SECS INFORMER

SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

MOREHEAD STATE UNIVERSITY

Volume 23 Issue 1 October 2021

Collaboration with Industry to Enhance the Regional Economy

The SECS faculty prepare students with advanced skills in Computer Science, Mechanical and Manufacturing, Design, Simulation and Animation, Electronics and Computer, Civil Engineering and Construction Management, Robotics, Six Sigma, OSHA, and Fanuc Certification.

The 21st Century Center for Manufacturing Systems that was established through the generous matching grant of the James Graham Brown Foundation (JGBF) of Louisville and the Advisory Board companies has been further developed through the $500,000 NSF EPSCoR project "Advanced Manufacturing Partnership for Enhanced Robotics and Structure" (Dr. Kouroush Jenab, PI and Dr. Jorge Ortega-Moody, Co-PI). This project aims to enhance the faculty potential to teach cutting-edge technologies, provide workshops, and conduct applied research in order to aid technology transfer from the University to industries that will result in economic development in the region.

Major accomplishments have become possible with the Advisory Board's dedication of time and expertise as well as strong financial support for our programs. In November 2020, the Association of Technology, Management, and Applied Engineering accredited for the first time the online completer BSTM program, and reaccredited our Bachelor of Science in Engineering Technology with three specializations of Construction and Civil Engineering Technology, Electronics and Computer Engineering Technology, Mechanical & Manufacturing, and the Master of Science in Engineering and Technology Management (MSETM). The Department of Engineering and Technology Management has also began recruiting students for the Bachelor of Science degree in Systems Integration Engineering (BSSIE).

The Department of Computer Science and Electronics continues to recruit students for the new Computer Science concentrations in Data Science, Cybersecurity, and Computer Engineering. The revised CS curriculum strengthens the core requirements for all Computer Science students and introduces new courses in emerging fields to meet the recent changes and demands in the evolving fields of Computer Science.

The Computer Science faculty continues to focus on preparing graduates for the 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.

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

Inside this issue...

ATMAE The Association of Technology, Management, and Applied Engineering
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FACULTY spotlight

Cheng Cheng

Dr. Cheng's paper "A Sensitive and Specific Genomic RNA Sensor for Point-of-Care Screening of Zika Virus from Serum" is published on Analytical Chemistry

Dr. Cheng has also submitted another manuscript "Optimization of ACEK-enhanced, PCB-based biosensor for highly sensitive and rapid detection of bisphenol A in low resource settings" to Biosensors and Bioelectronics for peer review. Dr. Cheng's team welcomes Mr. Jacob Vogelpohl as a new URF and Mr. Zhensen Wang as a new graduate student.

Mohamed Abdelrahman

Mohamed Abdelrahman joined MSU in Fall 2021 as a visiting assistant professor of Engineering Technology in the Construction Management and Civil Engineering Technology option in the School of Engineering and Computer Science.

Dr. Abdelrahman received his BS degree in Civil Engineering, He was awarded two Fellowship for graduate study and received MS and PhD degrees in Civil Engineering from the University of Colorado at Boulder.

His research interests include computational modeling and experimental studies on durability of cementitious materials. He specifically focuses on developing multiscale and multiphase computational model to evaluate the transport properties in concrete considering the effect of aging and the time-dependence of concrete. His research has been sponsored by US Department of Energy.

Prior to joining MSU, he worked as a postdoctoral fellow at University of Colorado at Boulder. He also worked as lecturer at Omar Al-mikhtar University. Abdelrahman has over ten years of working experience in the engineering field.

Heba Elgazzar

Dr. Heba Elgazzar has a new journal paper co-authored with the URF students, Kyle Spurlock and Tanner Bogart, on "Evolutionary Clustering and Community Detection Algorithms for Social Media Health Surveillance," that was accepted for publication in the Machine Learning with Applications Journal published by Elsevier, Volume 6, December 2021, and it has been available online in June 2021.

The software source code in the recent journal article has been also certified as Reproducible by Code Ocean (https://codeocean.com/). It received the Reproducibility Badge and it was cited as: Heba Elgazzar, Kyle Spurlock, Tanner Bogart (2021) Evolutionary DBSCAN And Louvain Method For Dynamic Community Discovery In Health-Related Social Network Data.

Dr. Heba Elgazzar has co-authored a journal paper with Dr. Sahar Ghanem entitled "Predicting the Behavior of Reinforced Concrete Columns Confined by Fiber Reinforced Polymers using Data Mining Techniques," that was published in Springer Nature Applied Sciences (SN Applied Sciences) 3, (2021).

Dr. Heba Elgazzar has received an instructional mini-grant from Morehead State University in a collaboration with Dr. Sherif Rashad. The grant was used to purchase new workstations to support a wide spectrum of applications in several areas such as machine learning, data science, data mining, and artificial intelligence.

Dr. Elgazzar was invited to serve as a Session Chair and as a Member of the Technical Program Committee of the 12th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON 2021), October 27-30, 2021.

Dr. Elgazzar's research paper on "Activity Recognition for Elderly using Machine Learning Algorithms" was published recently in October 2021 in Advances in Artificial Intelligence and Applied Cognitive Computing, Transactions on Computational Science & Computational Intelligence (published by Springer) which features full papers presented at the 22nd International Conference on Artificial Intelligence (ICAI'20).

SECS NEWS spotlight

MSU RECOGNIZES DR. NILESH JOSHI WITH DISTINGUISHED TEACHER AWARD

The faculty of Morehead State University have announced the recipients of the 2021 Distinguished Service Awards. These awards recognize faculty and staff for their service to the campus community and their fields of study. Dr. Nilesh Joshi, professor of engineering and technology management, was presented with the Distinguished Teacher Award.

Joshi earned a bachelor's degree in mechanical engineering from the Visvesvaraya National Institute of Technology in Nagpur, India, in 2000. He later earned Master of Engineering and Master in Business Administration degrees from the University of New Mexico in 2004. Joshi earned a Ph.D. in Systems Engineering from the University of Virginia in 2007. He worked as an associate advisor at KPMG International in their information risk advisory group in Richmond, Virginia, and as a manufacturing engineer in Bajaj Auto Ltd. in India.

Joshi began teaching in the Department of Engineering and Technology Management at MSU in January 2009 and has been a full professor since 2020. Over the years, he has helped lead the development several new program/course proposals, including the new Bachelor of Science in Systems Integration Engineering program. The BSSIE was launched in Fall 2020 after seeking approval from the Council on Postsecondary Education.

Dr. Joshi's research activities enhance his teaching for student success. To provide MSU students hands-on learning opportunities in cutting-edge technologies, he helped the ETM Department establish MSU's 21st Century Center for Manufacturing Systems with the help of a significant grant from the James Graham Brown Foundation of Louisville.

In the past, Joshi conducted technical training workshops for various companies in MSU's service region, including Mitsubishi Electric, Kyosan Denso Manufacturing Kentucky (KDMK), Boyd Fabrication, the 3M Company, Summit Polymers, Morehead Utility Plant Board and SRG Global, among others.

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MSU ENGINGEERING PROGRAMS RANKED AMONG BEST IN SOUTHEAST BY TRADECOLLEGE.ORG

Morehead State's engineering programs have been ranked among the top programs in the Southeastern U.S. by TradeCollege.org.

Engineering programs at MSU were ranked second for best value schools in the Southeast region and best value bachelor's degree programs in the Southeast region.

Morehead State offers bachelor's degree programs in engineering management, engineering technology and systems integration engineering. MSU also offers physics degrees with areas of concentration in electrical and mechanical physics. All the programs offer hands-on learning opportunities that prepare students for career success.

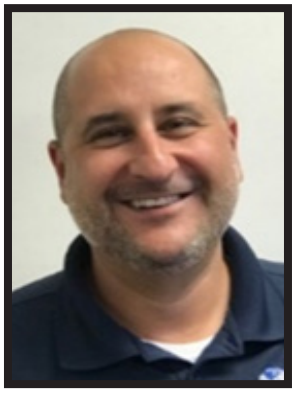
"The combination of theoretical engineering with a hands-on laboratory experience make Engineering Technology graduates very marketable in a number of areas that are in high demand in the region and beyond. Most ETM students have a high-tech, high-pay job upon graduation or within a few months after graduation, and many have accepted positions before graduation," said Dr. Ahmad Zargari, associate dean of MSU's School of Engineering and Computer Science. "

TradeCollege.org is a free resource for students seeking a career in the trades. Trade College's Best Value Rankings were designed to help students find high-quality and affordable trade colleges to pursue the trade career they are most interested in. Both quality and affordability are factors in the ranking.

View the complete list of rankings at www.tradecollege.org.

ADVISORY BOARD spotlight

Steve Defazio - Advisory Board Chair



Steve joined North American Stamping Group in January 2018 and is currently the Vice President of Operations. Steve's responsibility includes strategic and tactical oversight of 10 manufacturing divisions generating $450M in revenue.

Steve started his career as a Process\Electrical Engineer gaining knowledge in automation and error proofing technology. Steve's passion for data analytics steered him into quality engineering where he spent time as a QE and in quality management.

After being introduced to the Toyota Production System in 1998, Steve was convinced there was a more efficient way to manufacture product with quality at the center. Steve's unwavering commitment to this ideology allowed him the opportunity to be promoted to Business Unit Manager where he spent several years with Cooper Standard Automotive. Steve continued his discipline in learning the Toyota Production System and felt compelled to take the Manufacturing Manager's position with Kyosan DENSO Manufacturing (a JV between, Kyosan Denki and Denso) in 2008. For the next 2 years Steve spent time in Japan learning the Monozukri DNA of TPS. In 2010 Steve was promoted to SR. Manager of Operations where he led Operations and Engineering functions. In 2012 Steve was promoted to Vice President responsible for Kyosan Denso North America and FDM growth in North and South America. Prior to joining NASG, Steve was Executive Vice President for Takumi Stamping located in Fairfield, OH. Steve had operations responsibility for Takumi's three plants in North America.

Steve recently received his Executive Leader Certificate from Ivey Business School at Western Ontario University in 2019 by successfully completing the Executive leadership program combined with studies in Financial Business Planning and Strategic Negotiations. Steve is also a two-time graduate of Morehead State University earning his Bachelors in 1996 and Masters of Science in 2001. He is also an ASQ Certified Quality Engineer (CQE) – 2001, and a Certified Design for Six Sigma Black Belt – 2005. In 2009, Steve was recognized by his Peers in Japan as a Denso Advanced level three TPS Trainer.

In 2013 Steve received the ATMAE Industry Innovation Award at its National Conference in New Orleans, LA. It was awarded due to his demonstrated leadership to minimize losses while contributing to productivity enhancement through process improvement founded on TPS principles. Steve was the 2016 Morehead State University College of Business and Engineering Outstanding Alumni recipient due to his ongoing professional growth and achievements in industry. Steve has been a keynote speaker at many industry conferences speaking on topics such as 6 sigma, waste reduction utilizing TPS, & Applied Management.

Josh Bradley

Josh Bradley is a 2012 Honors graduate of Morehead State University (MSU), where he earned a B.S. in Computer Science and Mathematics. While at MSU, Josh was named the first Barry M. Goldwater scholar in school history. He later received an M.S. in Computer Science from the University of Maryland, College Park, where he studied applications of machine learning (ML) in the Bioinformatics field.

In 2016, Josh began his career as a Data Scientist for the United States Department of Defense (DoD). At the DoD, he developed/applied novel ML techniques over big data to discover patterns and enable analysts to make data-driven decisions with actionable intelligence. Other job activities include the research and development of state-of-the-art face detection/recognition models, being an active contributor to multiple open-source software projects in the computer vision community, and teaching junior data scientists how to apply their work at enterprise scale. His work is currently used throughout the DoD in support of the warfighter and cyber defense operations.

In 2021, Josh became a Senior Data Scientist at Microsoft with the mission to "Empower every person and every organization on the planet to achieve more." He continues to pursue research interests in the field of deep learning (specifically computer vision and natural language processing). Daily responsibilities cover all aspects of building deep learning-enabled solutions for government customers to solve mission-critical problems. This includes problem definition; data acquisition and exploration analysis; architectural design; training, testing, and evaluating deep learning models; and production deployment on Azure, Microsoft's premier cloud platform.

SECS NEWS spotlight

COMPUTER SCIENCE STUDENTS RESEARCH MACHINE LEARNING

Students in Morehead State's computer science programs have the opportunity to conduct groundbreaking research alongside experienced faculty members, and two such students are currently researching the real-world applications of machine learning.

Suhana Ambol, a junior from Madhya Pradesh, India, who is double majoring in computer science and mathematics, began her research as a freshman through MSU's Undergraduate Research Fellowship Program. Along with her faculty mentor, Professor of Computer Science Dr. Sherif Rashad, Ambol has been researching continuous authentication of smartphone users using machine learning using a dataset of smartphone users' behaviors. Rashad and Ambol applied various supervised machine learning classifiers to authenticate users based on their smartphone activities. They are currently working on research to detect malware on smartphones using neural networks. Ambol presented her work at the Institute of Electrical and Electronics Engineers (IEEE) annual conference, which was held virtually.

Ambol said the work she's doing with Rashad interests her because of its usefulness and how it can be applied to help people.

"It always amazes me how the evolution of technology has provided immense opportunities to society," she said. "As an instance, artificial intelligence is widely used in the commercial sector providing personalized recommendations to online users based on their previous product search or online behavior.

Ambol also works under the mentorship of Dr. Heba Elgazzar, assistant professor of computer science. She said working with Elgazzar and Rashad has been a rewarding learning experience.

"Dr. Rashad is an incredible mentor. He has been a great motivation and guidance. I have learned a lot working under him. In my freshman year, all these topics were very new to me, but Dr. Rashad made sure that I understood the concepts well and move ahead in the right direction," Ambol said. "Dr. Elgazzar is our faculty advisor for Association of Computing Machinery (ACM) and it's a great experience to work under her guidance and learn from her. Both of them are always eager to help the students and dedicated towards their success."

Senior general computer science major Kyle Spurlock from Ashland has also been conducting undergraduate research with Elgazzar and presented his work at the IEEE conference. He and Elgazzar use unsupervised machine learning techniques to find inferences about data that previously shows no obvious classification or correlation. They are using clustering, defined as grouping similar samples to detect communities, and centrality, which is used to find the most interconnected or most important individuals within a population to analyze the data. Spurlock said the idea was to highlight potential connections between what is said on social media and use it as a supplementary health surveillance system for COVID-19.

"Current health surveillance techniques are very poor in terms of overall ability to accurately report on disease presence, and this is especially true of countries with poor health infrastructure," Spurlock said. "While the COVID-19 focused element of the research was mostly just a sign of the times, it is interesting to see what progress can be made in various subjects just by applying algorithms to a different context."

Like Ambol, Spurlock said the support he's received from his professors has pushed him to reach his full potential.

"The support and attention of the professors in my program has been what has made MSU for me. I am very grateful to them for all they have done for me and been able to share with me, of which I feel has definitely given me a better understanding and appreciation for my study."

SECS NEWS spotlight

Kentucky Advanced Manufacturing Partnership for Enhanced Robotics and Structures Update

Kentucky NSF EPSCoR awarded Kentucky Advanced Manufacturing Partnership for Enhanced Robotics and Structures (KAMPERS) Research which is conducted by several academic institutes (UK, UofL, MSU, WKU, EKU) to develop global excellence in next-generation flexible electronics, robotics, and manufacturing technologies. The mission is to advance the state-of-the-art in advanced manufacturing through the integration of synthetic biology, 3D printing, and the emerging field of printed electronics to revolutionize the capabilities of robotic manufacturing infrastructure, medical assistive robots, prosthetics, and consumer products. At MSU, this research grant will enhance 21st Century Center for Manufacturing Systems to teach cutting-edge technologies, and conduct applied research in science, technology, engineering, and mathematics (STEM), and aid technology transfer from the University to industries that will result in economic development in the region.

In 3rd year of the project, the MSU Research Team (Dr. Jenab (PI), Dr. Ortega-Moody (Co-PI), a Research Associate, two graduate students and two undergraduate students) nested in "21st Century Center for Manufacturing Systems" at MSU, work on the following areas:

1. Develop the industrial control lab for condition-based maintenance (CBM)
2. Develop training modules/ workshops for the manufacturing technician workforce.
3. Mentor the research team (postdoc/research Associate and students) to develop maintenance algorithms.
5. Attend national and international conferences (ATMAE 2021, Orlando, FL) to disseminate research outcomes and stay up-to-date on the current state of technologies
6. Organize, coordinate, and develop training materials for training workshops.

STUDENT spotlight

Latakusum Pokharel

Latakusum Pokharel, an MSETM graduate student from Nepal, completed an undergraduate degree in applied physics due to her enthusiasm for technology and physics since childhood. In her undergraduate program, Latakusum completed projects on the applications of atmospheric plasma for industrial purpose. She plans to continue projects with real world applications during her graduate studies. She was the recipient of a grant to attend a conference in Singapore to present her paper in plasma physics but wasn't able to attend because of Covid-19. Along with her studies, Latakusum is also a resident counsellor for the Craft Academy.

Although she is away from her home country for the first time, Kentucky has the vibe of Nepal and she finds the people here to be very kindhearted and friendly. She likes to listen music and write stories, as she has published eight novels to an online platform loved by thousands of readers.

Andres Salinas-Hernandez

Andres Salinas-Hernandez, from Mexico, is a Research Associate in the Department of Engineering and Technology Management as part of the Kentucky NSF Experimental Program to Stimulate Competitive Research (EPSCoR)..

Andres received a Bachelor of Science degree in Mechatronic Engineering from the Technical Institute of Veracruz and a Master's degree in Automation and Sustainability Engineering from the Technical Institute of Queretaro. Before coming to MSU to complete the MSETM, Andres worked for 8 years in hospital maintenance.

His current project is the development of a virtual reality scenario with a flexible manufacturing process for automation training, with current focus on predictive maintenance based on Bayesian methods and Implementation of Dynamic Systems and PID control.

STUDENT spotlight

Thomas Buteyn

Morehead State graduate student Thomas Buteyn of Somerset just finished serving as the student member of the board of directors for the ATMAE. Buteyn is pursuing his Master of Science degree in Engineering and Technology Management and plans to graduate in May of 2022. As a GA, he assists in teaching multiple lab sections for Dr. Grise and Dr. Moody. Buteyn is working to create a glove that will track finger position and hand movement in VR training scenarios.

Buteyn is the founder of Buteyn Technology, a robotics consulting firm contracted by Arugga AI Farming out of Isriel. Buteyn has been working in AppHarvest's facility in Morehead on a pollination robot to assist in the growing of tomatoes. He hopes to find a job in the automation industry after graduation.

Alejandra Figueroa Lopez

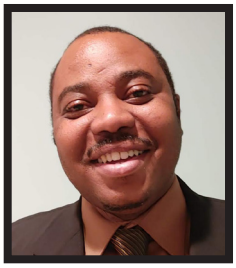
Alejandra Figueroa Lopez is in the last semester of her MSETM degree with plans to graduate in Fall 2021. Alejandra is currently working on her thesis named "A Vision-based Quality Control Model for Manufacturing Systems", with a purpose to design a model that makes use of quality methods within a vision control system to inspect different features of test products and collect the resulting data from elaborating a moving average chart.

After analyzing the data, the consequent prognosis and diagnosis can be used to determine when a production machine will require tool replacement in order to avoid having defective products to reduce economic losses such as raw material and production shutdown.

Anish Raut

Anish Raut, an international GA student from Nepal, completed his undergraduate degree in Applied Physics. He is currently enrolled in Engineering Technology Management at Morehead State University due to its wide application and a deep interest in engineering and manufacturing. He is currently working on a research paper on Virtual and Augmented reality. His goal is to work with machines and robotics in the future.

Lawrence Fraction



Lawrence Fraction is a graduate of Morehead State University with a Bachelors in Computer Science with a minor in Business. Continuing his education as Graduate student with the Department Of Engineering and Technology Management (DETM) he is now applying his degree to the engineering side of technology.

As a GA, Lawrence is assisting with seven labs for Dr. Cheng, Dr. Moody, Dr. Joshi, and Mr. Mason. Lawrence is using engineering and computer science to study how to make waste collection for cities more efficient, by denoting when a waste receptacle is full and signaling for pickup.

Ritesh Chakradhar

Ritesh Chakradhar, from Nepal, graduated with a bachelor's degree in Mechanical Engineering in 2017. An MSETM student, he is working as a GA under Dr. Jorge Alberto Ortega-Moody and Dr. Kouroush Jenab on the KY NSF EPSCoR grant. He is researching how to employ virtual reality to train a user to do welding procedures without the need for expensive training. The study will improve safety and hands-on performance. With the help of various technology and software, the goal of adopting virtual reality is to increase confidence and a greater understanding of welding. In 2021, he presented a poster for SUPER COLLIDER 2021 organized by KY NSF EPSCoR and was ranked in top 3. His poster presentation was titled "Improving the quality of welding training via virtual reality".

Tyler Ward

Tyler Ward, from Flatwoods, KY, is a first-year graduate student at Morehead State University in the MSETM program with a concentration in Information Systems and Analytics. He graduated from MSU in spring 2021 with a Bachelor's degree in Computer Science.

His duties as a GA currently include assisting CSE faculty with grading homework assignments, quizzes, and exams, as well as conducting laboratory sessions and tutoring students. He also works one on one with undergraduate students assisting them in topics such as object-oriented programming, data structures, networking, and programming theory.

Learn much more at **www.moreheadstate.edu/seis**

FOR YOUR INFORMATION

The 2021 annual ATMAE conference will be held at the Doubletree by Hilton in Orlando, FL November 3-5, 2019.

The Department of Engineering and Technology Management will host the annual EKTSA Eastern Regional Competition on Friday, March 4, 2020.

The Spring 2022 SECS Advisory Board meeting will be March 25.

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

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