

Development of a Virtual and Augmented Manufacturing Lab to enhance Advanced Manufacturing Education

The School of Engineering and Computer Science programs, including the Bachelor of Science in Construction and Civil Engineering Technology (BSET-CC), Electronics and Computer Engineering Technology (BSET-EC), Mechanical and Manufacturing Engineering Technology (BSET-MM), the Bachelor of Science in Technology Management (BSTM), and the Master of Science in Engineering and Technology Management (MSETM) have been accredited/re-accredited through November 2026. The primary purpose of the Association of Technology, Management and Applied Engineering (ATMAE) accreditation is to provide recognition of the attainment of certain professional goals and standards for Technology, Management, and Applied Engineering programs.

The ATMAE accreditation visiting team audited MSU programs in April 2020 and met virtually with advisory board members, alumni, employers, faculty, staff, the Dean, Provost, and MSU President Morgan. The team was also provided with a virtual tour of laboratories and classrooms and a virtual resource room. During the Board of Accreditation hearing on November 4, 2020 that was virtually conducted at the annual ATMAE conference, the board approved the visiting team's recommendation to accredit/reaccredit MSU programs (reaccreditation for ETCC, ETEC, ETMM, and MSETM and accreditation for BSTM) through November 2026.

The Computer Science program continues to focus on preparing graduates to design and implement solutions for new problems, to be ready to pursue 21st Century careers in the diverse fields of Computer Science, and to be able to pursue the study of Computer Science at the graduate level. The CS faculty have made major curriculum revisions and have added new tracks including Data Science and Computer Engineering. The revised CS program includes Cybersecurity, Computer Gaming, and Advanced Topics.

We are very excited that MSU's Bachelor of Science Degree in Systems Integration Engineering (BSSIE) is now available. The BSSIE, which has an ABET accreditable engineering CIP code (14.2701), integrates an appropriate blend of science, physics, and mathematics with hands-on design, mechanical, and electrical engineering content to prepare graduates who are capable of solving complex systems-based technological problems.

Graduates of the BSSIE program will be interdisciplinary professionals who focus on the functionality of an entire system.



COBT Dean John Nelson visiting the virtual and augmented reality lab for an overview of the research and development of industrial training scenarios.

They will be responsible for ensuring that the various components of the system are well integrated and function together with appropriate performance and security. The program will provide opportunities for the underserved people in Eastern Kentucky to receive a high quality STEM education, leading to well-paid and rewarding careers in industry. The upgraded education and training provided in the BSSIE program, in conjunction with the hands-on training available in the 21st Century Center for Manufacturing Systems will lead to even greater opportunities for our graduates who seek a higher-level engineering education.

Dr. Kouroush Jenab and Dr. Jorge Ortega-Moody's NSF-EPSCoR has resulted in major developments to our laboratories and programs. A team of faculty and staff, led by Dr. Jenab and Dr. Moody, including a postdoctoral researcher, graduate students, and undergraduate research fellows, has developed a virtual and augmented reality laboratory that will extend our potential to offer robotics and automation classes virtually during covid-19 and beyond. The 21st Century Center for Manufacturing Systems will provide training in Sustainable Advanced Manufacturing (SAM) and Industrial Controls that will support our new Systems Integrated Engineering program.

Sincerely,

Ahmad Zargari
Professor and Associate Dean
School of Engineering and Computer Science



The Association of
Technology,
Management, and
Applied Engineering

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Inside this issue...

Faculty Spotlight	p. 2
SECS News Spotlight	p. 3
Student Spotlight	p. 4
Advisory Board	p. 5

FACULTY spotlight



Cheng Cheng

Dr. Cheng's book chapter "AC Electrokinetics-enhanced Capacitive Virus Detection" (doi: 10.1007/978-1-4614-6623-9_40-1) is published in Professor Mohamad Sawan's book, *Handbook of Biochips: Integrated Circuits and Systems for Biology and Medicine*, New York, NY: Springer

(ISBN: 978-1-4614-6623-9). This book provides a broad survey of the field of biochips, including fundamentals of microelectronics and biomaterials interaction with various, living tissues, as well as numerous, diverse applications. Although a wide variety of biochips will be described, there will be a focus on those at the brain-machine interface. Analysis is included of the relationship between different categories of biochips and their interactions with the body and coverage includes wireless remote control of biochips and arrays of microelectrodes, based on new biomaterials.

Dr. Cheng's new manuscript "A Sensitive and Specific RNA Sensor for Point-of-Care Screening of Zika Virus from Serum" is recently submitted to *Sensors and Actuators B: Chemical* for peer review. Ms. Allie Skaggs from Dr. Cheng's group is making significant progress in her research funded by NSF EPSCoR and is close to her first journal publication.



Sherif Rashad

Dr. Sherif Rashad has a research paper co-authored with URF student, Suhana Ambol, on "Continuous Authentication of Smartphone Users Using Machine Learning" that was accepted for publication in the IEEE Xplore digital library. The paper was also presented at the IEEE

11th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (IEEE UEMCON 2020), October 28-31, 2020. The paper was presented by Suhana and she received Best Presenter Award from IEEE UEMCON 2020.

Dr. Rashad has a new research paper co-authored with the graduate student, Yevgeniy Byeloborodov, on "Design of Machine Learning Algorithms for Behavioral Prediction of Objects for Self-Driving Cars" that was accepted for publication as a full paper in IEEE Xplore digital library. The paper was also presented at the IEEE 11th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (IEEE UEMCON 2020), October 28-31, 2020.

Dr. Rashad was invited to chair two sessions at the IEEE 11th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (IEEE UEMCON 2020), October 28-31, 2020. The sessions were on topics related to Artificial Intelligence, Machine Learning, and Information Security.



Heba Elgazzar

Dr. Heba Elgazzar has a research paper co-authored with the URF student, Kyle Spurlock, on "Predicting COVID-19 Infection Groups Using Social Networks and Machine Learning Algorithms" that was accepted for publication in the IEEE Xplore digital library. The paper

was also presented at the IEEE 11th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (IEEE UEMCON 2020), October 28-31, 2020. She also has a research paper co-authored with the URF student, Tristan Jordan, on "Stock Market Prediction using Text-based Machine Learning" that has been published in IEEE Xplore digital library. The paper was also presented at the International IOT, Electronics and Mechatronics Conference (IEMTRONICS 2020), September 9-12, 2020.

Dr. Elgazzar has a new authored research paper on "Activity Recognition for Elderly using Machine Learning Algorithms", that was accepted for publication in *Advances in Artificial Intelligence and Applied Cognitive Computing*, Springer Nature-Research Book Series, *Transactions on Computational Science & Computational Intelligence*. The paper was also presented at the 22nd International Conference on Artificial Intelligence (ICAI'20), July 27-30, 2020. Heba has a new research paper co-authored with the URF student, Tristan Jordan, on "Content-Based Image Retrieval Using Deep Learning" that was accepted for publication in *Advances in Data Science and Information Engineering*, Springer Nature-Research Book Series, *Transactions on Computational Science & Computational Intelligence*. The paper was presented at the 19th International Conference on Information & Knowledge Engineering (IKE'20), July 27-30, 2020.

Dr. Elgazzar has received an internal research grant from Morehead State University for her research proposal entitled, "Design and Implementation of Network Science Algorithms for Social Networks," She has received a Unity License Grant for 30 licenses of Unity Pro 6.x, iOS Pro 6.x, Android Pro 6.x with an approximate value of \$54,000. The grant is awarded by Unity Technologies for use in courses and activities that include game design and development (from October 2020 to October 2021).

Dr. Elgazzar was invited to chair two sessions at the 11th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON 2020), November 4-7, 2020 on topics related to Machine Learning, Networking, and Security. She was invited to chair two sessions at the International IOT, Electronics and Mechatronics Conference, (IEMTRONICS 2020), September 9-12, 2020 on topics related to Data Science, IoT, and Information Theory.

Elgazzar to present paper on machine learning Buteyn named to ATMAE Board

Dr. Heba Elgazzar, assistant professor of computer science at MSU, will present a paper on machine learning at the 2020 International Internet of Things (IoT), Electronics and Mechatronics Conference later this month.

The paper, "Stock Market Prediction using Text-based Machine Learning," was co-authored by Elgazzar and recent MSU computer science graduate Tristan Jordan of Olive Hill. The research aims to design machine learning algorithms to predict changes in stock prices for an unidentified company. The algorithm will use forum posts of users with varying levels of involvement with the company of focus. The proposed algorithm to make these predictions will use a recurrent neural network (RNN) that will be able to analyze patterns in word use and order. It will place reactions to forum posts into a category based upon expected price movement over various lengths of time.

"I highly appreciate the encouragement and the support for my research activities from the college dean and the associate dean of the School of Engineering and Computer Science," Elgazzar said.

In addition to being presented at the conference, the paper will also be published in the Institute of Electrical and Electronics Engineers (IEEE) Xplore library.



Morehead State graduate student Thomas Buteyn of Somerset has been elected to serve as the student member of the board of directors for the Association of Technology, Management and Applied Engineering (ATMAE).

Buteyn is pursuing his Master of Science degree in Engineering and Technology Management and plans to graduate in December 2022. He was nominated for the board post by Dr. Ahmad Zargari, associate dean of the School of Engineering and Computer Science (SECS). He was elected by the vote of ATMAE members.



"I am honored to be voted into a role where I can be a voice for the students," Buteyn said. "I hope to gain valuable leadership experience and make lasting connections that I can call on in my future career."

ATMAE is a collegiate accrediting agency and a professional organization with more than 1,000 student and professional members. Buteyn will serve a one-year term on the organization's board, beginning in November. His responsibility will be to represent all student members of ATMAE and provide a student perspective on issues and changes the board is considering.

ATMAE Accreditation Visit is a Success

Five programs in the School of Engineering and Computer Science, including the Bachelor of Science in Construction and Civil Engineering Technology (BS-ETCC), Electronics and Computer Engineering Technology (BS-EETC), Mechanical and Manufacturing Engineering Technology (ETMM), the Bachelor of Science in Technology Management (BSTM), and the Master of Science in Engineering and Technology Management have been accredited/reaccredited through November 2026.

The primary purpose of the Association of Technology, Management, and Applied Engineering (ATMAE) accreditation is to provide recognition of the attainment of certain professional goals and standards for Technology, Management, and Applied Engineering programs.

"ATMAE accreditation provides us with a framework for self-evaluation and continuous program improvement to ensure that our graduates will have attained a recognized skill level and set of competencies required by industry," said Dr. Ahmad Zargari, Associate Dean of School of Engineering and Computer Science.

The ATMAE accreditation visiting team made a virtual visit to MSU in mid-April 2020 and met virtually with the advisory board members, alumni, employers, faculty, staff, the Dean, Provost, and MSU's President Morgan. The team was also provided with a virtual tour of ATMAE accredited programs, laboratories, and classrooms. The ATMAE Board of Accreditation approved the visiting team's recommendation to accredit/reaccredit MSU programs during the board hearing on November 4, 2020 that was conducted at the 2020 Annual ATMAE Conference that was held virtually from November 4 to November 6, 2020. As the result, the Board granted reaccreditation for ETCC, ETEC, ETMM, MSETM and initial accreditation for BSTM through November 2026.



STUDENT spotlight



Thomas Andrew Buteyn

Thomas Andrew Buteyn, from Somerset, KY, graduated from Morehead State University in 2020 with a bachelor's degree in Engineering Technology with a focus on Electronics and Computer Engineering Technology. He is pursuing an MSETM degree. Thomas is currently a graduate assistant doing

research with the KY NSF EPSCoR grant project under the guidance of Dr. Kouroush Jenab and Dr. Jorge Ortega Moody at MSU. He is also a teaching assistant where he instructs four undergraduate electronics lab sections. He was recently elected to the ATMAE Board Of Directors as a student representative. He also presented a poster for a project on the development of an Automated Indoor Aeroponics System at the annual ATMAE conference which was held virtually in November.



Ritesh Chakradhar

Ritesh Chakradhar, from Bode, Madhyapur Thimi, Bhaktapur, Nepal, is pursuing a Master of Science in Engineering and Technology Management. His research interest is in manufacturing and production along with the aid of technology. Ritesh's two years of work experience led to his

interest to pursue further study in Engineering and Technology Management. Ritesh is a Graduate Assistant working on the KY NSF EPSCoR grant project under the guidance of Dr. Kouroush Jenab and Dr. Jorge Ortega Moody. He is working on research to develop Industrial Welding Training using mixed reality.



Alejandra Figueroa Lopez

Alejandra Figueroa Lopez, pursuing her MSETM, is in her second semester and plans to graduate in Spring 2021. She's currently working on Machine Vision Systems to predict when a CNC machine needs maintenance by analyzing images and using tool wear control charts, in order to ensure product quality.



Saikrishna Reddy Kanumuru

Saikrishna Reddy Kanumuru is an MSETM student working toward a second master's degree. He received a BS in Electronics and Communication Engineering and an MS in Space Systems Engineering. He assisted the software team for the CXBN-2 satellite and is currently working on Machine

vision systems. He is assisting on the KY NSF EPSCoR grant project under the guidance of Dr. Jenab and Dr. Moody.



Andres Salinas-Hernandez

Andres Salinas-Hernandez, from Mexico, is a GA working on the KY NSF EPSCoR grant project under the guidance of Dr. Kouroush Jenab and Dr. Jorge Ortega Moody. He received a BS degree in Mechatronic Engineering from Technical Institute of Veracruz and

MS degree in Automation and Sustainability Engineering from Technical Institute of Queretaro. He also has eight years of work experience in hospital maintenance.

Andres is currently working on research and development of a virtual reality scenario with a flexible manufacturing process for automation training. His project includes integration of hardware, software, and machines into virtual reality scenarios that can be controlled using PLCs in the lab and the virtual environment.



Dara Singh

Dara Singh, a post-doctoral scholar working on the KY NSF EPSCoR grant project under the guidance of Dr. Kouroush Jenab and Dr. Jorge Ortega Moody, received his Bachelor of Science and Master of Science degrees in Mechanical Engineering from Sharif University of Technology in 2007 and 2011, respectively. His master thesis was in numerical simulation of solid-fluid interaction.

Dara received his PhD. degree in Mechanical Engineering from the University of Kentucky where he worked on numerical simulation of non-linear deformation of soft tissues. He has also worked as a piping stress engineer for various multinational oil and gas companies.



Victoria Russ

Victoria Russ, a senior studying Engineering Technology in the Mechanical and Manufacturing track, is an Undergraduate Research Fellow working on the KY NSF EPSCoR grant project under the guidance of Dr. Kouroush Jenab and Dr. Jorge Ortega Moody. She is

working on research and development of a virtual reality scenario for excavator training with a focus on teaching excavator operators to competently operate an excavator. Victoria's project includes the use of the Oculus Rift, Unity software, leap motion controller, and several electrical applications to achieve a game like feel.

ADVISORY BOARD **spotlight**

Abbott has head start in booming industry

When Andrew Abbott (14) earned his Bachelor of Science Degree in Engineering Technology (Design and Manufacturing) he was entering a field that analysts expect to thrive in Kentucky in the coming years.

Abbott was MSU's Student Government Association president in 2013-14. He was a member of Delta Tau Delta Fraternity and served as its president in 2012-13. He credits his time in leadership positions at MSU to his ability to lead a team in the professional world.

"I attribute a lot of my leadership qualities to those two organizations. Those organizations took me to places I'd never been, both physically and as an eager future leader," Abbott said.

Since April 2019, Abbott has worked as an engineering manager at Cooper Standard in Mt. Sterling and previously worked at Hitachi Automotive Systems in Berea as a production engineering senior manager. He said the knowledge and skills he gained at MSU have helped him in his career.

"I especially enjoyed the computer-aided drafting (CAD) instruction I received at MSU," Abbott said. "I started my career as a tooling design engineer, where this was a crucial part of my expectations. In my role now, I've found more value in the project management classes I took because of schedule attainment and resource management."

A recent report from the Kentucky Council on Postsecondary Education and the labor market analytics firm Emsi projects that engineering jobs are expected to increase by 11 percent over the next decade, creating approximately 3,000 jobs. Positions in manufacturing, engineering technology, industrial engineering and civil engineering will drive growth in the job market.

Morehead State offers a wide variety of engineering technology programs to allow students to shape their education to suit their specific interests. The School of Engineering and Computer Science (SECS) is offering a new bachelor's degree in systems integration engineering, as well as five new and revised programs in computer science (data science, cybersecurity, computer gaming, computer engineering and advanced topics). We also offer bachelor's and master's degrees in space systems engineering that put students on the cutting edge of aerospace technology.

One of the things Abbott said benefitted him most is the mentorship he received from faculty members in MSU's School of Engineering and Computer Science.

"I found that both (Dr.) Nilesh Joshi and Dr. (Ahmad) Zargari are more than willing to invest their time and experience in students. They played a large role in my education and I thank them for that," Abbott said.

FOR YOUR INFORMATION

Due to Covid-19 travel restrictions, the ATMAE visiting team conducted a virtual visit of our programs on April 19 - April 21, 2020 that resulted in successful accreditation/reaccreditation of ETM programs.

The Kentucky Council for Postsecondary Education (CPE) approved Morehead State University's Bachelor of Science Degree in Systems Integration Engineering (BSSIE).

The next SECS Advisory Board meeting will be held on March 26, 2021.



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Learn much more at www.moreheadstate.edu/secs