



### Department of Engineering Technology holds student presentations at Nissan Training Center

By Sidelines April 28, 2017

Story and Photo by Connor Burnard | Contributing Writer

On Thursday afternoon, the MTSU Department of Engineering Technology held student poster and project presentations at the Nissan Training Center in Smyrna.

The presentations included senior projects that are required to graduate, as well as underclassmen class projects.

Walter Boles, the Chair of the Department of Engineering Technology, said that the presentations are a good way for students to bring attention to their work.

"The students can showcase their senior projects, they can have other students and people outside as well as inside the university see their work, give them a sense of pride. I think it publicizes what our students can do in our department, and I'm very proud of them," Boles said.

Brian Slaboch, an assistant professor of mechatronics engineering, said that the event brought the separate areas of engineering together to gain exposure in a professional environment.

"Today, you're seeing the engineering technology open house, which is where we see all the different projects from mechatronics, electromechanical engineering technology, computer engineering technology and all the different sub-departments inside of the engineering technology department," Slaboch said. "Students get to practice their presenting skills and interact with future colleagues and employees in a real-world environment."

Carol Boraiko, a professor in the Department of Engineering Technology, also said that the presentations are a great way for students to prepare for a professional setting after graduation.

"They get to show off what they can do, they get to practice talking to people, they get to make sure it actually works," Boraiko said. "It's great practice to build things and make sure it works and to explain it."

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Among the presenters were Davis Phoxay, Joe Beck, Ayman Yaseen and Mohannad Al Dujaili. All of these presenters were senior mechatronics majors who worked together to create a working autonomous "Mailbot" for their senior project that can retrieve and disburse one's mail.

"You go through however many years you go through college and you're learning all these things, all this math, all this coding but you're not really applying it but for one project for that one thing. But this project literally requires everything we've learned through all of college and to put it together all from scratch," Phoxay said.

For their Introduction to Materials Science and Engineering class, freshman mechatronics majors Deyton Haefner, Hayim Enrique Juarez Del Moral and William Ben Kelley presented a materials project about steel.

"We give an overview of its properties, its applications and its processing technique overall, and then we also gave a list of industries that have the largest impact in the world of steel," Moral said.

"Overall, it's a culmination of everything we've learned this semester. Going through class and being able to actually identify each of these properties inside the material, actually knowing what it means, what it does, where it can be used," said Haefner.

Another senior presentation was that of senior engineering technology major Billy Vongdara, who presented a biomechanical energy harvester that attaches to one's body and uses energy from body movements to create energy

"The idea is to put it on your body and charge batteries or charge your cell phone instead of relying on outlets," Vongdara said "Doing this project is a lot more hands-on than just reading a book in class. I learned how to machine stuff, I learned the technology that they're using in the future. Just a whole lot of knowledge that you can't learn just in class. It really pushes you."

Nissan North America invited the Department of Engineering Technology to their Smyrna Training Center to hold the event. Next year's presentations will likely be held on campus, as they have been in the past, according to Boles.

Representatives from Siemens and other interested parties visited MTSU March 22, touring the Department of Engineering Technology's mechatronics and other lab facilities as it considers building on the current partnership.

Mechatronics engineering is a multidisciplinary field of engineering with a combination of systems in mechanical, electrical, telecommunications, control and computer engineering.

## Siemens officials tour MTSU mechatronics facilities

MTSU News, March 23, 2017



MTSU junior Tony Cheatham demonstrates how the Experimental Vehicles Program's lunar rover collapses for storage. Department of Engineering Technology graduate assistant Joel Clements, back left, Jimmy Davis of The Davis Groupe, Judith Bevels and Sara Mould of Siemens and Keith Hamilton, who retired from Bridgestone but promotes mechatronics engineering

at all levels, watch and listen March 22 at MTSU. Siemens officials, including vice president of BT Americas Dana Soukoup (not pictured), learned more about MTSU's mechatronics and engineering technology facilities.

Dana Soukoup, vice president of Siemens Building Technologies Division in Chicago, Illinois, was joined by fellow Siemens officials Judith Bevels of Murfreesboro and Sara Mould of Nashville; Jimmy Davis of Murfreesboro based The Davis Groupe; and Keith Hamilton, who retired in 2016 from Bridgestone Americas and continues to promote mechatronics engineering at all levels.

Mechatronics is based on a three-level international certification program created by Siemens, a German engineering company. To date, MTSU is the only Siemens-certified Level 3 four-year mechatronics program in the world. To learn more, visit <http://mtsu.edu/programs/mechatronics/>.

Engineering Technology Chair Walter Boles led the entourage on the tour of mechatronics and engineering facilities. College of Basic and Applied Sciences Dean Bud Fischer joined them for tours of the new Science Building and just-renovated Davis Science Building.

In a hands-on lab, MTSU graduate assistant Joel Clements of Murfreesboro and junior mechanical engineering technology major Tony Cheatham of Knoxville, Tennessee, shared about the Experimental Vehicles Program in engineering technology.

The group had a business lunch with MTSU President Sidney A. McPhee, interim Provost Mark Byrnes and other MTSU officials.

Later, they toured the mechatronics facility at the Tennessee College of Applied Technology in Smyrna, Tennessee, and met with state officials in Nashville.

Engineering technology is one of 11 departments in the College of Basic and Applied Sciences.

# Mechatronics is burgeoning at MTSU

By CONNIE ESH, [cewrites@yahoo.com](mailto:cewrites@yahoo.com)

April 12, 2017

Mechatronics - which combines electronics, mechanical engineering and computer science - is the newest major in MTSU's Engineering Technology Department, and it's growing fast.

"We expected about 50 majors by year four, but we have over 200, and it's only year three," says Associate Dean Dr. Saeed Foroudastan.

This past week, the department hosted students from four high schools from nearby counties on a tour of the labs and classrooms they will use if they come to MTSU for degrees. The tour was funded by the Tennessee Precision Metalforming Association - and in addition to the students, several industry representatives participated in the tour.

Of course, the tour was also a recruiting event for the Engineering Tech Department. Not only did the high school students take a grand tour of the labs, they also learned about the university's programs of study.

Study hard to 'have fun'

Department Chair Dr. Walter Boles asked the students if they liked to have fun. When they agreed, he told them, "Be good at math and physics, and chemistry if you're interested in chemical engineering, and all your engineering classes will be fun "

When Foroudastan spoke, he had the students laughing and listening right from the start. He asked them if they planned on coming to college, explaining that they were going to need to come because they needed "the big house and the racing car and the boat or whatever you like."

Then in a more serious tone, he told them how much money they were likely to make if they had a degree in, say, mechatronics or some other area of engineering technology .

"You could start at \$70,000 or \$80,000 a year," he said. "Right out of college. There's a shortage of engineers. They'll beg you to go to work."

Job will be 'hobby'

Foroudastan admitted that the course work could be tough, but that it would be worth the effort.

"For four years, you're going to work hard. You're going to stay right here and work," he said. "But then for 40 years, you have job that's fun, and you have a hobby. You don't get the degree and in ten years, you don't have a hobby."

One of the "hobbies" students get involved with at MTSU is building vehicles to race. One is a Baja racer and another is a solar-powered boat - while the third and possibly most interesting is a lunar rover.

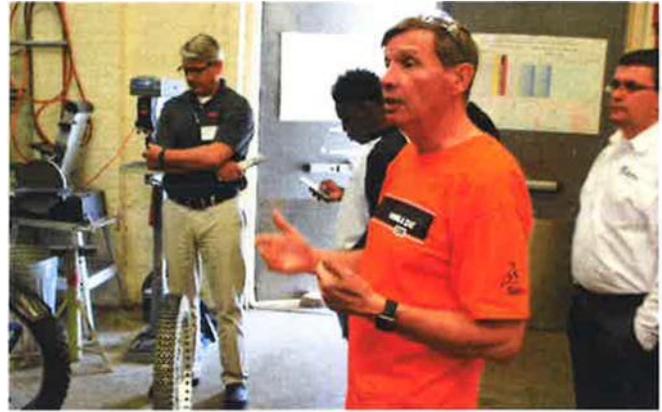
The "True Blue" rover is built from scratch by the students and must be raced by a team of one woman and one man. "Built from scratch" includes designing, building and testing every part of the vehicle - even including the US flag decals, the wheels and airless tires necessary to drive around in the moon's outer-space vacuum.

This year, two moon buggies from MTSU competed in the race sponsored by NASA at the Space Center in Huntsville, Alabama - and they both won prizes. One came in ninth in the world, overall. And the other took first places in design and safety

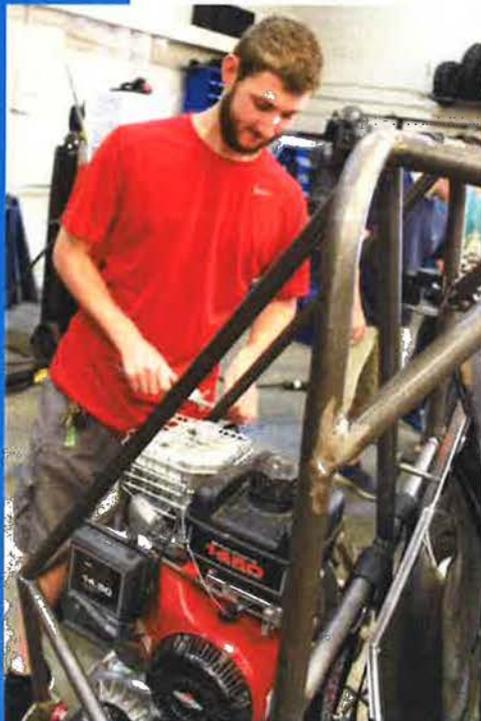


MTSU Seniors Sarah Gunger, Maryam Sedhom, and Naomi Florentino concentrate as they study mechatronics, which combines electronics, mechanical engineering, and computer science.

MTSU Graduate Assistant Joel Clements guided the tour of the vehicle area of the mechatronics lab where lunar rovers, Baja racers, and solar-powered boats are built.



### Students 'do all the work'



Tinkering with the required Briggs and Stratton engine on the Baja racer he built with fellow mechatronics students at MTSU is Sam Fassnacht, prepping it for rigorous testing it must hold up to.

Foroudastan says when the students have a problem building the rover, he and the other instructors only give advice. "Then we stand back like this," he says, folding his arms. "They do all the work. We find the money - everything else is done by the students."

Graduate assistant and master's student **Joel Clements** guided the tour of the vehicle area. Undergraduates **Sam Fassnacht** and **Mikhail Ault Normandie** showed a Baja racer they're planning to race in June.

"It's required to have a Briggs and Stratton engine," Fassnacht explained. Then Clements added, "They build the Baja and we take it out and try to break it. That one, we did. Now they have to fix the problems."

The students' solar-powered boat also sprinted to second place overall for two consecutive years at the Solar Splash in Dayton, Ohio, in addition to capturing the outstanding workmanship award and first place in qualifying.

### 99 percent job placement rate

It's all part of learning mechatronics at MTSU. And the department can brag of a 99 percent job placement rate. One reason may be that local industries support the program (Murfreesboro Electric and the TVA were among the sponsors of the solar boat).

Mechatronics appears to be the wave of the future, with programs at Matlow State and Rutherford County Schools as well as MTSU - and middle school, high school and college students are all preparing to "catch the wave."

## MTSU, Motlow professors discuss need for mechatronics

By **Sidelines** September 13, 2016

Story by *Emily Neal II Contributing Writer* | Photo by *Rick Casebeer, courtesy of MTSU News and Media Relations*

Middle Tennessee is seeing rapid growth in the demand for people trained in mechatronics, a field of engineering that combines mechanical, electrical, telecommunications, control and computer engineering systems.

MTSU has one of the fastest-growing programs in the state and is the only four-year university that is "Level 3" Siemens-certified in the world, according to a recent press release.

MTSU's Walter Boles appeared on an episode of "Inside Workforce Development" last week with the Dean of Career and Technical Programs at Matlow College, Fred Rascoe, to discuss the recent growth in automation and robotics in recent years.

"Many existing engineers say that they obtained a traditional engineering degree and had to learn the basics of a different discipline on their own in order to do their job as it evolved to include more automation," Boles said in the press release. He went on to explain that mechatronics graduates will already have the basic training for automation covered.

Companies like Bridgestone Americas, Nissan North America and General Motors as well as others are waiting to hire graduates with degrees in mechatronics.

"These companies employ the most advanced manufacturing technologies available and it is crucial to be able to supply the industries with a well-educated and trained workforce to meet the stringent demands today," Rascoe said in the press release.

Rascoe believes that the MTSU and Matlow programs in mechatronics are "addressing the needs of today and tomorrow," while Boles added that both schools are "fulfilling a critical need."

Boles added, "Many companies make facility location and relocation decisions based on the availability of a technically educated workforce. (The) Middle Tennessee (region) can take advantage of the current lead we have and expand capacity further."

At the seventh Tennessee Department of Education Technical Education Cluster Collaboration on Sept. 7, Boles and other experts addressed high school teachers in STEM fields as well as technical fields to introduce teachers to the mechatronics programs offered at MTSU and Matlow.

Matlow has been producing mechatronics students since 2010. MTSU's first 13 mechatronics students graduated in December 2015.



## MTSU seeks mechatronics building

Scott Broden, USA TODAY NETWORK - Tennessee, March 10, 2017

MTSU wants to construct a mechatronics building to prepare more students for high-paying industrial jobs involving robotics and other technologies, state Sen. Bill Ketron said Friday.

Ketron touted the county's existing mechatronics labs, including one that recently opened at the new Tennessee College of Applied Technology (TCAT) campus in Smyrna across from the Nissan automobile factory.

"We hope to build something similar at MTSU (Middle Tennessee State University)," Ketron told those attending the Rutherford County Chamber of Commerce's Capitol Connection break fast with lawmakers.

MTSU President Sidney McPhee confirmed the university has interest in building an on campus facility devoted to mechatronics.

"We are in the preliminary stage of having some discussions about a facility that would help us fill the needs of a high-demand workforce development area that's in mechatronics," McPhee said during a Friday afternoon phone interview. "It has been one of the fastest-growing degree programs at the university. There is a need for not only the building, but also a facility that would train for a mechatronics degree for positions in that area that are in demand."

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## Research Presentations

Dr. Lei Miao presented his research outcomes in the following conferences:

"Toward Intelligent Traffic Light Control with Quality-of-Service Provisioning", 2017 International Conference on Information Technology and Intelligent Transportation Systems, June 2017, Xi'an, China

"Optimal Secret Sharing for Secure Wireless Communications in the Era of Internet of Things", the 4th International Conference on Smart and Sustainable City, June 2017, Shanghai, China

"Optimal On-Off Scheduling for a Class of Discrete Event Systems with Real-Time Constraints", American Control Conference, May 2017, Seattle, WA

"Calibration-Free Wireless Indoor Localization (CAFLOC)", Workshop on IoT Infrastructures and Data Analytics for Smart Cities, March 2017, Paris, France

"Receding Horizon Control with Two Planning Horizons for a Class of Discrete Event Systems with Real-Time Constraints", 55th IEEE Conference on Decision and Control, Las Vegas, NV, USA, December 2016

Former Mechatronics Engineering student Jamshid Farzidayeri presented a conference paper: "An indoor Bocce game played by autonomous robots", co-authored with several ET faculty members, in *the ASEE Annual Conference and Exposition 2017*.

## Civil Air Patrol's Engineering Technologies Academy

This summer, the Engineering Technology Department hosted almost 50 Civil Air Patrol cadets June 20<sup>th</sup> and 22<sup>nd</sup> as part of the Civil Air Patrol's Engineering Technologies Academy. These cadets, ages 15 to 21, came from as far as California to participate in both aerospace and engineering activities.

These cadets, in addition to their interest in aviation, have a desire to pursue careers in engineering and technology, were the top 50 cadet applicants nationwide selected to come to MTSU.

During their visit, Engineering Technology faculty members Dr. Brian Slaboch and Dr. Yating Hu spoke with the cadets about careers in engineering, the skills required for success, and provided an overview of the Mechatronics Engineering program. They discussed the learning opportunities here at MTSU, as well as the various student projects and research opportunities that are offered in Mechatronics. These cadets also had the opportunity to meet one-on-one with current MTSU Mechatronics students to learn more about the program.

The cadets toured both the Mechatronics and Experimental Vehicle Program labs to see up close the design, engineering and fabrication skills our Engineering Technology/Mechatronics students demonstrate as well as the tools and resources available to support this activity. Students were allowed to pilot the Human Exploration Rover, participate in team building exercises, operate an Army PackBot, as well as build and operate a small robot that was controlled via a Bluetooth app using their personal cell phone.



At left, Civil Air Patrol cadets are shown operating small robots using their cell phones as part of their Mechatronics build activity hosted by the Engineering Technology Department.

Below left, Civil Air Patrol cadets begin work on their robotics projects June 20<sup>th</sup> in the Davis Science Building.



A cadet is shown at the control console of a US Army PackBot robot. These robots, donated to MTSU, were originally developed to detect and disable explosive devices as well as other surveillance duties. Today these robots are used by the Engineering Technology Department as a learning tool for demonstrating robotic technology.

## Mechatronics' Graduating Class of 2017

Brian Slaboch, Ph.D., Assistant Professor, Mechatronics Engineering

The graduating class of 2017 completed the mechatronics' programs second group of senior design projects led by Dr. Brian Slaboch (pictured far right).

Students worked in teams of four or five to complete a complex design challenge. Two teams were tasked with developing autonomous object retrieval robots capable of retrieving a coffee mug and returning it to its user. The motivation behind such a project was to provide some autonomy to an end-user who is constrained to sit in a chair for extended periods of time.

Two other groups of students were tasked with developing an autonomous mailbox robot that replaces a traditional mailbox. Such a machine could be used to assist persons with mobility issues in retrieving their mail.

The senior mechatronics students worked incredibly hard and we had four very successful real-world projects that mimic the design process used in industry. Also pictured is Joseph Beck (4<sup>th</sup> from the left) who was named as the top mechatronics student in his graduating class.

Congratulations Joe!



## EVP

MTSU's Experimental Vehicle Program (EVP), once again represented the university and our students well in 2017 international competitions.

This year we were able to enter two teams in the NASA Lunar Human Exploration Competition held in Huntsville, Alabama, from March 31-April 1. MTSU's team took honors with a top 10 obstacle course finish and the Drive Train Technology Challenge and Safety Systems competition awards.

The Solar Splash team was able to successfully compete in Springfield, Ohio, June 7-11. This year the team entered an entirely new boat. MTSU's team brought home awards for Best Electrical Design, Best Workmanship, and 3rd place in the sprint competition.



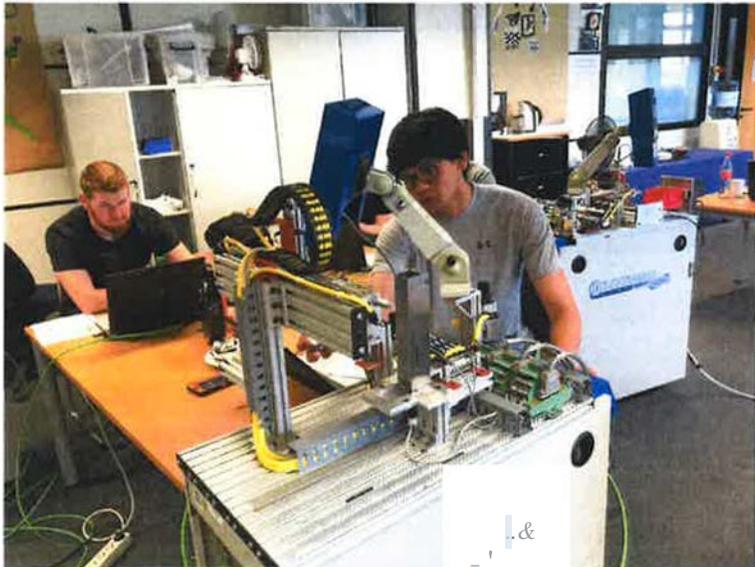
# MTSU Mechatronics in Germany

Ahad S. Nasab, Ph.D., P.E., Professor Mechatronics Engineering

For the past two years several MTSU Mechatronics Engineering students have attended a week-long intensive Mechatronics System Integration training at Siemens Technical Academy in Berlin, Germany. This activity is in part funded by a STEM National Science Foundation Scholarship grant. Other sponsors have included the MTSU Engineering Department, the CBAS Dean's office, the ET Industrial Advisory Council, the Russell Chair of Manufacturing, and the MTSU International Affairs Office.



The Siemens training introduces students to the Systems Approach to understanding, diagnosing, and design of complex automation systems. Students are also introduced to German manufacturing practices through several tours of major German companies such as Siemens and BMW.





## 1st Annual Rutherford County Schools STEM Expo Night

Lei Miao, Ph. D., Assistant Professor, Mechatronics Engineering

A group of Mechatronics students: Sarah Gunger, Joseph Beck, Christopher Secret, John Blankenhorn, and Aldair Nieto, together with Dr. Lei Miao, Dr. Antonio Saavedra, Mr. John Rozell, volunteered for the 1st annual Rutherford County Schools STEM Expo Night, which took place on Mon, Apr 3, 2017. The MTSU group served as poster judges and also run a STEM station. The photo shows the STEM station with hands-on engineering projects, including a sumo robot, a two-wheel self balancing robot, a human following robot, a 3D printer, and a battle bot.



# National Robotics Challenge

Vishwas N. Bedekar, Ph.D., Assistant Professor

Middle Tennessee State University S239 student chapter of Society of Manufacturing Engineers (SME) from Engineering Technology (ET) Department participated in the National Robotics Challenge (NRC 2017) in Marion Ohio. The national challenge took place on April 6 - April 8, 2017 and the chapter fielded 3 teams in minisumo robot competition and 1 team in the combat robot competition .

The requirements of minisumo competition are: The Mini-Sumo Robot Contest requires a student team to build a self-propelled, self-controlled, sensing robot, designed to force another Sumo Robot outside a four (4) foot diameter circle. The competition circle will be a flat black, 3' 6" in diameter, surrounded by a one-inch (1") wide, painted or taped, flat white ring. Another white one-inch (1") wide, ring will surround the inner ring with one inch (1") between them. When any part of the Sumo touches or crosses over the 1" white outer ring it will lose the heat MTSU's teams secured first place (Gold Award) as well as



third place (Bronze Award) in this competition in the post-secondary category .

The requirements of combat robot competition are: In the Robot Combat event students design and create a single custom-built machine that employs one or more methods of destroying or disabling their robot competitor. This robotic device will be remote controlled but may include some autonomous operations. MTSU's team secured the third place (Bronze Award) in the post-secondary category .

The student chapter of SME would like to sincerely thank Engineering Technology Department for funding and support for these student projects. Special thanks are to Dr. Walter Boles, Chair of Engineering Technology and Ms. Jennifer Tweedie, Executive Aide for all their encouragement and financial support. The chapter would also like to thank the department for usage of facilities and supporting the travel. Special thanks are also due to Ms. Jackie Victory, Student Organization and Service for their financial support through Student Activity Fee Award.

Names of Participants :

- Wenbo Dong, Captain, minisumo and combat robot
- Jacob Pawleski, Captain Minisumo
- Aldair Nieto, Captain Minisumo
- Nicole Chandler
- John Blackenhorn
- Kristian Bishop
- Dustin Arnold
- Paul Brewer

## New Labs and Lecture Halls

Lei Miao, Ph. D., Assistant Professor, Mechatronics Engineering

The ET department now has new classrooms and LAB spaces in the renovated Davis Science Building (DSB). The new LABs are equipped with state-of-the-art equipment.



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## New Faculty

**Misa Faezipour** has joined the Engineering Technology department of Middle Tennessee State University as an Assistant Professor as of August 2017. Prior to joining MTSU, she has been a Visiting Researcher and Adjunct Professor at University of Bridgeport collaborating with the Electrical Engineering, Computer Science and Engineering, and Biomedical Engineering programs. She received the B.Sc. in Computer Engineering from Azad University, North Tehran Branch, Tehran, Iran and the M.Sc. in Engineering Management and Ph.D. in Industrial Engineering from the University of Texas at Arlington. Her research interests lie in the broad area of complex systems, healthcare, sustainability, system dynamics simulation, and systems thinking.

Dr. Faezipour is a member of INCOSE, INFORMS, IEEE, IISE, and System Dynamics Society organizations. She is also member of Tau-Beta-Pi, Phi-Kappa-Phi, Alpha Pi Mu, and International Golden Key Honor Societies. She currently is working on sustainability and system dynamics applications in various areas of industry and healthcare and product and process management optimization.

**Mina Mohebbi** (PhD, Pennsylvania State University) has recently joined the department of Engineering Technology as an assistant professor. She received her doctoral degree in Civil and Environmental Engineering with focus on Geo-environmental engineering in June 2017. As a part of her PhD research, she collaborated with a group of power plant companies to evaluate the long-term leaching behavior of fly ash deposits in mine lands. She also holds a master's degree in Environmental Engineering from University of Tehran, and an undergraduate degree in Civil Engineering from Amirkabir University of Technology. Her research deals with beneficial uses for industrial byproducts, evaluating their environmental impacts on soil and water resources, developing geochemical models to predict the long-term conditions, and designing the sustainable remediation techniques. As an assistant professor, she is currently teaching Engineering Safety, Occupational and Environmental Hygiene, and a graduate course in Industrial Hygiene.

## Collaboration between the ET Department and Wirtgen America to Benefit ET Students and Faculty

By Dr. Saleh M. Sbenaty, Professor Computer Engineering Technology

It all started almost 2 years ago, Dr. Sbenaty received an e-mail followed by a phone call from Mr. Bill Stetar, an alumnus of the ET department, who is currently serving as the Director of Service Training at Wirtgen America in Antioch, TN. The initial goal of the proposed collaboration was to recruit students for internships and possible full-time positions. Wirtgen America is the North American Subsidiary of The Wirtgen Group, an internationally operating group of companies in the construction machinery sector incorporating four traditional brands: Wirtgen, VogeLe, Hamm and Kleemann. As technological leader in the field, they offer their customers mobile machine solutions for road construction and road rehabilitation, as well as for mining and processing minerals. <http://www.wirtgen-group.com> and <http://www.wirtgenamerica.com>

Dr. Sbenaty was invited to visit Wirtgen America in fall 2015 where he met with several service and training engineers and toured the facility. Many phone calls and e-mails later, Dr. Sbenaty and Mr. Stetar arranged for two informational visits to MTSU followed by two days of on campus student interviews. The result was the hiring of the first ET student as an intern at Wirtgen America. Ms. Zhor Namir, an Electromechanical ET major, was hired to facilitate trainings and future recruitments of ET students.



The collaboration between the ET Department and Wirtgen America soon grew to include a new aspect, which is providing research and project solutions by the ET faculty and students to Wirtgen America. Dr. Sbenaty was invited to meet the service and training engineers again to determine the scope of work for several projects, two of which have been already implemented successfully.

The intent of the first project was to design, build, and test a heavy duty battery charger/jumping station that is capable of jump-starting road building equipment. The unit is capable of providing a selectable 12 V or 24 V DC voltage, with up to 500 CCA, equipped with a 120 V AC charger, a volt-meter, light indicators, a kill switch, and audible warning alarm for reverse polarity. The unit should be small enough to fit into the bed of a pickup truck. In addition, the unit should be housed in a heavy duty metal casing that is water resistant and durable to withstand weather and the harsh work environment. Mr. Cody Herdt and Dakota Arritt, Electromechanical ET seniors at the time, were selected for this project. Dr. Sbenaty led the research and design efforts while the students were engaged throughout with him in the research, design, building, and testing processes. The final product was delivered to Wirtgen America on Dec. 15, 2016.

The intent of the second project was to design, build, and test a training hydraulic piston position system control and monitor. Two Computer ET students were chosen to work on this project, Albert Chittaphong and Kevin Nentwig. Most hydraulic cylinders do not have a position feedback sensor installed inside them. Workers using road construction machines will reap the benefits of a mobile in-cylinder sensor that accurately determines the exact position of the piston rod. Benefits of such a system include the ability to monitor the distance of the extension or retraction of the piston in various measurement units, as well as measuring the voltage and current outputs from the sensor. The sensor used is an MTS MH-Series mobile hydraulic in-cylinder sensor. Along with the sensor, the system includes a thin film transistor (TFT) liquid crystal display (LCD) that shows the position and reading measurements. The display allows the machine operator to use the touch-screen interface to change certain settings and to monitor the readings for maintenance and training purposes. An Arduino microcontroller was used to collect data and program and convert the current from the sensor into a readable voltage. The microcontroller was also used as the brain behind the work for most of the interfacing hardware. Equipment used involve digital multi-meters, a DC power supply, LEDs, and resistors for testing. This position-feedback sensor demo was presented at the ET Open House on April 28, 2017 at the Nissan Training Center in Smyrna, TN. The system can be used to train future users on how such position sensors are used in various industrial environments.



## New Lathes in Machining Lab

The Machining Lab in VET 108 has three new. The 14-inch Willis lathes replace the old (1960s) ones that have worn out over the decades of use. The new lathes have digital readouts in both inch and metric, to enable students to hold precise dimensions quickly and more consistently. These machines also feature, in addition to standard inch threads, metric threading capabilities. This feature was not possible on the older lathes.



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## Lightning's Arcade - Nostalgic Games and Much More

By Carter Yong & Christopher Winfrey, Computer Engineering Technology  
Faculty Advisor: Dr. Saleh M. Sbenaty

Our senior project was to build an All-In-One Arcade Cabinet. The main idea for the cabinet was to create something that everyone would enjoy playing and is intuitive to figure out. The cabinet features a wide array of consoles to play from the Super Nintendo Entertainment System, SNES, to the old 1970's arcade machines. The system also allows the user to add more games at their own leisure. We used a 10" LCD for the display, two 4-ohm Speakers for sound, and a Raspberry Pi 3 Model B to control the system. We used Suzo-Happ buttons and Sanwa Joysticks for the controls. The entire system is wired to run off a single power supply and provides several control and system configuration options through Wi-Fi. The cabinet was built from birch and pine plywood that was laser cut. The wood was primed and then several coats of MTSU royal blue paint were applied along with the MTSU decals.

About the authors: After graduation in August 2017, Carter begins a full-time position as a Controls



Design Engineer for Automation Nth in La Vergne, TN where he will do electrical design, installation, and debug of control systems and for providing automation solutions for companies around the world. While Chris will begin working towards his MSPS in Engineering Management. He was also offered a graduate assistantship that allows him to work with MTSU's Experimental Vehicles Program. This work would give him an opportunity to network with companies and to assist students by helping them manage their projects.



## Congratulations!

- Dallas Leitner has defended his master thesis and passed during July 2017!

Title: 4-Bit Cellular Automata Encryption Analysis

The thesis analyzed the rule space of 4-bit neighborhood binary cellular automata. It managed to unleash a large number of dynamically chaotic rules for the first time in the field of cellular automata in cryptography. An important result that will positively impact the design of strong encryption/decryption systems.

Thesis Committee:

Dr. Karim Salman, Chair

Dr. Walter Boles

Dr. Saleh Sbenaty

- Mechatronics student Christopher Secrest received a \$500 URECA grant to work on a human following and fall detection robot. His project also won the 2nd place award in the annual ET Student Expo.

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