightbulbs
- **Drone Team 1 & 2:** hybrid drone and car
- **Recycle Robot:** automated conveyor to sort trash for recycling
- **Paper Clip Producer:** machine to form wire into paper clips
- **Hardware Handler:** automated system for sorting nuts, bolts, and washers
- **Puppy Prosthesis:** wheeled prosthesis to provide mobility for a disabled dog



Fall 2020 Mechatronics capstone projects:

- **Aircraft Accelerator:** pneumatic system for launching small RC aircraft (two teams)
- **AFSP:** automated system for producing face shields for COVID workers
- **X-Plotter:** tabletop three-axis machine with replaceable heads for 3D printing, milling, and drawing
- **Rolling Bridge:** small, automated bridge that can unroll itself and roll back up (two teams)



ENGINEERING TECHNOLOGY CAPSTONE SENIOR PROJECTS

- **FANUC Robot and FEC Controller:** a means to automatically verify engine bolt torque on robotic assembly lines
- **Precision Torque Wrench:** microprocessor-controlled pneumatic torque wrench that can accurately tighten bolts to within 2% of specification
- **Energy-Harvesting:** piezoelectric device that generates electricity by someone's walking on the device
- **Adjustable Die:** complex stamping die that is adjustable to create different parts using one tool

FACULTY RESEARCH UPDATE

Dr. Misa Faezipour is focusing on system dynamics and modeling, and the application of systems engineering in various areas such as health care, business, education, and energy.

Dr. Lei Miao is participating in a project funded by the Federal Highway Administration and Tennessee Department of Transportation to evaluate and optimize traffic signals utilizing big data and machine learning.

Dr. Mina Mohebbi is investigating classroom human factors, assessing physical, cognitive, and environmental factors on learning.

Dr. Emmanuel Rowe is establishing a research laboratory to study and evaluate ceramic materials.

Dr. Vishwas Bedekar continues his research into energy harvesting.

Elissa Ledoux, a Mechatronics instructor and Vanderbilt Ph.D. candidate, is developing a powered hand orthosis to assist stroke survivors in regaining manual dexterity. She received a \$2,300 grant through the Vanderbilt Wond'ry Ideator program.

INDUSTRY PARTNER PROFILE: JIMMY DAVIS/THE DAVIS GROUPE

Creating and maintaining strong partnerships with industry is a vital component of the Engineering Technology Department in preparing students for professional careers in industry and manufacturing. A proud industry partner and ET alumnus who best represents this goal is Jimmy Davis, a 2010 ET graduate who is the founder and president of The Davis Groupe, a family-owned company that has provided system integration, fabrication, and on-site installation services for local manufacturing for over 20 years.

While managing a diverse business, Davis continues to be a longtime supporter of the Engineering Technology Department and its students. His company sponsors the annual ET golf tournament, which has raised over \$75,000 to fund senior capstone projects. Davis was also on the industry team that led the push to bring Mechatronics Engineering to MTSU in 2013 and was instrumental in securing a \$15,000 endowment for student scholarships in Mechatronics Engineering. The Davis Groupe also has provided student internship opportunities to work alongside engineers, designers, and technicians on real-world projects.

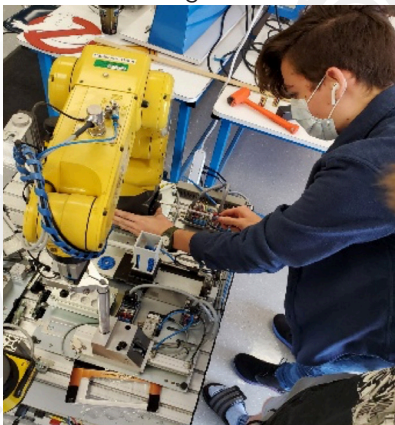
We recognize Jimmy Davis as a valued industry partner and thank him for his continued support of MTSU and the Engineering Technology program.



SPOTLIGHT: OAKLAND HIGH SCHOOL MECHATRONICS

Over the years, Middle Tennessee has seen exceptional growth in both manufacturing and distribution. As a result, it has become difficult to find sufficient employees to fill gaps in the workforce. Oakland High School, through a partnership with Motlow State Community College and MTSU, is working to fill this gap.

Established in 2014, the Oakland Mechatronics program has become a feeder program for local colleges' engineering and technology programs. What began as a standard Career Technical Education (CTE) pathway has grown into one of the top CTE programs in the country. Through a partnership with Motlow, OHS Mechatronics students can earn up to 60 hours in college credit and graduate with an associate's degree in Mechatronics Engineering. Approximately 90% of Oakland Mechatronics students continue to a four-year university to study in an engineering-related field, some choosing MTSU, where they can earn a bachelor's degree in Mechatronics Engineering or Engineering Technology.



While certificates and college credit are major assets for the students in the program, Oakland teachers Leonard Ciletti and Scarlett Murphy have found that students value the immersive, hands-on experience they receive in the program. They can receive instruction in Computer-Aided Design, Programmable Logic Controllers, Digital Circuits, Industrial Robotics, Mechanical Components, and Fluid Power.

Oakland High School continues to grow its Mechatronics program through partnerships with MTSU, the Rutherford County Chamber of Commerce, and local industry leaders. Through these partnerships, Oakland strives to improve the program and providing an exceptional hands-on education combined with industry-relevant experience valued by today's high-tech employers.

APPLIED ENGINEERING BUILDING: A vision for the future

There are several exciting updates related to our continued work toward a new facility to replace the aging Voorhies Engineering Technology Building, our home for almost 80 years. The following is a summary of where we are:

- MTSU submitted a funding request July 1 for a new engineering building to the Tennessee Higher Education Commission (THEC).
- THEC gave our project its highest ranking on the priority list that is sent to the governor in January.
- The MTSU Development Office has established a building campaign to raise funds from outside sources as required by THEC. For this project, approximately \$2.5 million in funding must be raised by June 30, 2021, for the project to move forward.

There are several options available for our alumni, local business, and ET supporters who want to be part of this wonderful opportunity:

- Monetary gifts to be directly used for the new building project.
- A "Pledge of Commitment" agreement in which patrons can pledge support when the new building is approved. No money is required until 120 days after the building has been approved.
- Naming opportunities for a specific classroom, laboratory, or student area. You will be recognized with a plaque commemorating your support.
- Gift-in-kind donations: New equipment and/or tools for labs can be purchased and donated to help meet our funding requirements.

We recognize that this year has been a challenge for everyone, especially economically. But we see a bright future and ask that you consider the value that your Engineering Technology program brings to our community, employers, and, most of all, our students. We invite you to visit the MTSU Development Office webpage at mtsu.edu/development or call them toll free at 877-444-MTSU to learn more and determine what support option works best for you.

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Contact Us

Middle Tennessee State University
Box 19
Murfreesboro, TN 37132

615-898-2776 Phone
615-898-5697 Fax
etdept@mtsu.edu

Tonya Scott, coordinator
(615) 898-3442 Phone
tonya.scott@mtsu.edu

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