Collaborating for a Stronger Future

2023 Annual Conference
October 25-27 • Atlanta, Georgia

atmae.org #ATMAEconference
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Dear Members, Colleagues, and Friends of The Association of Technology, Management, and Applied Engineering,

Welcome to Atlanta, Georgia, as we embark on a theme of **Collaborating for a Stronger Future** in moving ATMAE forward as a self-managed organization providing service to members, academic institutions, and industry partners. The Annual ATMAE Conference provides an excellent opportunity for members, scholars, students, and members of industry to explore potential research and educational partnerships.

With a theme of **Collaborating for a Stronger Future**, it is intended that ATMAE’s Accredited Institutions work together to ensure continued greater recognition of its Accreditation Program and the opportunity for research and engagement among colleagues.

The Accreditation hearings are on Wednesday, followed by the Accreditation training workshops for visiting team members and chairs. You can become an accreditation team member and visit one or more of the national or international institutions with ATMAE-accredited programs. You are encouraged to take part in the training sessions.

I also invite you to participate in the ATMAE’s parallel technical sessions and poster presentations, on Thursday and Friday to learn about the research carried out by ATMAE members.

On Wednesday evening, we are bringing back the Networking Reception to allow members, colleagues, and associates to visit and enjoy a relaxing time.

The Student Robotics Competition promises to be an exciting event, as several university teams’ robots compete for the Outstanding Team Award. Poster review and judging will take place on Thursday. Be sure to visit our sponsors and exhibitors’ booths to learn of new programs, books, software, equipment, and processes being displayed.

On Thursday evening you are invited to attend the Awards Banquet to congratulate awardees and hear Keynote Speaker Dr. Michael Filler, Associate Director for Research Programs, Institute for Electronics and Nanotechnology at Georgia Tech University, speak about **Collaboration** opportunities related to the Chips Act 2022.

On Friday morning, please join us at the Breakfast Business Meeting, where we will welcome new Board Members, learn of the Board of Directors’ initiatives, get an update from our Independent Boards, and learn of ATMAE’s financial status.

Following the Business Meeting, National Industry Advisory Council (NIAC) will offer a Student Career Panel and mock interviews to allow students and young professionals to learn about the interview process and securing employment.

Lastly, the Board of Directors wishes to express its gratitude to our academic institutions, sponsors, and exhibitors for their support of this conference.

In addition, be sure to find time to explore the culture, sites, and food of the City of Atlanta during this visit and plan your next trip for business or vacation.

Dr. Fred Barez
Chair, 2022-2023 ATMAE Board of Directors
THURSDAY, October 26 | 6:00pm
Capital Ballroom

From Classroom to Cleanroom: Preparing the Workforce for Microelectronics Mastery

Michael A. Filler, Ph.D.

Dr. Michael A. Filler is a Full Professor and the Traylor Faculty Fellow in the School of Chemical & Biomolecular Engineering at Georgia Tech. His research focuses on the synthesis, understanding, and scalable manufacturing of semiconductor nanowire materials and devices to enable “hyper-scalable” electronic systems.

He holds a courtesy appointment in the School of Materials Science and Engineering, Dr. Filler is also the Interim Executive Director of the Institute for Electronics and Nanotechnology (IEN). Prior to joining the faculty at Georgia Tech, Dr. Filler earned a B.S. and Ph.D. in chemical engineering from Cornell University and Stanford University, respectively, and completed postdoctoral studies at the California Institute of Technology.

Dr. Filler has been recognized for his research and teaching with the National Science Foundation CAREER Award, Georgia Tech Sigma Xi Young Faculty Award, and as a Camille and Henry Dreyfus Foundation Environmental Chemistry Mentor.

Michael.filler@chbe.gatech.edu    (404) 894-0430
## SCHEDULE AT A GLANCE

### WEDNESDAY, October 25, 2023

<table>
<thead>
<tr>
<th>TIME</th>
<th>ROOM</th>
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<tbody>
<tr>
<td>7:00am-5:30pm</td>
<td>Georgia Registration</td>
<td>Registration Open</td>
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<tr>
<td>7:00am-2:00pm</td>
<td>Georgia 13</td>
<td>Board of Accreditation Hearings</td>
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<tr>
<td>8:00am-10:00am</td>
<td>Georgia Prefunction</td>
<td>Exhibit Check-in and Set-Up</td>
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<tr>
<td>10:00am-6:30pm</td>
<td>Georgia Prefunction</td>
<td>Exhibits Open</td>
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<tr>
<td>10:00am-12:00pm</td>
<td>Georgia 3</td>
<td>Complimentary Workshop: “Leveraging Jupyter Notebooks and Github for Enhanced STEM Content Creation and Learning Activities” Dr. Hector Will, Oakland City University</td>
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<tr>
<td>10:00am-12:00pm</td>
<td>Capital Ballroom 5</td>
<td>Student Division Robot Team Check-in</td>
</tr>
<tr>
<td>10:30am-12:00pm</td>
<td>Georgia 2</td>
<td>Complimentary Workshop: “Four Pillars of Manufacturing Revision” Moderator: Ms. Suzy Marzano, SME Speakers: Dr. John Irwin, Michigan Technical University and Dr. Neil Littell, Ohio University</td>
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<tr>
<td>12:00pm-2:00pm</td>
<td>Capital Ballroom 5</td>
<td>Student Division Robot Team Prep</td>
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<tr>
<td>12:30pm-2:00pm</td>
<td>Georgia 2</td>
<td>Complimentary Workshop: “Getting Your Research Published in the JTMAE” Dr. Gretchen Mosher, Iowa State University</td>
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<td>2:00pm-2:30pm</td>
<td>Capital Ballroom</td>
<td>Networking and Refreshment Break</td>
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<tr>
<td>2:30pm-3:30pm</td>
<td>Georgia 10</td>
<td>Student Division Opening Meeting</td>
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<tr>
<td>2:30pm-3:30pm</td>
<td>Georgia 2</td>
<td>JTMAE Board Meeting</td>
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<td>2:30pm-3:30pm</td>
<td>Georgia 4</td>
<td>Foundation Board Meeting</td>
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<td>2:30pm-3:30pm</td>
<td>Georgia 5</td>
<td>Certification Board Meeting</td>
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<tr>
<td>2:30pm-3:30pm</td>
<td>Georgia 3</td>
<td>Complimentary Workshop: “Best Practices from Epsilon Pi Tau (EPT)” Dr. Steve Freeman, EPT</td>
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<tr>
<td>2:30pm-4:30pm</td>
<td>Georgia 12</td>
<td>Accreditation Self-Study Report Training Workshop (For those interested in learning what is necessary to prepare a self-study report)</td>
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<tr>
<td>4:00pm-5:30pm</td>
<td>Georgia 2</td>
<td>Board of Directors Meeting</td>
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<tr>
<td>4:00pm-6:00pm</td>
<td>Capital Ballroom 5</td>
<td>Student Division Robotics Viewing and Judging</td>
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<tr>
<td>5:30pm-6:30pm</td>
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<td>Opening Reception</td>
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<tr>
<td>6:30pm-8:00pm</td>
<td>Georgia 11</td>
<td>Epsilon Pi Tau Reception and Initiation</td>
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<td>6:30pm</td>
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<td>Dinner on Your Own</td>
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<tr>
<td>7:00pm</td>
<td>Hotel Lobby</td>
<td>Student Division Night Out</td>
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Accreditation Track  |  Student Track
## SCHEDULE AT A GLANCE

### THURSDAY, October 26, 2023

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<tr>
<th>TIME</th>
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<tr>
<td>7:00am-5:30pm</td>
<td>Georgia Registration</td>
<td>Registration Open</td>
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<tr>
<td>7:00am-8:30am</td>
<td>Capital Ballroom</td>
<td>Breakfast</td>
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<tr>
<td>7:00am-9:00am</td>
<td>Georgia 13</td>
<td>Board of Accreditation Business Meeting (Open to All)</td>
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<tr>
<td>8:00am-5:00pm</td>
<td>Georgia Prefunction</td>
<td>Exhibits Open</td>
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<tr>
<td>8:30am-2:30pm</td>
<td>Georgia 11</td>
<td>Poster Session Viewing</td>
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<tr>
<td>9:00am-10:00am</td>
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<td>Breakout Session #1 - Oral Presentations</td>
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<tr>
<td>9:30am-11:30am</td>
<td>Georgia 13</td>
<td>Accreditation Standards &amp; Policies Committee Meeting (Open to All)</td>
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<tr>
<td>10:00am-10:30am</td>
<td>Capital Ballroom</td>
<td>Networking and Refreshment Break</td>
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<tr>
<td>10:00am-10:30am</td>
<td>Georgia 11</td>
<td>Poster Judging Session #1</td>
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<tr>
<td>10:30am-11:30am</td>
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<td>Breakout Session #2 - Oral Presentations</td>
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<tr>
<td>11:30am-1:00pm</td>
<td>Capital Ballroom</td>
<td>Lunch Break</td>
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<tr>
<td>12:00pm-2:00pm</td>
<td>Capital Ballroom 5</td>
<td>Student Division Robotics Competition sponsored by SME</td>
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<tr>
<td>1:30pm-3:00pm</td>
<td>Georgia 12</td>
<td>Accreditation Visiting Team Member Training Workshop</td>
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<td>(For those interested in becoming a visiting team member or renewing a training requirement)</td>
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<tr>
<td>1:30pm-3:00pm</td>
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<td>Breakout Session #3 - Oral Presentations</td>
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<tr>
<td>3:00pm-3:30pm</td>
<td>Georgia 11</td>
<td>Poster Judging Session #2</td>
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<tr>
<td>3:00pm-3:30pm</td>
<td></td>
<td>Networking and Refreshment Break</td>
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<tr>
<td>3:30pm-5:00pm</td>
<td>Georgia 10</td>
<td>Haig Vahradian Student IT/IQ Challenge</td>
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<tr>
<td>3:30pm-5:30pm</td>
<td>Georgia 12</td>
<td>Accreditation Visiting Team Chair Training Workshop</td>
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<td>(For those interested in becoming a visiting team chair or renewing a training requirement)</td>
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<tr>
<td>3:30pm-5:30pm</td>
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<td>Breakout Session #4 - Oral Presentations</td>
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<tr>
<td>6:00pm-9:30pm</td>
<td>Capital Ballroom</td>
<td>Awards Banquet and Keynote Speaker</td>
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<td>“From Classroom to Cleanroom: Preparing the Workforce for Microelectronics Mastery”</td>
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<td></td>
<td>Keynote Speaker: Dr. Michael Filler, Interim Executive Director, Institute for Electronics &amp; Nanotechnology Professor &amp; Traylor Faculty Fellow, School of Chemical &amp; Biomolecular Engineering Director, The Filler Lab at Georgia Tech</td>
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### FRIDAY, October 27, 2023

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<tr>
<th>TIME</th>
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<tr>
<td>7:30am-9:30am</td>
<td>Capital Ballroom</td>
<td>ATMAE Breakfast and Business Meeting</td>
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<tr>
<td>9:30am-11:00am</td>
<td></td>
<td>Breakout Session #5 - Oral Presentations</td>
</tr>
<tr>
<td>9:30am-11:00am</td>
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<td>Division Meetings</td>
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<tr>
<td>10:00am-11:00am</td>
<td>Georgia 10</td>
<td>Student Division Career Panel</td>
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<tr>
<td>11:00am</td>
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<td>Hotel checkout by 11 am</td>
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<tr>
<td>11:00am-12:00pm</td>
<td>Georgia 10</td>
<td>Student Division Mock Interviews</td>
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| 9:00am| Google Map: The ‘unseen’ that controls the seen  
Mr. Muritala Ayinla Hassan,  
School of Industrial Science and Technology, University of Central Missouri | Challenges with Prefabrication in the Mechanical, Electrical and Plumbing (MEP) Scopes in Construction Projects  
Dr. Sherif Attallah,  
Ball State University | 3D Printing with Pelletized Feedstock  
Dr. Mehmet Bahadir,  
Southeastern Louisiana University | Developing an effective technical presentation course for student needs  
Dr. Scott Abney,  
East Carolina University |
| 9:30am| Building Collapse: Avoidable yet endless tragedies in Nigeria  
Mr. Muritala Ayinla Hassan,  
School of Industrial Science and Technology, University of Central Missouri | Community Partnership to build Net-Zero House  
Dr. Sherif Attallah,  
Ball State University | What managers define to enhance the adoption of automation for the future of manufacturing  
Remon Benjamin,  
Iowa State University | Developing a Mentorship Program to Connect Students with Alumni and Industry: A Framework for Promoting Career Development and Networking  
Dr Mahmood Al-Odeh,  
Eastern Illinois University |
| 10:30am| Protection of Jamming Attack on Vehicular Network  
Dr. Biju Bajracharya,  
East Tennessee State University | Matter: The Next Generation Smart Home Standard  
Dr. Rendong Bai,  
Eastern Kentucky University | The Importance of Evaluating Alternative Project Costs for ATMAE Accredited Graduates  
Dr. Dennis Jones, The University of Texas at Tyler | Estimating Inventory Impacts after Catastrophes: Comparative Evaluation of Methods  
Dr. Nilesh Joshi, Morehead State University |
| 11:00am| Optimizing Charging Station Selection and Reducing Wait Times  
Dr. Biju Bajracharya,  
East Tennessee State University | Can AI Replace College Teachers - The Challenge of ChatGPT  
Dr Rendong Bai,  
Eastern Kentucky University | Evaluating Student’s Growth for Product Scoping through a Design-to-Build Curriculum  
Mr. Chad Dolphin, Iowa State University | Engaging Students through Active Learning in a Gaming Course  
Dr. Devang Mehta,  
North Carolina A&T State University |
| 1:30pm| The Genie is Out of the Bottle: AI-Aided Industrial Automation, Creative Expression, and the Second Enlightenment  
Odin Blevins, Eastern Kentucky University | The capstone experience: A hub, both for launching professional careers and recruiting students  
Dr. Justin Dodd,  
Eastern Kentucky University | Continuous Improvement in Manufacturing for Optimizing post-COVID Operations  
Dr. Susan Ely, University of Southern Indiana | How to deploy the simple power of statistics along with Lean principles to achieve operational and process excellence  
Dr. Merwan Mehta,  
East Carolina University |
| 2:00pm| Self-driving Vehicle with Ackermann Steering Mechanism Using a Hobby RC Car and ROS2  
Dr. Wutthigrai Boonsuk,  
Eastern Illinois University | An investigation on the performance of Chat GPT in supporting green building research  
Dr. Mohsen Goodarzi,  
Ball State University | Feasibility Threshold for Finite Element Analysis Modeling of Ductile Cast Iron Mold Designs  
Mr. Donald Mapes,  
Tarleton State University | Leadership Styles and Traits of STEM Faculty  
Umana Nadeem, Southeast Missouri State University |
| 2:30pm| Integration of a vision sensor and robotic arm for basic part checking and sorting  
Zachary Cantrill, Eastern Kentucky University | Review of Quantitative Dry Shaft Excavation Inspection Methods  
Dr. Adam Kaplan,  
Kennesaw State University | Application of Artificial Neural Networks in Bearing Fault Classification  
Dr. Armin Moghadam,  
San Jose State University | Teaching Project Management using Computerized Simulation  
David Stec, Central Connecticut State University |
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<th>TIME</th>
<th>GEORGIA 6</th>
<th>GEORGIA 7</th>
<th>GEORGIA 8</th>
<th>GEORGIA 9</th>
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<tbody>
<tr>
<td>9:00am</td>
<td>Continuous Improvement Model for a Graduate Program</td>
<td>Artificial Intelligence-Powered Chatbots for Stakeholder Analysis in a Project Management Course</td>
<td>Cyber Threat Detection Based on Artificial Neural Networks Using Event Profiles</td>
<td>Mr. Raviteja Muvva, Eastern Illinois University</td>
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<td>Dr. Eli Aba, University of Wisconsin-Stout</td>
<td>Dr. Neil Littell, Ohio University</td>
<td>Mr. Raviteja Muvva, Eastern Illinois University</td>
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<td>9:30am</td>
<td>Course Design Lessons Learned from COVID-19 Pandemic</td>
<td>Implementing a Digital Engineering Strategy with a Four-Year Institution</td>
<td>TikTok Sentiment Analysis using Python</td>
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<td>Dr Eli Aba, University of Wisconsin-Stout</td>
<td>Dr. Neil Littell, Ohio University</td>
<td>Ms. Annie Nguyen, Eastern Illinois University</td>
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<tr>
<td>10:30am</td>
<td>Accreditation’s Long Pole: Implications for ATMAE</td>
<td>The Importance of Data Governance in Lean Six Sigma: A Focus on Data Privacy in Higher Education</td>
<td>Artificial Intelligence: A Vision of the Future of the Project Management Profession in 2035</td>
<td>Dr. Neil Littell, Ohio University</td>
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<td>Dr. Robert (Bob) Chin, East Carolina University</td>
<td>Manal Alduraibi, Purdue University</td>
<td>Dr. Neil Littell, Ohio University</td>
<td>Dr. Sangho Park, Central Connecticut State University</td>
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<tr>
<td>11:00am</td>
<td>Scaling Mt. ATMAE: Joining forces across departments and programs to create a unified accreditation self-study</td>
<td>Perpetual pavements, environmental and cost assessment</td>
<td>Rewriting a Product Design and Development Course to Focus on Quality Planning and Assurance</td>
<td>Dr. Darren Olson, Central Washington University</td>
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<td>Prof. Vigs Chandra, Eastern Kentucky University</td>
<td>Dr. Tamer Breakah, Ball State University</td>
<td>Dr. Darren Olson, Central Washington University</td>
<td>Dr. Anindita Paul, Morehead State University</td>
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<tr>
<td>1:30pm</td>
<td>I can’t get no satisfaction: Significance of student satisfaction in higher education</td>
<td>Ethical hacking using Chat GPT and Raspberry Pi.</td>
<td>How to Use the ATMAE Certification Review and Training Sessions to Supplement Your Courses</td>
<td>Dr. Mark Miller, The University of Texas at Tyler</td>
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<td>Dr. Justina Buck, University of Arkansas Fort Smith</td>
<td>Dr. Chafic BouSaba, Guilford College</td>
<td>Dr. Mark Miller, The University of Texas at Tyler</td>
<td>Mr. Ian Troop, Millersville University of Pennsylvania</td>
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<tr>
<td>2:00pm</td>
<td>From ATMAE for ATMAE Internship Features Self-Reported by ATMAE Members</td>
<td>Artificial Intelligence and Its Effect on Teaching in a Construction Program</td>
<td>Proven Motivational Techniques for Online Courses</td>
<td>Energy Efficiency Evaluation of an Internet of Things (IoT) Sensor Node</td>
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<td>Monique Bracken, University of Arkansas</td>
<td>Dr. Tamer Breakah, Ball State University</td>
<td>Dr. Mark Miller, The University of Texas at Tyler</td>
<td>Dr. Jie Zhu, University of Northern Iowa</td>
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<td>Dr. I. Richmond Nettey, College of Aeronautics and Engineering, Kent State University</td>
<td>Dr. Ulan Dakeev, Sam Houston State University</td>
<td>Dr. Joshua Peschel, Iowa State University</td>
<td>Dr. Carl Blue, Clemson University</td>
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<td>TIME</td>
<td>GEORGIA 2</td>
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<td>3:30pm</td>
<td>Arduino it: Free, open-source microcontroller learning lab resources for control, communication, and computing applications Prof. Vigs Chandra, Eastern Kentucky University</td>
<td>Modeling nonlinear response of Gypsum board panels Dr. Tatagata Ray, Morehead State University</td>
<td>Using Fractional, Factorial Design of Experiments to Optimize Gauge Repetitability and Reproducibility Results When Establishing Measurement Procedures Dr. Darren Olson, Central Washington University</td>
<td>Innovation in Entrepreneurship Ms. Anusha Viljal, University of Central Missouri</td>
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<td>4:00pm</td>
<td>Exploring Product Safety Climate and Decision-Making: Insights into Low Probability, High Consequence Events (LPHCs) in the Mfg. Industry Dr. Saxon Ryan, Iowa State University</td>
<td>How Mentoring Matters for Women in Male Dominated Fields Dr. Jennifer Warrner, Ball State University</td>
<td>A Study on the Dimensional Accuracy and Surface Roughness of Parts Made on a Mini 3-Axis CNC Router Dr. R. Radharananan, Mercer University</td>
<td>Virginia Tech: Continuing Evolution of Graduate Academic Programs in ETMAE (1968-2023) Dr. Ken Harmon, Virginia Tech - Department of Industrial and Systems Engineering</td>
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<td>4:30pm</td>
<td>Developing a Stereoscopic Vision Sensor (S-ViS) Array for Mobile Robotics Mr. Joshua Greineder, Millersville University of Pennsylvania</td>
<td>True Grit: Can Work Ethic, Mettle, and Drive be Taught? Dr. Jennifer Warrner, Ball State University</td>
<td>Comparative Study on the Dimensional Accuracy and Surface Finish of Parts Made on the Low-Cost FDM, SLA, and SLS 3D-Printers Dr. R. Radharananan, Mercer University</td>
<td>Application of Arena Simulation for effective teaching of Value Stream Mapping in Undergraduate Lean Six Sigma Class. Dr. Swapnil Patole, Mississippi State University</td>
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<td>5:00pm</td>
<td>Automated Bioacoustic Monitoring of Frogs and Toads Using Convolutional Neural Networks Mr John McMeen, Northeast State Community College</td>
<td>The sustainable choice for your DWV plumbing system. Mr. Jack Wintrow, Cast Iron Soil Pipe Institute</td>
<td>Comparative Study on the Accuracy and Efficiency of a Mini-CNC Lathe and a Conventional Lathe Dr. R. Radharananan, Mercer University</td>
<td>Laying the Groundwork for Program Accreditation: A Case Study About a Legacy Industrial Technology Program Dr. Darren Olson, Central Washington University</td>
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<td>9:30am</td>
<td>Fostering empathy through assistive technology design challenge in a CAD modeling course Dr. Ying Ying Seah, Oakland City University</td>
<td>Electrodynamic Processing of Micro and Nano Pharmaceutical Powders Enhances Blended Ordered Mixture Dr. Mohammed Ali, University of Texas at Tyler</td>
<td>Safety Risks and challenges Faced by Commercial Female Drone Pilots Dr. Burchan Aydin, Texas A&amp;M University - Commerce</td>
<td>How to Start a Student Organization for Women in Manufacturing Mrs. RaeJean Griffin, University of Texas at Tyler</td>
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<tr>
<td>10:00am</td>
<td>Applying Modular Design in Mobile Robotics Research and Development Mr. Benjamin Wright, Millersville University of Pennsylvania</td>
<td>Hands-On Learning: A Project-Based Microfabrication Course Covering Maskless Photolithography, Metrology, Etching, and Sputter Film Deposition Judith Fischer, University of New Mexico</td>
<td>Innovative projects using mixed methods data collection approaches Dr. Gretchen Mosher, Iowa State University</td>
<td>Building Connected Course Content to Enhance Student Learning David Stec, Central Connecticut State University</td>
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<td>10:30am</td>
<td>A human-robot collaborative assembly station with integrated VR monitoring/control – a digital-engineering project for THK manufacturing company Dr. Yuqiu You, Ohio University</td>
<td>Photography education: At the intersection of the future and the past Dr. Erica Walker, Clemson University</td>
<td>Community Resilience: Technology used for Advanced Education, Training, and Preparation Dr. Jessica Murphy, Jackson State University</td>
<td>The 3 + 1 Academic Program Vision: A Holistic Exploration of Challenges and Opportunities through an Extensive Stakeholder Survey Dr. Edem Tetteh, Rowan College at Burlington County</td>
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**ORAL PRESENTATIONS AT-A-GLANCE**

**Thursday, October 26, 2023 and Friday, October 27, 2023**
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<th>TIME</th>
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<th>GEORGIA 7</th>
<th>GEORGIA 8</th>
<th>GEORGIA 9</th>
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<tbody>
<tr>
<td>3:30pm</td>
<td>If you want to teach in our program, change majors</td>
<td>Leveraging Digital Tools for Workplace Readiness</td>
<td>STEM Outreach Utilizing Integrated Summer Youth and Teacher Robotics</td>
<td>Color fastness of Untreated Textiles in Direct-to-Garment Printing</td>
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<td></td>
<td>Mr. Jake Hildebrant, Murray State University</td>
<td>Mrs. Melinda Doty, East Carolina University</td>
<td>Workshops</td>
<td>Dr. Amanda Bridges, Clemson University</td>
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<tr>
<td>4:00pm</td>
<td>Administrators in the Classroom: Why and How</td>
<td>Learning with a Smile – Modified Ride-on Cars for Children with Mobility</td>
<td>I Think My Students Are On Artificial Intelligence!</td>
<td>Digital Color Output Conformity to ISO12647-7 Standards [GRACoL 2013</td>
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<td></td>
<td>Dr. James Jones, Ball State University</td>
<td>Limitations</td>
<td>Dr. Ray Richardson, Eastern Kentucky University</td>
<td>(CGATS21-2-CRPC6) with the use of Statistical Process Control (SPC)</td>
</tr>
<tr>
<td>4:30pm</td>
<td>Assessment of Scheduling Student Learning Outcomes: Challenges and Solutions</td>
<td>AI-Enhanced Learning: Analysis of Technical, Ethical, and Legal Considerations for Instructional Content Generation Dr. Armen Ilikchyan, Utah Valley University</td>
<td>Modernizing manufacturing curriculum to prepare the next generation of mfg. professionals: Robotic part tending Dr. Saxon Ryan, Iowa State University</td>
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<tr>
<td>5:00pm</td>
<td>Sustainable Packaging in a Global World</td>
<td>An exploratory evaluation of bootcamp-style instructions for Technical Topics</td>
<td>Re-engaging the disengaged student in the Technology Management classroom</td>
<td>Motion Capture to Performance Animation: the Art of the Retarget Ryan English, Eastern Michigan University</td>
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<td>9:30am</td>
<td>Budget Saving through DIY in Technology Program</td>
<td>Beating the Machine: Overcoming Problems with AI Writing Engines</td>
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<td>Dr. Ni Wang, Eastern Kentucky University</td>
<td>Dr. John Wyatt, Mississippi State University</td>
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<td>10:00am</td>
<td>Improve the Reliability of RF MEMS Switches through Novel Switch Architecture</td>
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<td>Dr. Qingzhou Xu, Morehead State University</td>
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<td>10:30am</td>
<td>Students’ scientific argumentation on model classification outcomes through machine learning</td>
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<td>Dr. Hector Will, Oakland City University / Purdue University</td>
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ATMAE Board of Accreditation Hearings Agenda

Wednesday, October 25, 2023

7:00 AM  Pre-meeting of the Board of Accreditation
7:30 AM  Call to Order & Welcome

8:00 AM  Chattanooga State Community College
8:12 AM  Delgado Community College
8:24 AM  Fort Hays State University
8:36 AM  Kent State University
8:48 AM  Millersville University of Pennsylvania
9:00 AM  Northern Illinois University
9:12 AM  Pennsylvania College of Technology
9:24 AM  Roane State Community College
9:36 AM  Southern Illinois University Carbondale
9:48 AM  Southwestern Oklahoma State University

10:00 AM  BREAK

10:12 AM  Texas A&M University - Kingsville
10:24 AM  University of Arkansas - Fort Smith
10:36 AM  University of Wisconsin - Platteville
10:48 AM  California State University - Chico
11:00 AM  Mississippi State University
11:12 AM  California State University - Fresno
11:24 AM  Eastern Kentucky University
11:36 AM  Nicholls State University
11:48 AM  Northwest Louisiana Technical Community College

12:00 PM  LUNCH BREAK

1:00 PM  Ozarks Technical Community College
1:12 PM  Pellissippi State Community College
1:24 PM  San Jose State University

1:36 PM  Other Accreditation Business & Closing Remarks
1:48 PM  Adjourn
GEORGIA 3  
Wednesday, October 25 | 10:00am-12:00pm  
Leveraging Jupyter Notebooks and GitHub for Enhanced STEM Content Creation and Learning Activities  
Dr. Will Hector, Oakland City Univ.

The rapidly evolving landscape of education in Science, Technology, Engineering, and Mathematics (STEM) necessitates innovative pedagogical approaches to enhance content creation and learning activities. Jupyter Notebooks and GitHub have emerged as powerful tools for fostering collaborative and interactive learning experiences in STEM disciplines. This workshop aims to demonstrate how educators and students can leverage these platforms to create, share, and collaborate on STEM content, thus promoting active engagement, interdisciplinary problem-solving, and deeper understanding of core concepts.

The workshop will provide a comprehensive overview of Jupyter Notebooks and GitHub, elucidate the benefits of using these tools in STEM education, and showcase practical examples of their implementation. Participants will learn how to create, execute, and share Jupyter Notebooks, as well as how to collaborate on projects and assignments using GitHub repositories. Additionally, the workshop will cover best practices for integrating these tools within existing curricula, promoting a seamless transition to a more interactive and collaborative learning environment.

ATMAE audience will benefit from this workshop by gaining insights into how Jupyter Notebooks and GitHub can enhance teaching and learning experiences, facilitate collaboration, and foster a growth mindset among students. Furthermore, the workshop will provide valuable resources for developing and implementing innovative learning activities that align with the goals and objectives of ATMAE.

Outline of the Workshop
- Introduction to Jupyter Notebooks and GitHub: A brief overview of their functionalities, features, and relevance to STEM education.
- Benefits of using Jupyter Notebooks and GitHub: Enhancing interactive and collaborative learning, promoting active engagement, and fostering interdisciplinary problem-solving.
- Practical implementation examples: Demonstrations of how to create, execute, and share Jupyter Notebooks, as well as how to collaborate on projects and assignments using GitHub repositories.
- Integration within existing curricula: Strategies and best practices for incorporating Jupyter Notebooks and GitHub into STEM courses and learning activities.

GEORGIA 2  
Wednesday, October 25 | 10:30am-12:00pm  
Four Pillars of Manufacturing Revision  
Ms. Susy Marzano, SME  
Dr. John Irwin, Michigan Technical Univ.  
Dr. Neil Littell, Ohio Univ.

The SME Manufacturing Education & Accreditation Committee has completed validating data from a Four Pillars of Manufacturing Knowledge 2021 survey, and as a result will present the Four Pillars revision. The panelists will highlight the changes made in each knowledge block and provide an opportunity for discussion of each. Participants will receive a link to the updated Four Pillars with a request for feedback. The goal of this project is to maintain the Four Pillars as a living document. This Committee will periodically review and consider the feedback for later revisions.
**GEORGIA 2**
**Wednesday, October 25 | 12:30pm-2:00pm**

*Getting your great research published in the JTMAE*

*Dr. Gretchen Mosher, Iowa State Univ.*
*John R. Haughery, Millersville Univ.*
*Fatemeh Davoudi, San Jose State Univ.*

The Journal of Technology, Management, and Applied Engineering (JTMAE) has been a member-supported journal for ATMAE and its predecessor, NAIT, since 1984. The Journal of Technology Studies is the official journal for the technology honorary Epsilon Pi Tau. New authors and reviewers often have questions about the peer-review process. The editor and editorial panel from both journals will share information to assist prospective authors, reviewers, and other stakeholders who are interested in submitting or reviewing manuscripts for either journal.

The presentation will offer information on the characteristics of both journals, characteristics of papers that are reviewed and accepted. A second part of the presentation will discuss the review process from the perspective of authors and reviewers. The presentation will conclude with a question and answer session.

This workshop is designed for new and experienced authors who are interested in submitting manuscripts to the JTMAE and JOTS. The workshop will also provide helpful information to those who are new to academic publishing on the basics of reviewing and typical review timelines.

Major points of presentation:
- Characteristics of the JTMAE and JOTS
- Preparing papers for submission
- Review process and timeline
- Best practices for responding to reviewer comments
- Question and answer session

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**GEORGIA 3**
**Wednesday, October 25 | 2:30pm-4:00pm**

*Best Practices from Epsilon Pi Tau*

*Dr. Steve Freeman, Epsilon Pi Tau*
*David Rouch, Epsilon Pi Tau*
*Kevin Howell, Epsilon Pi Tau*
*Susan Gregg, Epsilon Pi Tau*
*Karen Birch, Epsilon Pi Tau*
*Brian Andrus, Epsilon Pi Tau*

The Epsilon Pi Tau Board of Directors will provide best practices related for Epsilon Pi Tau trustees, and members.

The workshop will include the following topics:
- Using the Epsilon Pi Tau website
- Best practices for inviting prospective initiates
- Best practices for Chapter initiation ceremonies
- How to start a new chapter or re-establish an dormant chapter
- Best practices for engaging with industry

The Epsilon Pi Tau Board of directors will also provide information related to events celebrating Epsilon Pi Tau’s 95th anniversary in 2024 and will address questions or concerns from chapter trustees and other attendees.
**Google Map: The ‘unseen’ that controls the seen**  
*Mr. Muritala Ayinla Hassan, Univ. of Central Missouri*  
*Dr. Suhansa Rodchua, Univ. of Central Missouri*

Indeed, it is increasingly becoming impossible for man to abstain from technology almost at every moment. The reliance on a web mapping platform and consumer application, also known as Google Maps, is a clear indication of man’s nearly inseparable relationship with technology devices. The Google Maps App provides satellite imagery, aerial photography, street maps, 360° interactive panoramic views of streets, real-time traffic conditions, and route planning for traveling by foot, car, bike, air, and public transportation. Aside from driving skills, Google Maps is now an app that most drivers or commuters must familiarize themselves with for easy navigation of familiar and unfamiliar terrain. Today’s driver also turns to map technology to easily navigate and possibly circumvent traffic-choked areas, to keep them from getting lost or just simply to avoid the busy route.

However, despite the gains of the technology innovation, there are concerns that the over-dependence on the app is affecting the ability of users to creatively use their initiative while navigating both familiar and unfamiliar terrain.

The purpose of this study is to investigate the growing heavy reliance on the app by most US motorists and uncover if indeed users can do without the app and other navigating technological devices. The major points covered in this paper are:

- **The dying culture of map reading, creativity and instinct.**

This study will help ATMAE understand and look into the possible gaps in human-technology relations. The findings of the paper will also reveal possible areas for improvement on the part of the app, the road network, and Google Maps users.

**Cyber Threat Detection Based on Artificial Neural Networks Using Event Profiles**  
*Mr. Raviteja Muvva, Eastern Illinois Univ.*

Finding an automated method for detecting cyber-attacks is one of the biggest problems in cybersecurity. In this study, we describe an artificial intelligence (AI) method based on artificial neural networks for detecting cyberthreats. The suggested solution uses a deep learning-based detection method to improve cyber-threat identification by breaking down a large volume of recorded security events into individual event profiles. For this project, we created an AI-SIEM system that combines event profiling for data pre-processing with various artificial neural network techniques, such as FCNN, CNN, and LSTM. The system has a strong emphasis on separating true positive warnings from false positive alerts, assisting security analysts in quickly responding to cyber threats. All experiments in this paper on two benchmark datasets (NSLKDD and CICIDS2017) as well as two datasets that were gathered in the real world. We conducted trials utilizing the five traditional machine-learning methods (SVM, k-NN, RF, NB, and DT) to assess the performance comparison with existing approaches. The experimental findings of this study confirm that our proposed methods can be used as learning-based models for network intrusion detection and demonstrate that, when applied in the real world, they outperform traditional machine-learning techniques.
For identifying network breaches and cyber threats, there are typically two main systems. The company network has an intrusion prevention system (IPS) installed, which uses signature-based techniques to primarily inspect network protocols and flows. It produces the necessary intrusion alarms, also known as security events, and reports the alerts to another system, like SIEM. The gathering and administration of IPS alerts has been the primary focus of security information and event management (SIEM). Among the numerous security operations solutions, the SIEM is the most popular and dependable option for analysing the gathered security events and logs. Additionally, security analysts work to examine suspicious alerts based on policies and thresholds and to find malicious behaviour by examining correlations between events and applying attack-related knowledge.

An event pattern extraction approach is specifically included in the proposed AI-SIEM system by grouping together events with a concurrency feature and comparing event sets in the gathered data. Our event profiles may be able to offer various deep neural networks with condensed input data. Additionally, by making comparisons with data from long-term history, it helps the analyst to manage all the data quickly and effectively.

With the help of artificial neural networks and event profiles, we have proposed the AI-SIEM system in this study. Our approach is innovative in that it uses deep learning-based detection techniques to improve cyber-threat identification while condensing very large-scale data into event profiles. By comparing historical security data, the AI-SIEM system enables the security analysts to respond to critical security alarms quickly and effectively. It can also assist security analysts in quickly responding to cyber threats scattered across many security events by lowering false positive warnings. We conducted a performance comparison utilizing two benchmark datasets (NSLKDD, CICIDS2017) and two datasets gathered in the actual world to assess performance. First demonstrated that our processes may be used as one of the learning-based models for network intrusion detection based on the comparison experiment with other methods, utilizing well-known benchmark datasets. Second, we demonstrated encouraging findings from the evaluation using two real datasets, showing that our system also beat traditional machine learning approaches in terms of classification accuracy.

GEORGIA 8
Thursday, October 26 | 9:30am-9:55am
TikTok Sentiment Analysis using Python

Ms. Annie Nguyen, Eastern Illinois Univ.
Toqeer Israr, Eastern Illinois Univ.

TikTok has become one of the most popular social media platforms in recent years, with millions of active users sharing and creating short-form videos. To extract insights from these user-generated reviews, sentiment analysis techniques are increasingly used by researchers and marketers to understand the overall sentiment of the platform’s users towards various products and services.

In this project, we aim to perform sentiment analysis on TikTok reviews using Python. Our objective is to extract useful insights from user-generated reviews by analyzing the sentiment of the text. Specifically, we will use natural language processing (NLP) techniques to classify TikTok reviews into positive, negative, or neutral categories. We will also explore different machine learning algorithms and evaluate their performance in sentiment analysis on TikTok reviews.

The findings of this research can be valuable for businesses and brands to understand the overall sentiment of their products or services and develop strategies accordingly. Additionally, this project can contribute to the growing field of sentiment analysis and natural language processing by demonstrating the effectiveness of these techniques on TikTok reviews.
ORAL PRESENTATIONS

GEORGIA 9
Thursday, October 26 | 10:30am-10:55am

Smart Energy Monitoring for Residential Buildings with Intelligent Informatics and IoT

Dr. Sangho Park, Central Connecticut State Univ.

IoT-Based Monitoring of HVAC Systems for Improved Energy Efficiency and Sustainability

Improving energy efficiency has become an urgent issue for sustainability under global climate change. The building sectors in the US, including residential and commercial, consume 28% of the total energy, with most of it being consumed by HVAC systems. However, energy production for HVAC systems emits carbon dioxide, contributing to global warming and environmental problems. Therefore, it is imperative to monitor HVAC systems and optimally manage their performance, which has been increasingly important with the development of intelligent monitoring systems.

This paper presents a study that shows an ‘Internet of Things’ (IoT)-based distributed sensor network that enables remote monitoring of HVAC parameters such as temperature, humidity, barometric pressure, geo-localization, as well as remote video streaming of the sensor-dispatched site. The proposed system consists of multiple sensor nodes dispatchable to remote locations and a server computer that a user can control locally. The main objective of this paper includes the establishment of a baseline for determining whether future research on embedded intelligence using IoT is warranted in engineering education.

The study results show that developing a distributed sensor network is achievable using off-the-shelf components and low-cost generic embedded system computers. The current IoT system can be deployed to monitor various environments such as factories, schools, offices, hospitals, and homes, with capabilities including temperature, humidity, barometric pressure, geo-localization, and video stream. Additionally, more diverse sensing modalities could be added if bus interfaces are compatible.

The paper’s contribution includes empirical data that compare the performances of conventional scalar sensors versus data-intensive video sensors. It is addressed that video streaming is doable, but image processing is not possible at the edge level due to the excessive heat at the CPU die and the limited processing capabilities of the sensor node’s CPU.

GEORGIA 3
Thursday, October 26 | 10:30am-10:55am

Matter: The Next Generation Smart Home Standard

Dr. Rendong Bai, Eastern Kentucky Univ.
Dr. Vigs J. Chandra
Dr. Ray E. Richardson

Matter is the next-generation smart home protocol that was developed by the Connectivity Standards Alliance (formerly known as the Zigbee Alliance) in partnership with major technology companies such as Apple, Google, and Amazon. The goal of Matter is to create a unified, secure, and reliable smart home standard that allows different devices to communicate with each other seamlessly, regardless of the manufacturer or platform.

Matter is built on top of existing industry standards such as Wi-Fi, Thread, and Ethernet. It uses a common language to ensure interoperability between different devices. This means that Matter-enabled devices can work together out of the box, without the need for additional hardware or software.

One of the key features of Matter is that it focuses on privacy and security. Matter devices use end-to-end encryption to protect user data and prevent unauthorized access. In addition, the protocol includes a certification process that ensures that devices meet strict security and privacy standards.
Matter supports a wide range of devices, including smart speakers, lights, locks, thermostats, and more. The protocol is designed to be future-proof, with support for over-the-air updates that can add new features and capabilities to devices over time.

Matter represents a major step forward in smart home technology. By providing a unified and secure standard for smart home devices, Matter makes it easier for consumers to set up and manage their smart homes, while also ensuring that their data and privacy are protected. Matter is designed to be future-proof and supports a wide range of devices, including smart speakers, lights, locks, thermostats, and more. Learning Matter technology can prepare students for careers in home and building automation industry and provide valuable skills and knowledge.

Technology students should learn Matter technology because it is an emerging and important standard in the smart home industry. As the Internet of Things (IoT) continues to grow, more and more smart home devices are being developed and released by different manufacturers. This leads to compatibility issues and fragmentation, making it difficult for consumers to manage and control their devices.

Matter technology addresses these issues by providing a unified, open-source standard for smart home devices. Matter enables interoperability between different platforms and manufacturers. By learning Matter technology, students will be better equipped to develop and manage smart home systems that involve a wide range of devices.

In addition, Matter technology includes strong security and privacy features that protect user data and prevent unauthorized access. This is becoming increasingly important as more and more personal data is being collected by smart home devices.

Learning Matter technology can also prepare students for careers in IoT industry. As the industry continues to grow, there will be a growing need for professionals who are skilled in developing and managing smart home systems. Students could gain a competitive advantage and become successful in this field.

Major points

- Matter is a unified, open-source standard for smart home devices that enables interoperability between different platforms and manufacturers.
- Matter includes strong security and privacy features to protect user data and prevent unauthorized access.
- Because Matter uses a common language, it allows different devices to communicate with each other seamlessly, regardless of the manufacturer or platform.
- Matter is designed to be future-proof, with support for over-the-air updates that can add new features and capabilities to devices over time.
- Matter includes a certification program to ensure that devices conform to the standard and meet strict security and privacy requirements.
- Matter supports a wide range of devices, including smart speakers, lights, locks, thermostats, and many more.

GEORGIA 2
Thursday, October 26 | 10:30am-10:55am

Protection of Jamming Attack on Vehicular Network

Dr. Biju Bajracharya, East Tennessee State Univ.
Mohammad Shoeb Khan, East Tennessee State Univ.
Thomas Justice, East Tennessee State Univ.

A vehicular network is a type of communication network that enables vehicles to communicate with each other and the roadside infrastructure. The roadside infrastructure consists of fixed nodes such as roadside units (RSUs), traffic lights, road signs, toll booths, and so on. The RSUs are devices equipped with communication capabilities that allow vehicles to obtain and share real-time information about traffic conditions, weather, road hazards, and other relevant information. These infrastructures assist in traffic management,
emergency response, smart parking, autonomous driving, and public transportation to improve roadside safety, reduce traffic congestion, and enhance the overall driving experience. However, communication between the vehicles and the infrastructure devices could be deliberately disrupted by cyber attackers to cause fatal traffic accidents or congestion. One of the common methods used by such attackers is the wireless jamming attack, where the attacker uses a jamming device to transmit high-power radio signals on the same frequency that the vehicular network is using. This causes interference, delays, or prevents legitimate communications to the vehicles, disabling them from responding to obstacles, emergency services, and warning messages, resulting in serious consequences and posing a significant threat to the safety and efficiency of transportation systems. These safety concerns could be mitigated or avoided by implementing appropriate security measures to protect against jamming. This presentation will provide the overview of the vehicular network system, discuss and explore security measures and methods needed to ensure the safe and reliable operation of the vehicular communication system.

Major Points
- Overview of the Vehicular Network Systems.
- Describe the components of Vehicular Network Systems.
- Discuss the cyberattack: jamming attack on vehicular networks and its consequences
- Discuss the security measures and protection methods against jamming attacks to ensure safe and reliable operation of the vehicular communication system.

GEORGIA 9
Thursday, October 26 | 11:00am-11:25am

A Power efficient amplifier for Internet of Things applications with high figures of Merits

Dr. Anindita Paul, Morehead State Univ.

A power-efficient class AB-AB Miller op-amp suitable for Internet of Things (IoT) applications is developed in this research work. The amplifier is the indispensable circuit component for the data acquisition system. In IoT applications, physical objects are embedded with sensors and actuators that communicate with computing systems via wired or wireless networks allowing the physical world to be digitally monitored or controlled. Thus sensors are the heart of IoT applications. Their job is to convert environment characteristics (temperature, pressure) to an electric voltage or current at their outputs. Since the output current or voltage of the sensors is feeble, it must be amplified to be suitable for use in electronic systems. Thus battery-operated IoT gadgets should have a power-efficient amplifier to process the sensor’s output which is in a few mV to 100 µV range. Now, companies worldwide are pushing for more features and functionality in portable, handheld, and battery-powered gadgets. Thus, power constraints in modern VLSI design demand an approach that simultaneously increases an amplifier’s bandwidth, slew-rate, and open-loop gain.

A simple technique to implement highly power-efficient class AB-AB Miller op-amps is designed, which is very effective for IoT applications. It uses a composite input stage with resistive local common mode feedback that provides class AB operation to the input stage and essentially enhances the op-amp’s effective transconductance gain, the DC open loop gain, the gain-bandwidth product, and slew rate with just a moderate increase in power dissipation. Experimental results of op-amps in strong-inversion and sub-threshold fabricated in a 130nm standard CMOS technology validate the proposed approach.
This presentation will cover the following topics:

- Object of this research
- The proposed circuit’s operating principle
- Results
- Comparison with the state-of-the-artwork
- Conclusions

GEORGIA 2
Thursday, October 26 | 11:00am-11:25am
Optimizing Charging Station Selection and Reducing Wait Times

Dr. Biju Bajracharya, East Tennessee State Univ.
Samuel Ige, East Tennessee State Univ.
Mohammad Shoeb Khan, East Tennessee State Univ.

In recent years, efforts to promote sustainability and advance vehicular technology have led to an increase in the adoption of electric vehicles (EVs). However, one of the significant challenges facing EV owners is the lack of adequate charging infrastructure, as well as difficulty in locating the nearest available charging stations. This often leads to long wait times and inconvenience for EV drivers, who may have to travel far away to find a charging station. To address these issues, we propose an optimization technique that utilizes machine learning to identify the most suitable charging stations based on various factors such as distance, time needed for the EV to reach the station, availability and capacity of charging stations, number of charging stations at each location, and time of day, among others. In this presentation, we will discuss these factors and the methodology we have developed to optimize the charging station selection process. By optimizing charging station selection, our solution can help reduce wait times, promote sustainable transportation in the intelligent transportation system, and provide EV drivers with a more convenient and reliable charging experience.

Major Points

- Overview of the EV Charging infrastructure
- Discussion of the challenges and the need for improvement to make EV charging more accessible and convenient.
- Discussion of machine learning-based optimization techniques that enable EV owners to select suitable charging stations, reducing wait times at charging stations, and improving productivity for both EV owners and charging station operators.
- Highlight the importance of promoting sustainable transportation and improving the overall EV driving experience

GEORGIA 9
Thursday, October 26 | 1:30pm-1:55pm
The Benefits of Machine Vision for Autonomous Robots

Mr. Ian Troop, Millersville Univ. of Pennsylvania
Mr. Zane A. Weaver, Millersville Univ. of Pennsylvania
Dr. John R. Wright, Jr., Millersville Univ. of Pennsylvania
Dr. John R. Haughery, Millersville Univ. of Pennsylvania

Autonomous self-driving robots require many sensors to function effectively. One of those sensors, vision, is often used for robotic navigation. While computer vision is traditionally deployed for self-driving applications, it requires that all processing be done by the host’s central processing unit (main computer). Computers today are much faster than ever due to their increasing amount of processing power, but a lower cost solution such utilizing a microcontroller may be substituted if the processing of visual images are done locally. A machine vision unit does just this. These devices are dedicated smart sensors that combine a microcontroller with a camera for dedicated image processing.

This talk discusses how to utilize low-cost machine vision technology in conjunction with a distributed control methodology for mobile robotics development and control. The introduction, setup, and demonstration of the OpenMV H7 Cam will be introduced. Discussion of its performance with self-driving autonomous robots will also be presented.
The presentation will introduce a low-cost, powerful machine vision technology (OpenMV H7 Cam) that will benefit those involved with mobile robotic development and control.

Major points:
- Vision vs. Machine Vision for Mobile Robotic Applications
- Introduction, Set-up, and Demonstration of the OpenMV H7 Cam
- Performance results from the Intelligent Ground Vehicle Competition (IGVC)

GEORGIA 2
Thursday, October 26 | 1:30pm-1:55pm

The Genie is Out of the Bottle: AI-Aided Industrial Automation, Creative Expression, and the Second Enlightenment

Odin Blevins, Eastern Kentucky Univ.
Professor Vigs Chandra, Eastern Kentucky Univ.

From the printing revolution of the 1440s led by Gutenberg; to the scientific one of the 1550s, sparking the first enlightenment of 1680s, launching the intellectual and philosophical movements; the technological revolution of the 1870s railroads, electricity, telegraph; transistors fueling the digital revolution of the 1950s; followed by the Internet revolution in the 1990s, the mobile one in the 2000s, leading to the fourth Industrial revolution, Industry 4.0, in the 2010s, IoT devices, cloud and cognitive computing, accelerating the rate of automation and sharing of data between process, fueled by artificial intelligence (AI), bringing us to this moment in time, the early 2020s: the cusp of the second enlightenment. According to the Gartner group report of 2023, generative AI will enable industries across the board to design products that conform to specifications (generative design) while meeting constraints on the available resources, such as the materials and processes. And beyond that, AI-aided systems hold tremendous potential for expanding our understanding of the world, cognition, and interactions, fueling creative expressions. AI as a tool has been in service for decades across several different fields with limited cause for concern until recently. However, individuals and organizations have begun to express their concerns sparking heated debates over the use of these technologies in the personal and professional realm.

One of the primary goals for using AI is automation, a driving force advancing human control of the natural world for hundreds of years. With the level of automation predicted in the coming decade, easing the work that humans currently perform, this ease on the constraints of time and space will allow human-AI partnerships, leading to delightful discoveries, inventions, both practical and whimsical. Even today, AI is easing workloads by powering every online searches for information, providing voice activated virtual assistance through services such as Alexa or Siri, personalizing advertising while surfing the web, filtering email messages, and even acting as a sounding board, as one would with a professional colleague or personal friend, using sophisticated conversation dialog system chatbots.

AI will be upon us sooner than we know it. Its innate problem solving skills will pervade all forms of industry and media. While the fields of manufacturing, healthcare, material science, semiconductors are primed to use these, even in fields least expected such as the liberal arts AI models such as MidJourney have proven generating art is not only possible but entertaining to large audiences online. We must remain ahead of the AI generated curve and learn new ways to implement this technology to be as effective as possible.

Major Bulleted points:
- The AI family tree: A brief history of AI is important to provide proper context for today's achievements.
- Do you speak my language?: The explosion of today's language models and how it has brought AI to the spotlight.
Self-driving technology has recently gained much interest from the automobile industry. Major car manufacturers and big technology companies, including Tesla, Ford, Toyota, GM, Google, and Uber, are involved in strenuous research and have invested multi-billion dollars in hardware and software development. However, the research and development in these companies use proprietary and costly designs and software that is not open to the public. This presentation aims to demonstrate the building process of a self-driving vehicle with Ackermann steering (car-like) mechanism using an affordable hobby RC car. The study utilizes open-source software such as Robot Operating System 2 (ROS2)—the newest software tools and libraries for developing robotics applications—and a ROS2-compatible software package modified from the Linorobot2 software. Linorobot2 provides software programs and instructions to build a custom robot with different drivetrains, including two-wheel, four-wheel, and Mecanum drives. However, implementing the Ackermann steering method in Linorobot2 is not available. This presentation will detail essential hardware and software components and assemble procedures to construct the Ackermann steering vehicle. The hardware consists of a microcontroller board, motor driver board, inertial measurement unit (IMU) sensor, motor encoder, and LiDAR sensor. The software includes ROS2 package, micro-ROS library, Proportional-Integral-Derivative (PID) controller library, and navigation stack (Nav2). This presentation will benefit enthusiastic hobbyists, researchers, and educators in engineering technology or related fields who want to experience and learn self-driving technology.

Major Points:
- Ackermann steering mechanism for a car-like vehicle
- Hardware and software components for building an Ackermann steering hobby RC car
- Robot Operating System 2 (ROS2) and compatible software packages
- Implementation process to integrate self-driving technology

Industry 4.0, also known as the fourth industrial revolution, is a term used to describe the integration of advanced technologies such as artificial intelligence, the Internet of Things (IoT), big data, and automation into industrial production. It can make the manufacturing highly efficient, flexible, and adaptive, and improve the productivity. IoT is a key enabler of the Industry 4.0, and most sensors are connected to the cloud through wireless communication links. Wireless capability makes the deployment of a large number of IoT nodes feasible. However, wireless communication consumes a high amount of power, and one challenge is to make the IoT devices or nodes highly energy efficient since most nodes are powered by batteries.

In this project, we evaluated the energy efficiency performance of a low-cost Internet of Things node designed and implemented using off-shelf components. In order to improve energy efficiency, the deep sleep mode was explored, and the power dissipation of different operations were experimented and compared. It was proven that ultra-low power consumption can be implemented effectively. The audience will learn about a low-cost, low-power implementation of an IoT sensor node.
Major Points:
- Industrial 4.0 and Internet of Things overview
- Commonly used open-source hardware platforms for IoT implementation
- Energy efficient implementation of wireless communication using ESP8266
- Performance evaluation of the IoT node power dissipation

GEORGIA 2
Thursday, October 26 | 2:30pm-2:55pm
Integration of a vision sensor and robotic arm for basic part checking and sorting.
Zachary Cantrill, Eastern Kentucky Univ.
Dr. Ni Wang, Eastern Kentucky Univ.

Utilizing a Universal Robots UR3 and a Cognex IS 2000 vision sensor as a starting point, each device was programmed, a testing part was created, and multiple methods of allocating the communication of the two primary devices were considered and implemented. This project will demonstrate the technologies involved to set up a sorting robotic station for the manufacturing process.

The presenters will introduce the background of devices (Robots UR3, Cognex IS 2000, CLICK PLC, and Conveyor system) and their operation and capabilities. Specifications for a router will be discussed, with the model chosen to allocate future utilization and expansion. The performance will include a. the initial setup of the vision sensor and robotic arm. b. the programming so that if the vision sensor detected specific patterns on the surface of the part, it would be passed, and the arm would place it in one location. If the part did not have these patterns, it was considered a failed part, and the robotic arm would then place it in a separate location. c. Implementation of TCP/IP communication, facilitated by a Python script programmed to translate the outputs of the vision sensor into inputs the robotic arm could understand. Later in the project, it was decided that a PLC would be a better alternative, able to both simplify the setup and allocate future modification and expansion better. The PLC was chosen based primarily on criteria of cost and capabilities, with the chosen PLC being a CLICK Ethernet Basic PLC. The audience will get an idea about the whole process for a beginner to set up a sorting robotic station. A completed project result will be presented.

- Introduce background research on the camera system and robotic arm
- Apply the technology to communicate between the camera system and robotics
- Demonstrate an example to set up a robotic sorting station
- A great practice for students in the technology program

GEORGIA 2
Thursday, October 26 | 3:30pm-3:55pm
Arduino it: Free, open-source microcontroller learning lab resources for control, communication, and computing applications
Prof. Vigs Chandra, Eastern Kentucky Univ.
Rendong Bai, Eastern Kentucky Univ.
Ni Wang, Eastern Kentucky Univ.
Anthony Friend, Eastern Kentucky Univ.

By 2027, the market revenue for microcontroller units worldwide will reach 30 billion US dollars, including secure, multi-market, and high reliability devices deployed across various industries, according to Statista. With the exponential growth of these devices in various sectors of industry, there is an increasing need to familiarize students with microcontroller technologies in applied engineering and technology management programs. The influx of various brands of microcontrollers for hobbyists makes the present a happy conjunction of educational needs and abundant opportunities for doing so. Readily accessible, free, online lab-based learning resources that allow educators to teach content in flexible ways, will scaffold the learning of computing and interfacing sensors with single-board microcontroller systems.
Attendees will learn about readily available open-source online laboratory resources that can be customized for learning microcontrollers, specifically the Arduino, in foundational technology classes. The presentation will raise awareness regarding the relevance of microcontrollers, exciting students with the possibilities these technologies present. It will ease student jitters about programming through the use of flowcharts, as well as welcoming learners with a wide range of experiences working with electrical/electronic devices safely, creating usable prototypes. The vital role of microcontroller technologies across the automation, electrical, and computer systems curriculum in ATMAE programs will be discussed, linking with the learning of PLCs and special topics courses. Specific suggestions for their integration will be made.

Introducing microcontroller technologies in various contexts across the curriculum in ATMAE programs will raise awareness of their use in different industrial sectors. Developing experience working with any one type of microcontroller technology serves as the gateway to others. Inviting students to explore different uses of the technology improves online research techniques, adapting these for use safely while working with devices interfaced with microcontrollers. Free online resources for faculty members to update their skills learning about microcontrollers will be shared. Audience suggestions for improving the teaching of microcontroller technologies in the technology classroom are invited, along with challenges to its adoption. We will discuss recommendations for strategies for enhancing learning of these important technologies.

Major points:
- Need for making the learning of automation readily available and accessible in applied engineering technology
- Adding the microcontroller flavor to conventional electronics and automation courses
- Consideration for prerequisites related to mathematics, programming, and electrical concepts
- Arduino for teaching foundational computer interfacing, control, communication, and programming skills
- Offering a mix of online and physical lab-based activities for strengthening understanding of microcontrollers through virtual and real-world implementation

GEORGIA 2
Thursday, October 26 | 4:30pm-4:55pm

Developing a Stereoscopic Vision Sensor (S-ViS) Array for Mobile Robotics

Mr. Joshua Greineder, Millersville Univ. of Pennsylvania
Dr. John R. Haughery, Millersville Univ. of Pennsylvania
Mr. Ian P. Troop, Millersville Univ. of Pennsylvania
Dr. John R. Wright Jr., Millersville Univ. of Pennsylvania

An important design consideration in developing self-driving robotic vehicles with effective environmental awareness is sensor selection. Typical sensor technologies include ultra-sonic, infrared, light detection and ranging (LiDAR), and vision. While using these sensor technologies in tandem can allow precise ranging and pattern identification, it can increase development time and system cost. To emulate human anatomy, vision sensors can be used for both ranging and pattern identification through the use of stereoscopic cameras and image processing algorithms, mitigating the need for other sensor technologies. Therefore, this research developed a stereoscopic vision sensor (S-ViS) array for image processing and depth perception on a mobile robot.

This talk will present 1) the development and integration of Robotic Operating System 2.0 (ROS 2.0) and stereoscopic vision sensor (S-ViS) array image capturing and post-processing on a single-board computer (SBC), 2) the development of
an algorithm to transform S-ViS image data to point cloud vector data for line following (image processing) and object detection/avoidance (depth perception), and 3) the development and demonstration of an algorithm to generate a local map and vector data for integration with distributed microcontroller control systems to enable environment awareness and vehicle navigation.

The S-ViS array has the potential to enable synchronous image processing and depth perception, resulting in local map generation for real-time global environmental awareness. Furthermore, the S-ViS array reduced the complexity of sensor data (i.e., one sensor type) while increasing access to mapping and environmental awareness data through multiple cameras (i.e., array). Results have applications to mobile robotics and self-driving vehicles.

Major points:
- Deployment of Robotic Operating System 2.0 (ROS 2.0)
- Integration of a stereoscopic vision sensor (S-vis) array
- Development of an algorithm to transform S-vis image data
- Development and demonstration of a local map and vector data processing algorithm

GEORGIA 2
Thursday, October 26 | 5:00pm–5:25pm
Automated Bioacoustic Monitoring of Frogs and Toads Using Convolutional Neural Networks

Mr John McMeen, Northeast State Community College

Studying amphibious species, such as frogs and salamanders, is important for conservation efforts, not only for amphibians, but all species, as amphibians are highly susceptible to population decline due to environmental changes. Observation and monitoring of amphibian populations can provide an early warning for ecosystems experiencing habitat loss and climate change. Amphibians are currently facing a global population decline and more research is needed to understand the ecological impacts of environmental change. Bioacoustic monitoring, such as passive acoustic monitoring, is a popular approach for capturing audio recordings of vocalizing animal species. These approaches typically generate large datasets that are time consuming to analyze manually. Machine learning algorithms, such as convolutional neural networks, can be trained to identify vocalizing species and automate data monitoring processes.

Researchers deployed passive audio monitoring devices to capture frog and toad vocalizations at Steele Creek Park in Bristol, Tennessee, from April through September 2023. Several custom artificial neural networks were trained to assist researchers with acoustic analysis. This discussion will cover results and findings from this study that will be of interest to researchers and practitioners in the fields of applied technology, computer science, ecology, and environmental science. ATMAE professionals will gain insight on bioacoustics, applied machine learning principles, and amphibian conservation efforts in the southern Appalachian Mountains.

Discussion highlights:
- Artificial intelligence and machine learning applications.
- Audio data transformations such as spectrogram images.
- Applied methods for passive audio monitoring of wildlife.
- Implications on ecological research and conservation.
- Effects of road and air traffic noise on frog vocalizations.
Prefabrication in the mechanical, electrical and plumbing (MEP) scopes in construction projects help a lot of specialty contractors save time and money in delivering their scope of work. Not only does contractors control their cost and time schedules, but they are also able to complete a significant percentage of their manhours in a safe environment close to tools and much more controlled conditions, which also has a positive impact on the level of quality. It has become very clear that contractors who are not adopting prefabrication in planning their commercial and industrial projects might fall out of competition with the companies who are practicing and mastering this strategy. This is especially because of the shortage of skilled manpower that the construction industry is witnessing for the last decade and is expected to continue. However, this comes with some cost and challenges. This includes identification of prefabrication scopes, maintaining the right size fabrication shop with the right machinery, running the needed software to detail the prefabricated scopes. The objective of this session is to present the challenges benefits and challenges associated with prefabrication work in the MEP field.

The presentation will cover rationale behind prefabrication in MEP scope of work and the current challenges facing this effort.

Implications for the ATMAE audience: Audience should come out of this presentation with good understanding of the process of MEP prefabrication, why companies are going this direction and the challenges associated with this strategy now.

Major bulleted points of presentation:
- MEP
- Construction Planning
- Challenges with Prefabrication

Building Collapse: Avoidable yet endless tragedies in Nigeria

Logically, a building is expected to be a place of comfort and relief from fear and stress of all kinds when it is properly built. Whatever qualifies as a standard structure should be able to stand the test of time for a reasonable period. The frequent incidences of building collapse in Lagos, Nigeria, are becoming alarming, with tragic tales of sorrow, death, and perpetual anguish. According to the GDP Report for the Quarter One in 2021 published by the National Bureau of Statistics, Nigeria’s real estate sector grew by 1.77%, contributing a total of 5.28% to the real GDP of the country for the period under review (around USD5.3 billion).

But despite the bourgeoning real estate sector in Lagos, Nigeria’s commercial center, tragic incidences of building collapse are on the rise, as evidenced by the rising number of victims. Over the years, building collapse tragedies have claimed the lives of innocent occupants, pupils, residents, hawkers, bystanders, passersby, and site workers. In Lagos, the collapsed building tragedy spares no region, as no one seems to know when and where the next tragedy will strike.

The purpose of this study is to present a case study of building collapse in Nigeria and proposed solutions on safety and quality standards to prevent this type of tragedy. The major points of this paper will be covered as follows:
- Causes of building collapse at different levels and stages in construction
Personnel or hired third party agencies. The objective of this session is to present the process of this project and the challenges associated with building the net-zero house.

The presentation will cover details on how this project was developed with the community partner and the challenges faced during design and construction.

Audience should come out of this presentation with understanding of the Solar Decathlon competition and how programs can engage community partners in this effort. This is in addition to highlights on main challenges and opportunities.

Major bulleted points of presentation

- Net-Zero Houses
- Solar Decathlon
- Community Partnership

GEORGIA 7
Thursday, October 26  |  11:00am-11:25am
Perpetual pavements, environmental and cost assessment

Dr. Tamer Breakah, Ball State Univ.
Dr. Mohsen Goodarzi, Ball State Univ.
Dr. Tarek Mahfouz, Ball State Univ.

Perpetual pavements are pavements that are designed to last for 50 years or more without requiring major maintenance or rehabilitation. They are typically made of high-quality materials and are constructed using a variety of techniques that help in extending their lifespan. Perpetual pavements can offer a number of advantages over conventional pavements, including: reduced maintenance costs, increased durability, improved safety, and reduced environmental impact. The negative environmental impact of perpetual pavements is significantly lower than that of conventional pavements. This is because they require less materials and energy to construct, and they produce less waste. The initial cost of perpetual pavements is typically higher than that of conventional pavements, but the long-term savings in maintenance costs can offset the initial investment. Overall, perpetual pavements are considered as a promising option for improving the performance and sustainability of the
transportation infrastructure. In this study, the cost and environmental savings of perpetual pavements are discussed and evaluated.

Major Points:
- Introduction to perpetual pavements.
- Environmental and cost analysis.
- Cost benefit analysis.

Attendees of this presentation will be introduced to the evaluation of the environmental and economical of perpetual pavements. A cost benefit analysis will for perpetual pavements will be performed.

**GEORGIA 3**
**Thursday, October 26 | 1:30pm -1:55pm**

**The capstone experience:**
A hub, both for launching professional careers and recruiting students

Dr. Justin Dodd, Eastern Kentucky Univ.
Dr. Michael (Sean) June, Eastern Kentucky Univ.
Dr. Abdul-Amir Al-Helu, Eastern Kentucky Univ.
Prof. Vigs Chandra, Eastern Kentucky Univ.
Dr. Ray Richardson, Eastern Kentucky Univ.

Capstone courses in college curriculum provide senior students the opportunity to work on sizeable projects or professional certifications to synthesize principles, concepts, procedures to solve real-world problems. This involves relating past classroom learning to future industry practice. Capstone experiences vary according to the nature of the program of study whether it be Construction Management, Manufacturing, Engineering Technology Management, and Cyber Systems Technologies. These courses can range from being single or multi-semester, individual or group projects, professional certifications and /or exams, and structured or flexible. Through the examination of capstone experiences in differing disciplines, valuable ideas can be benchmarked, and best practices applied to other disciplines to encourage multi-disciplinary collaboration.

This presentation will discuss the structure and flow of capstone projects undertaken in Construction and other disciplines, with the intention of developing opportunities to showcase student work. It will present ideas for adapting best practices and highlight the opportunity capstone presentations create for building a community of learners.

Analysis of student achievement evaluated through capstone course experiences and other means of feedback strengthens student competencies. Students involved in projects are more likely to have a realistic understanding of professional expectations. Opportunities for bringing together graduating, continuing, and incoming students during capstone presentations events will strengthen their sense of being part of a professional community in addition to being recruitment and retention opportunities.

Major bulleted points of presentation
- Capstones mix theory and practice for concrete learning experiences.
- Capstones build professional communities and provide recruitment and retention opportunities.
- Identifying challenges and opportunities in implementation of multi-person, full-scale industry projects.
- Designing and implementing multiphase capstone projects based on the elements of a standard industry design cycle.
- Benchmarking best practices across disciplines opens the door to multidisciplinary projects.

**GEORGIA 3**
**Thursday, October 26 | 2:00pm -2:25pm**

**An investigation on the performance of Chat GPT in supporting green building research**

Dr. Mohsen Goodarzi, Ball State Univ.
Dr. Tamer Breakah, Ball State Univ.

As a language model developed by Open AI, there is a hope that ChatGPT can play a role
in supporting research in several ways such as information retrieval, idea generation, literature review, data analysis, and education and outreach. However, the usefulness and reliability of this technology is not yet demonstrated. Therefore, it is important to understand the extent to which it should be relied on in conducting research. To understand this, the accuracy and reliability of ChatGPT in providing a literature review of green building studies was tested in this study. First, ChatGPT was asked to provide a literature review of satisfaction with green buildings and support its literature through scientific publications. After 12 rounds of performing this search using different phrases, a total of 60 publications were listed and discussed by ChatGPT. These citations were then searched in different scientific databases such as Google Scholar, Web of Science, and Scopus. The results showed that only 9 were published and the remaining 51 citations did not exist. After further investigations, it was found that among the 51 fabricated publications, 4 were repeated with either different author names or different journal names. Furthermore, among the published works, 6 had wrong publication dates, wrong journal names, or wrong authors names. The findings of this study demonstrated that although ChatGPT can potentially help develop and conduct research, it cannot be a substitute for human expertise. Researchers should use ChatGPT as a complementary tool alongside their own knowledge, critical thinking, and research skills, and exercise caution in interpreting and validating the information provided by ChatGPT. It should be noted that this tool is still in the trial stage and further research is necessary after the new version is introduced and the findings should be compared to the current findings.

GEORGIA 3
Thursday, October 26 | 2:30pm-2:55pm
Review of Quantitative Dry Shaft Excavation Inspection Methods
Dr. Adam Kaplan, Kennesaw State Univ.
Dr. Nicole Farris, Texas A&M Univ. - Commerce
A proper drilled shaft (a.k.a. caisson) excavation inspection is crucial to the shaft’s structural integrity. Factors such as irregularities on the sidewalls, the verticality of the shaft, and debris on the shaft bottom play an essential role in the constructability and the structural performance of the shaft under service loads. In the case of dry shaft construction, the field inspector may visually assess the walls and base of the drilled shaft by entering the excavation. An entry into a drilled shaft requires compliance with Occupational Safety & Health Agency (OSHA) requirements, which may include testing for toxic and flammable gases. Due to such safety concerns, field inspectors have been reluctant to carry out such inspections. In this study, a range of drilled shaft excavation inspection equipment with the capability to eliminate sending a human into the dry shaft excavation has been investigated. Equipment varies in size, cost, and technology. The field effectiveness of several equipment types was evaluated during field demonstration events. Field observations have been summarized in tables as a guideline for equipment selection decisions. Finally, equipment selection recommendations have been made based on six criteria: safety, cost, mobility, accuracy, speed, and state department of transportation (DOT) experience.

GEORGIA 3
Thursday, October 26 | 3:30pm-3:55pm
Modeling nonlinear response of Gypsum board panels
Dr. Tathagata Ray, Morehead State Univ.
Gypsum board or drywall is typical in residential and commercial building construction. Due to
inherent fire resistance, gypsum board is widely used in a building wall, ceiling, and partition systems in residential, institutional, and commercial structures. An interesting fact about the gypsum boards is that their lateral force-deformation relationship reveals that they can dissipate energy in cyclic loading, which comes from windstorms and earthquakes. Hence, there is a need to model this nonlinear force-deformation behavior to account for energy dissipation. Numerous available models can trace the stiffness and strength changes through yielding, softening, and hardening; however, models that can address more complex behavior, such as degradations, large deformation, bond slip, and joint gap, do so by complex polygonal rules or smooth continuous functions describing momentary (tangent) behavior. There is a need for a unified model based on a combination of mechanical springs that can trace the instantaneous combined stiffness. To model the gypsum boards, a one-dimensional smooth hysteretic model using series and parallel springs, designed for nonlinear structural analysis, is enhanced to incorporate (1) time-independent properties, (2) nonlinear elastic and post-elastic softening and hardening, (3) sudden or continuous variation of strength, (4) degradation of elastic and inelastic stiffness, (5) a modified bond-slip model, and (6) an alternative joint-gap model with a variable gap closing length. This numerical formulation can adequately model the experimental response of the gypsum boards.

GEORGIA 3
Thursday, October 26 | 4:00pm-4:25pm
How Mentoring Matters for Women in Male Dominated Fields

Dr. Jennifer Warrner, Ball State Univ.
Sarah Strong, Ball State Univ.
Natalie Sanchez, Ball State Univ.

Although women encounter barriers in the construction industry, there are ways to overcome these barriers that can lead them to be successful in the field. It is one thing for the women going into the construction industry to accept that they will face additional challenges primarily due to their gender, but it is another thing for these women to be able to push through these challenges and overcome them. Female mentors have been found to be a positive influence in attracting women in the industry and provide benefits to both the mentor and mentee. Mentors provide useful feedback and guidance, can help increase one’s professional network, and can help with overcoming challenges at work. This presentation will highlight the importance of mentors for students from underrepresented populations. Results and finding from a qualitative research study about mentorship for females working in the construction industry will be highlighted. Ideas for how to incorporate mentorship programs into an academic program will also be shared. The information from this presentation could be incorporated into other academic majors and organizations as well.

Major Points:
• Importance of mentorship
• Importance of mentorship specifically for females in the construction industry
• Results and findings from a qualitative research study about mentorship for females working in construction
• Ways to incorporate mentorship into academic programs and other organizations

GEORGIA 3
Thursday, October 26 | 4:30pm-4:55pm
True Grit: Can Work Ethic, Mettle, and Drive be Taught?

Dr. Jennifer Warrner, Ball State Univ.
Sherif Attallah, Ball State Univ.
Natalie Sanchez, Ball State Univ.

Employers seek candidates who are reliable, dependable and productive – essentially, candidates with a good work ethic. However, research shows that new graduates lack this skill. According to research by NACE (the National Association of
ORAL PRESENTATIONS

Colleges and Employers), 87% of employers say professionalism and work ethic are very important, but only 44% of new graduates are proficient in those areas. In time and budget driven industries like the construction industry, a good work ethic is imperative for new hires. With a significant number of new graduates lacking these skills, can work ethic, mettle, and drive be taught? If so, how and when? This presentation will highlight results from a qualitative research study about work ethic in the construction industry. Both student and employer perspectives will be shared. The presentation will discuss responses, data, and insights to questions including:

- What are current trends and insights about work ethic by employers?
- Why is a good work ethic important?
- How do students believe they develop a good work ethic?
- Do employers and students think work ethic, mettle, and drive be taught?
- Do current college student believe their generation has a good work ethic?
- What strategies to teach work ethic be included in an academic curriculum?

Information from this presentation can be beneficial to other academic institutions and organizations.

Major Points:

- The importance of work ethic in the workplace and the classroom
- Qualitative research data and insights about work ethic from employers and students
- Strategies to teach work ethic in an academic curriculum

GEORGIA 3
Thursday, October 26 | 5:00pm-5:25pm
The sustainable choice for your DWV plumbing system.

Mr. Jack Wintrow, Cast Iron Soil Pipe Institute

The drain, waste, and vent (DWV) piping system in a building is a crucial component of the overall plumbing infrastructure. With sustainability in mind the choice of materials in construction is equally crucial. These systems are said to be out of sight, out of mind, sometimes an afterthought until a problem arises. Deciding which materials to use requires forethought and careful examination of what is environmentally friendly and a component of a circular economy.

A DWV piping system may be constructed of cast iron, PVC, ABS, other materials, or a combination of all the above. Which material fits best in a circular economy where waste and pollution are designed out, products are resilient and stay in use, and waste is recaptured by recycling? Which material fits in the take, make, waste linear model in which resources are extracted, turned into products, used, and discarded?

We live in a global economy and the environmental concerns at home here in the US are not necessarily the same concerns in other parts of the world. Goals for resiliency and sustainability should be referenced when looking at manufacturing processes in other countries.

This presentation will provide discussion of relevant topics that will bring the opportunity for thought provoking questions to help design a DWV system that functions at the highest-level while also being environmentally friendly. Some points that will be covered.

- Circular economy
- Prevalent materials being used
- Manufacturing process of materials
- Where waste goes
- Recycling
- Environmental concerns inside and outside the USA
- The green choice

A buildings DWV piping is a living & breathing system and is critical to the overall functionality of the plumbing. When the right material choice is made it can also be sustainable and resilient.
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Learning Outcomes:
- Define circular economy and how it applies to DWV materials.
- Identify where waste goes and how materials are recycled.
- List some green manufacturing processes.
- Choose the material that is most environmentally friendly.

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**GEORGIA 9**

**Thursday, October 26 | 2:30pm-2:55pm**

**Technical Writing Competencies in Industry 4.0: Evaluating Essential Skills for Success in Graphic Communications**

Dr. Carl Blue, Clemson Univ.

This research aimed to identify preferred technical writing competencies for students in graphic communications majors studying printing technologies in Industry 4.0. The study gathered data from industry professionals and academics in the print industry to evaluate selected technical writing competencies in the field. The purpose was to develop a better understanding of the technical writing skills required for students to succeed in this field. The research methodology included a survey with 10 selected topic areas related to technical writing, such as terminology, processes, proposals, reports, abstracts, instructions, documentation, visuals, presentations, and business communications. Over 120 respondents from industry and academia were asked to assess the importance of listed competencies. The findings of this study can be used to improve the curriculum and instructional materials for graphic communications students, ensuring that they acquire the necessary technical writing skills to succeed in the print industry.

Major bulleted points of presentation
- Research aimed to identify preferred technical writing competencies for graphic communications students in Industry 4.0
- Data gathered from industry professionals and academics in the print industry.
- Research methodology: survey covering 10 technical writing topic areas.
- Over 120 respondents participated in the survey.
- Findings will help improve curriculum and instructional materials for graphic communications students.
- Key skills highlighted: Excel competency, professional email writing, written and verbal communication, soft skills, product knowledge, and proper grammar.
- Respondents emphasized the importance of addressing ethical and social justice considerations in the curriculum.
- Technical writing is an important topic for graphic communications students, academics, and the industry.

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**GEORGIA 9**

**Thursday, October 26 | 3:30pm-3:55pm**

**Color fastness of Untreated Textiles in Direct-to-Garment Printing**

Dr. Amanda Bridges, Clemson Univ.

Many direct-to-garment printing units require pretreatment of fabric before image transfer. However, some CMYK printers, specifically those recommended for use on white or light-colored garments, require no pretreatment (Roland, n.d.). The Roland VersaSTUDIO BT-12 printer used in my GC 1050 Applications of Digital Graphics course is one such unit. The manufacturer guidelines recommend high quality, untreated cotton fabrics for best color quality; however, some research has indicated that 100% cotton fabrics can lead to ink smearing and low color strength (Hyeok-Jin, Jin-Pyo, Min-Ji, Sang-Yong, Ji-Hye, & Dong-Jun, 2022). This experimental research project seeks to examine a variety of fabrics and fabric blends to determine the best color fastness, which refers to color that does not run or fade after laundering.

An overview of direct-to-garment printing and the current state of the technology will be provided.
The presentation will then cover all aspects of the experiment including materials and equipment used, methods and procedure, results and data analysis, and findings.

Implications for ATMAE Audience: Direct-to-garment printing is a newer technology, and research related to color quality is somewhat limited. The results of this study can provide manufacturers and consumers with updated recommendations regarding color fastness of untreated common textiles.

Major Points:
- Overview of direct-to-garment printing
- Identify need for more research in direct-to-garment printing
- Common uncoated materials used in direct-to-garment printing
- Overview of experimental research project
- Results and material recommendations for uncoated fabrics

Improving the digital to garment inkjet printing properties of cotton by control the butyl acrylate content of the surface treatment agent.

Digital Color Output Conformity to ISO12647-7 Standards [GRACoL 2013 (CGATS21-2-CRPC6)] with the use of Statistical Process Control (SPC)

Dr. Haji Naik Dharavath, Central Connecticut State Univ.

The purpose of this applied research was to apply the SPC to determine the digital color output conformity to ISO 12647-7 standards in a Color Managed Digital Printing Workflow (CMDPW) over a period [100 days, (N = 100)]. The quality of digital color printing is determined by these influential factors: screening method applied, type of printing process, calibration method, device profile, ink (dry-toner or liquid-toner), printer resolution and the substrate (paper). For this research, only the color printing attribute overall average color deviation [ACD, \( _E (2000) \)] was analyzed to examine the CMDPW process consistency in a day-to-day digital printing operation. Printed colors from the random sample size \((n = 80)\) were measured against the GRACoL2013 standards to derive the colorimetric/densitometric values. Reference colorimetric values used in the analysis were the threshold deviations (acceptable color deviations) as outlined in the ISO12647-7 standards (GRACoL2013). A control chart analysis was applied for further determining the process (CMDPW) ACD variation. The data collected were run through multiple software applications (MS-Excel/SPSS/Minitab) to apply various statistical methods. Analyzed data from the experiment revealed that the printed colorimetric values were in match (aligned) with the GRACoL 2013 (reference/target) standards. Since the color values were in control throughout the process, this enabled the CMDPW to produce consistent acceptable color deviation (Average Printed \(_E (2000) = 2.978\)). Acceptable Threshold color deviation is \(_E (2000) \leq 3.00\).

Motion Capture to Performance Animation: the Art of the Retarget

Ryan English, Eastern Michigan Univ.

Three-dimensional computer animation created from live performance captured data, or motion capture – often referred to as mocap, is known as performance animation. After wading through a myriad of hardware and software options that enable this process many users think the procedure is straightforward. Determine your motion capture hardware, capture data, and import data to animation software and the result should be excellent, except when it is not.
The process of retargeting motion capture for use as performance animation is a delicate balancing act, a craft of its own: the Art of the Retarget. Retargeting is the process of interpreting and remapping data from a motion capture session from the original subject to the digital character or avatar. For ideal results one should have an array of knowledge that spans the basics of animation key framing and curve management to character setup. Utilizing this base knowledge of these sub-fields of the animation pipeline with a corresponding awareness of motion and intent are paramount to achieving a meaningful retarget of the motion data.

The data collected, point data or rotational information, will inform various points in the process of retargeting. Realizing and mitigating proportion differences between the physical actor and the digital character are the first steps to a great retarget. Making compromises based on the data will be necessary, but understanding the final intent of the animation will help guide the creative choices ahead. The subjective goal of the animation will determine the crucial first steps of the retarget process. If the placement of the hands is the foremost goal of the retarget, the process will look different than if the location of the feet is the most important. Outlined is a set of parameters to help guide the retarget process, considering data type and animation intention.

GEORGIA 6
Thursday, October 26 | 5:00pm-5:25pm
Sustainable Packaging in a Global World
Dr. Charles Weiss, Clemson Univ.

Sustainability is a major concern when it comes to packaging around the globe, and it is a very relevant topic to be discussed in classrooms and board rooms across the county. The term sustainability continues to be a hot button issue, but it is often misinterpreted, and many consumers just think a package is sustainable if it can be recycled. This presentation will look at the key factors when it comes to sustainable packaging around the world. Sustainability is no longer about creating something that is recyclable, but rather sustainability needs to be an important aspect for the entire life cycle of any package that is created locally, nationally, and globally. As part of a senior level Current Trends and Development class at Clemson Univ., students were charged with doing research on what packaging trends are going on in developing countries, and how packaging can be more sustainable for those countries. From the student response it is very clear today’s students are very interested in sustainable practices and are interested to find out what is going on globally in terms of package design. This presentation will look at current trends and will also highlight some projects students have created in the senior level Current Trends and Developments class at Clemson Univ.
which may pose potential safety hazards due to the handling of the powder and high-energy sources. Fortunately, a new alternative technology based on material extrusion similar to FDM systems has been developed. The significant difference is that the feedstock is in the form of pellets, eliminating the step of turning the raw material into filament form. This results in a safer and more convenient approach than powder-based 3D printing, which requires the handling of hazardous powder materials. Using pellet-shaped material is also more convenient from a recycling standpoint. Additionally, pellet-shaped feedstocks are commonly standardized industrial materials available for plastic and metal injection molding processes. Therefore, using these standardized materials with 3D printing technology would be a groundbreaking development in additive manufacturing applications.

Major points of the presentation:
- Characteristics of 3D printers using pelletized feedstocks
- Advantages of using pelletized materials for 3D printing
- Comparison of various 3D printing technologies and pellet-using printing systems.

**GEORGIA 4**
**Thursday, October 26 | 9:30am-9:55am**
*What managers define to enhance the adoption of automation for the future of manufacturing*

Remon Benjamin, Iowa State Univ.
Dr. Saxon Ryan, Iowa State Univ.

As the rise of automation in the various manufacturing fields is inevitable, it is crucial to gain a deeper understanding of the factors that contribute to successful adoption within an organization. Despite the potential benefits, many firms struggle to adopt automation and other Industry 4.0 technologies, partly due to a lack of clarity around the key factors that drive successful adoption and integration. Additionally, while various factors can impact automation adoption, it remains unclear which are the most significant. Alongside identifying the factors that lead to successful adoption, examining the reasons behind failures and extracting valuable lessons from them is vital.

This presentation will discuss the methods of assessing a large group of manufacturing experts. Additionally, the manufacturing automation participants’ opinions that lead to the success or failure of automation adoptions will be shared. Furthermore, managers’ perspectives on the most impactful factors will be discussed.

The audience will learn about the factors that affect the adoption of automation from management’s perspective. They will learn about which factors contributed to the successful integration of such technologies in their manufacturing firms and which factors led to the failure of its adoption. Furthermore, the audience will know the highest and lowest weighted factors that impact both successful and failure of automation adoption in manufacturing settings across the Midwest.

**GEORGIA 4**
**Thursday, October 26 | 11:00am-11:25am**
*Student’s Growth for Product Scoping through a Design-to-Build Curriculum*

Mr. Chad Dolphin, Iowa State Univ.

Product Scoping refers to an ability to distinguish features or characteristics of a product, this ability is important and helps maintain efficient communication between drafters, designers, manufacturing engineers, and shop floor personnel. The task of this research was to evaluate Student’s ability to learn product scoping through a hybrid activity combining content from one course, a Computer Aided Design Class; Advanced Technical Graphics and Communication, and another class; Introduction to Manufacturing.
The presentation will summarize the data gathered before and after the design-to-build activity was completed by students.

This research falls within Scholarship of Teaching and Learning, and may be interesting to an audience centered around Engineering Design, Manufacturing Processes, teaching Geometric Dimensioning and Tolerancing, and Design-to-Build Activities.

- Introduction
- Student and Course Demographics
- Activity Overview
- Pre-test Data
- Post-test Data
- Results and Conclusions
- Future Work

Continuous Improvement in Manufacturing for Optimizing post-COVID Operations

Dr. Susan Ely, Univ. of Southern Indiana

This topic involves changes to continuous improvement practices in manufacturing operations after the global pandemic, COVID-19. Both during and after the pandemic, businesses had to make adjustments in their operations due to issues with staffing, supply chain disruptions, and other modifications as guidance from the government and CDC changed with time. This impacted quality strategies previously implemented and necessitated adjustments, undoing previous efficiencies and quality practices. Post COVID operations cannot always return to previous procedures due to ongoing impacts from the pandemic.

This presentation will review previous leading strategies by industry-sector and present changes in Lean Six Sigma and other quality initiatives reflected in each sector as a result of the pandemic.

Discussions of particular challenges of the pandemic that impacted the adjustments to improvement methodologies and as well as ongoing limitations to traditional business operations will be addressed. New trends in manufacturing to gain efficiency, reduce cost, address labor shortages, and maintain high levels of customer service and quality will be presented. Finally, strategies for making agile and flexible quality management systems to adjust easily to future challenges will be shared. Materials will be provided to attendees to facilitate classroom or workplace discussions.

This topic is significant for educators and industry members alike, as ongoing continuous improvement is critical to maintaining a competitive edge in business operations and for training students for leadership positions in manufacturing operations.

Topics include:
- Continuous improvement
- Lean Manufacturing Techniques
- Six Sigma Methodologies
- Post-pandemic operations
- Agile and flexible business practices
certain complexities arise related to the formation of the graphite nodules which makes gate, riser and vent placement critical in their role of evacuating gas and dealing with turbulent flow. More recently, using Finite Element Analysis software, molten metal flow in ductile applications can be visualized prior to making a ductile cast iron pour to show potential locations of shrinkage defects and formation of gas pockets and other internal defects resulting from the placement of these risers, gates, and vents. However, many legacy mold designs remain in service and continue to produce adequate castings having been vetted with real world outcomes. This paper provides a systemic quantitative method to analyze legacy mold form performance over time and establishes that the benefit of FEA modeling can be balanced against the cost to redesign legacy molds used on everyday products by establishing some reasonable sub-set criteria that can be used to evaluate legacy molds as is, eliminating the need to apply costly FEA methods on each and every ductile iron mold form.

GEORGIA 4
Thursday, October 26 | 2:30pm-2:55pm
Application of Artificial Neural Networks in Bearing Fault Classification

Dr. Armin Moghadam, San Jose State Univ.
Dr. Fatemeh Davoudi Kakhki

Bearing failure highly impacts performance and production of manufacturing systems, causes safety incidents, and results in casualties and property loss. Therefore, identification of bearing faults, at early stages, is crucial to ensure seamless and reliable operation of induction motors in industrial and manufacturing operations.

Presentation Intelligent fault diagnosis methods using vibration signal analysis is widely used for fault detection of bearing for condition monitoring of induction motors. This approach, however, has several challenges. First, a combination of various data preprocessing methods is required for preparing vibration time-series data as input for training data-driven models such as artificial neural networks (ANN). In addition, there is no determined number(s) of features or specific methodology for data transformation that guarantee efficient and reliable fault diagnosis results. In this study, we use a publicly available benchmark dataset and to conduct experiments to evaluate the performance of ANN with various structures in detecting and classifying faults in three different locations of the rolling bearing element of the induction motor.

This study introduces proper implementation of data-driven models such as ANN algorithms to improve performance of fault detection task with higher speed and more reliability. Furthermore, the methodology and results have significant applications in predictive and preventive machine maintenance, and can be applied for the purpose of fault detection and classification using vibration signals in other machinery used in manufacturing environment. Therefore, the approach, methodology, and results will be beneficial to both researchers and practitioners with interests in reliability analysis and quality improvement of manufacturing systems.

Major Points:
• Challenges of using vibration signals for fault detection and classification are discussed.
• We will discuss how data-driven solution can address the challenges in use of vibration signals through data-dimension reduction and transformation techniques.
• Artificial neural networks with different structures are constructed and their performance is compared in fault detection and classification tasks.
• Implications of methodology and results for early fault diagnosis and enhanced reliability are discussed, with a focus on manufacturing systems.
• Implication of the proposed approach and results in planning predictive and preventive maintenance in industrial systems are discussed.
**ORAL PRESENTATIONS**

**GEORGIA 4**
Thursday, October 26 | 3:30pm-3:55pm

**Using Fractional, Factorial Design of Experiments to Optimize Gauge Repeatability and Reproducibility Results When Establishing Measurement Procedures**

Dr. Darren Olson, Central Washington Univ.

This presentation will be focused on the results of a blocked, two-level, fractional-factorial design of experiments (DOE) that was used to demonstrate the concept of optimizing gauge repeatability and reproducibility (R&R) results. The gauge R&R study was conducted using standard procedures, with two appraisers, three trials per appraiser, and five work pieces. The experiment was a two to the third design, blocked by operator (appraisers A and B). The two control factors were use of a fixture (yes/no) and method of tool application (lying flat or handheld). Outcomes were measured using the Total Variation Method, in terms of percent R&R (Y1) and percent appraiser variation (Y2), with the objectives being to minimize Y1 and Y2 by selecting measurement methods that are robust to the appraiser (i.e., regardless of operator). The scenario for this experiment was purposely chosen to be a simple measurement, using digital calipers to measure the major diameter of mass-produced steel bolts. The objective was to test the concept of using fractional, blocked DOE to help quality engineers specify measurement processes that are robust to variation from total R&R in general, and particularly robust to appraiser variation. This presentation will focus on the following key points:

- Overview of standard gauge R&R procedures
- Review of blocked, fractional factorial DOE principles
- Overview of the experimental setup
- Results of the test-of-concept

**GEORGIA 2**
Thursday, October 26 | 4:00pm-4:25pm

**Exploring Product Safety Climate and Decision-Making: Insights into Low Probability, High Consequence Events (LPHCs) in the Manufacturing Industry**

Dr. Saxon Ryan, Iowa State Univ.
Kirshanthi Ganesa-Moorthy, Iowa State Univ.
Nir Keren, Iowa State Univ.

Incident events can be reviewed with respect to the combination of the probability of events and the severity of their consequences. A review of our recent history reveals that Low Probability, High Consequence events (LPHCs), tend to be discounted. For example, before September 11, 2001, an Airplane crashed into capital energy plants, and terrorist attacks on these plants were not considered credible events when risk assessments were conducted. It is then paramount that the perception of LPHCs informs decisions about the facilities’ global operations and policy making, and the uncertainty behind predicting the occurrence of LPHCs may play a major role in decision-making.

Leaders in the manufacturing industry may dictate policies and make decisions while susceptible to the discount bias associated with LPHCs. They might discount LPHCs, although they have the tools and capabilities to assess LPHC risks. Therefore, LPHCs are a concern in this industry. This combination of factors exacerbates this concern since the decision-makers need to prioritize their needs and determine choices that would work based on their perception of their best interest. However, the possibility of products failing while consumers use them is a major product liability issue that manufacturers would face if root causes were not identified and controlled.

One organizational element that needs to be considered in the grand scheme of LPHCs is product safety climate, which, when at a proper level, may counter the discount of LPHCs bias and its effect on decision-making.
This presentation describes the development and the results of a research project on the relationships between product safety climate perceptions and decision-making scenarios reflecting various combinations of probability-consequence events in manufacturing facilities. The audience will learn about common patterns describing the product safety climate while understanding product safety dimensions and potential measures to de-bias the discount associated with LPHCs.

**GEORGIA 4**  
**Thursday, October 26 | 4:00pm-4:25pm**  
**A Study on the Dimensional Accuracy and Surface Roughness of Parts Made on a Mini 3-Axis CNC Router**  
Dr. R. Radharamanan, Mercer Univ.  
Maxwell G. Gabbard, Mercer Univ.  
Noah J. Harris, Mercer Univ.

Computer numerical control is a broad term that encompasses a variety of types of machines — all with different sizes, shapes, and functions. But the easiest way to think about CNC is to simply understand that it is all about using a computer to control a machine that carves useful objects from solid blocks of material. Traditional CNC machines are expensive, complicated, and typically only found in large manufacturing companies that can afford them. Small hobbyist CNC machines can run anywhere from $7,000 and higher; professional machines can cost millions of dollars! Now, for a fraction of the cost — under $800 one can own a Mini 3-axis CNC machine and cut, drill, mill, and carve objects of one’s imagination.

In this paper, a Mini 3-axis CNC router was assembled and tested. Simple shapes were cut on three different materials: plastic, wax, and wood. Measurements were made using a digital caliper. Data were collected for factorial design experiments considering 2-levels for parameters: spindle speed, feed rate, depth of cut, and material. Statistical analyses were performed on the collected data. Effects of chosen parameters on the dimensional accuracy of the parts made were analyzed. The results indicated that material and depth of cut have significant effects on the dimensional accuracy of the parts made. Surface roughness measurements made on the cut surfaces of different materials were also presented and discussed. Through this hands-on project, the students were trained in assembling and testing a CNC router, cutting simple to complex shapes using G-Codes, measuring the parts made for dimensional accuracy, collecting data for experimental design, and analyzing the data using Minitab and Microsoft Excel. Some of the difficulties encountered in assembling and testing the CNC router and recommendations for future work are also highlighted and discussed.

**GEORGIA 4**  
**Thursday, October 26 | 4:30pm-4:55pm**  
**Comparative Study on the Dimensional Accuracy and Surface Finish of Parts Made on the Low-Cost FDM, SLA, and SLS 3D-Printers**  
Dr. R. Radharamanan, Mercer Univ.  
Maxwell G. Gabbard, Mercer Univ.  
Noah J. Harris, Mercer Univ.

Three-dimensional (3D) printing is one of the most versatile and revolutionary additive manufacturing (AM) techniques to create 3D objects with unique structure and diverse properties. AM processes take the information from a computer-aided design (CAD) file that is later converted to a stereolithography (STL) file. In this process, the drawing made in the CAD software is approximated by triangles and sliced containing the information of each layer that is going to be printed.

The objective of this study is to compare the dimensional accuracy and surface finish of parts made on AM low-cost fused deposition modeling (FDM), stereolithography (SLA), and selective laser
sintering (SLS) 3D-printers. FDM is an extrusion-based 3D printing technology. The build materials used in FDM are thermoplastic polymers and come in a filament form. In FDM, a part is manufactured by selectively depositing melted material layer by layer in a path defined by the CAD model. SLA printers are a resin-based process which uses a laser to cure the liquid resin to create a hardened plastic part. SLA is a powerful 3D printing technology that produces extremely accurate and high-resolution parts that are capable of being used directly in end-use, low-volume production, or for rapid prototyping. SLS uses high-power laser to sinter small particles of polymer powder into a solid structure based on a 3D model. SLS 3D printing has been a popular choice for engineers and manufacturers for decades. Usually, SLS printing does not require support, which is advantageous over SLA printing. Small size parts were made of distinctive designs to evaluate the advantages and limitations of each printer. Measurements made on the printed parts from these printers were compared with the design specifications. The factors considered for the comparative analysis include print time, accuracy, material, complexity, and surface finish. Results obtained were analyzed and discussed.

GEORGIA 4
Thursday, October 26 | 5:00pm-5:25pm
Comparative Study on the Accuracy and Efficiency of a Mini-CNC Lathe and a Conventional Lathe

Dr. R. Radharamanan, Mercer Univ.
Sam W. Johnston, Mercer Univ.
Marc N. Palomares, Mercer Univ.
James C. Taylor, Mercer Univ.

Early CNC machines in the 1940s and 1950s used punched tape, which was then commonly used in telecommunications and data storage. This technology was replaced by analog computing technologies. From the 1960s into the 1970s, digital technologies emerged, making the production process automated and more efficient. In this paper, a low cost Mini-Computer Numerical Control (M-CNC) lathe was assembled and tested. The project cost was less than $450 for all necessary items to assemble the machine and the materials to manufacture the parts. The objective of this study is to compare and contrast the accuracy and efficiency of the M-CNC lathe assembled and tested to a conventional lathe. Two different small artifacts were made (a step part and a taper part) on both M-CNC and conventional lathes using three different materials (wood, plastic, and wax). Five samples of each artifact were made using the three materials on both lathes. Once all of the samples were machined, measurements were made and data collected for factorial design experiments: 2 machines (M-CNC lathe and conventional lathe), 3 materials (wood, plastic, and wax), 2 parts (a step part and a taper part), and 5 replicates (5 samples); three measurements on the step parts (small, medium, and large diameters) and two measurements on the taper parts (small and large diameters) were made. The data were analyzed using factorial design experiments. The statistical analyses and tests indicated that the M-CNC lathe with proper G-code programs was faster in producing prototypes than the conventional lathe; the wood had the roughest surface finish, while plastic and wax were both smooth. If this lathe was used to machine wood, the speed of the chuck would need to be increased or the final product would need to be sanded to get a smooth finish.

GEORGIA 2
Friday, October 27 | 10:00am-10:25am
Applying Modular Design in Mobile Robotics Research and Development

Mr. Benjamin Wright, Millersville Univ. of Pennsylvania
Mr. Dennis Nguyen, Millersville Univ. of Pennsylvania
Mr. Camdyn Brunner, Millersville Univ. of Pennsylvania
Dr. John R. Wright, Jr., Millersville Univ. of Pennsylvania
Dr. John R. Haughery, Millersville Univ. of Pennsylvania
A significant hurdle in research and development (R&D) of mobile robotics is the time required to design and implement a mechanical chassis due to the complexity required of modern control systems. The significance of this subsystem is underscored by the fact that limited system integration and testing of the diverse set of technologies (e.g., sensors, motors, controllers) required by mobile robots is only possible when the mechanical system is developed. And because a successful mobile robot requires fully integrating and iteratively testing the mechanical, electrical, and control systems, developing a robust mechanical design in a shortened timeline can allow for increased integration and testing time. Therefore, by using a modular design approach, mobile robotics R&D can be improved.

This presentation will provide an overview of the modular design approach and how it can be applied to a diverse set of engineering fields. Additionally, examples from mobile robotics R&D projects will be presented to illustrate the application of the modular design approach. Finally, results of using a modular design approach will be compared with projects that have not used this approach, with best practices for successful implementation offered.

These benefits are particularly important in the context of mobile robotics research and development, where fast prototyping and iterative testing cycles are essential when developing and integrating multiple technologies. Findings from this research have the potential to significantly impact R&D timelines for fields beyond robotics, including automotive, manufacturing, agricultural, and logistics/material handling.

Major points:

- Overview of the modular mechanical design approach and use cases
- Development examples using the modular design approach in mobile robotics R&D
- Results of R&D efforts using the modular design approach vs. those not using this approach
- Best practices for successful modular design approach implementation

GEORGIA 2
Friday, October 27 | 10:30am-10:55am

A human-robot collaborative assembly station with integrated VR monitoring/control – a digital-engineering project for THK manufacturing company

Dr. Yuqiu You, Ohio Univ.
Yang Liu, Ohio Univ.
Dr. Chang Liu, Ohio Univ.
Krerkkiat Chusap, Ohio Univ.
Max Liechty, Ohio Univ.

Digital engineering (DE), as an engineering strategy, has been accepted and applied in aerospace, automotive and some other leading industries to realize significant savings, quality and schedule improvements. It embraces current technologies based on various engineering disciplines including 3D CAD/CAE/CAB, math and behavior modeling and simulation, agile model-based systems engineering, AI & machine learning, factory automation, additive manufacturing (3D printing), and virtual & augmented reality (VR & AR).

THK Manufacturing of America, a global leading company for linear motion solutions, is currently under the transition from traditional manufacturing to digital manufacturing. The company is seeking applications to implement digital engineering solutions on their factory floor. This presentation is to introduce a collaborative project between the company and the Univ. to develop a human-robot collaborative assembly station with integrated VR monitoring/control to replace their current manual assembly stations.

The proposed presentation is to introduce a collaborative project between the Univ. and THK manufacturing on a human-robot collaborative assembly station with VR monitoring/control. The
project is a digital engineering solution application for THK to replace their current manual assembly stations for linear motion guides. The project involves faculty, graduate students, undergraduate systems from multiple engineering and computer science disciplines. The presentation will introduce the development of the solutions, design and system integration, hardware and software, system structure, HMI development, programming, and VR integration.

The proposed presentation will provide a real-world case on the implementation of digital engineering solutions in a leading manufacturing company. Not only the knowledge and skills applied from multi-disciplines during the development process will be introduced and demonstrated, but also the challenges and needs from manufacturing companies to face the trends of digital engineering will be explored and discussed. The challenges for academic institutions during the trend of digital engineering, the collaboration between the Univ. and the company, and the benefits for students will also be discussed in this presentation.

Major bulleted points of presentation:
- Background of this collaborative project
- System overview
- System structure and integration
- VR integration and programming
- System demonstration and implementation
- Challenges of digital engineering solutions for both manufacturing and academic institutions
- Benefits of this project
- Future research and project

**GEORGIA 3**
Friday, October 27 | 9:30am-9:55am

*Electrodynami**c Processing of Micro and Nano Pharmaceutical Powders Enhances Blended Ordered Mixture*

Dr. Mohammed Ali, The Univ. of Texas at Tyler

This investigation aims to maximize uniformity of the ordered mixture of individual micro and nano pharmaceutical powder particles through adoption of an in-situ electrostatic charging process. Batch processing involves using industry certified commercial blender where active pharmaceutical ingredient (API) powder and excipient (E) powder mix together. There are some mechanistic limitations with blending of powders in bulk quantities such as 1) uncontrolled electrostatic adhesion force, 2) cohesion among Es and APIs through the formation of soft and hard aggregates, and 3) adhesion of E and API resulting to a non-uniform blending. Constituent-wise the blending process does not distinguish between cohesive and adhesive forces. During industrial grade blending of API and E powders, the interparticle collision and friction causes turbocharging which results into clumping of particles and subsequent plastic deformation due to Vander Waals forces. Consequently, both the positive and negative charges exchange take place during the separation of the particles irrespective of them having same chemical composition. Electrostatic charging is always present in bulk polymer powder blending process. Additionally, the cohesive forces govern flowability and blending uniformity of fine powders and the capillary force dominates hygroscopic power while the relative humidity (RH) is greater or equal than 65%. This study proposes to control electrodynamically both blending and compaction processes at RH < 60% to achieve the desired Quality-by-Design. For a uniform blending of two or more submicron- and nano-sized particles with dimensional relative standard deviation (RSD) <
3%, powders to be dispersed first and then blended forming ordered mixture. Such an electrodynamic blending process could provide homogenous blend down to milligram-sample levels.

**GEORGIA 3**  
Friday, October 27 | 10:00am-10:25am  
**Hands-On Learning: A Project-Based Microfabrication Course Covering Maskless Photolithography, Metrology, Etching, and Sputter Film Deposition Techniques**  
Judith Fischer, Univ. of New Mexico  
Matthias W. Pleil

Microfabrication is an essential skill for engineers working in a range of fields, from electronics to biotechnology. This presentation will provide an overview of an undergraduate-level course on microfabrication that covers fundamental principles, techniques, and applications of microfabrication. The course is designed to introduce students to the basic concepts of microfabrication, including lithography, etching, deposition, device and process characterization. The presentation will discuss the use of microfabrication in a range of applications, including microelectronics, microfluidics, and MEMS. Students gain hands-on experience in designing and fabricating microstructures and devices using microfabrication equipment and techniques. The presentation will provide an overview of the course structure, including lectures, laboratory sessions, and project work. It will also discuss the course outcomes and the skills that students will develop by the end of the course. This presentation is relevant to anyone interested in microfabrication, whether they are students, educators, or industry professionals.

**GEORGIA 6**  
Friday, October 27 | 10:00am-10:25am  
**Improve the Reliability of RF MEMS Switches through Novel Switch Architecture**  
Dr. Qingzhou Xu, Morehead State Univ.

RF MEMS switches represent an enabling technology that has potentials to dramatically revolutionize the modern communication systems. Despite their remarkable advances and expanding applications, RF MEMS switches still fall far short of fulfilling their early promise. The reliability remains to be the main issue that has limited their wide applications. This research is to tackle this problem through novel mechanical design. Small mechanical springs will be placed within a switch’s uncontrollable two-third zone. These springs will efficiently decrease the impinging velocity of switch membrane during each of the repetitive switching on/off cycles and prevent the occurrence of severe mechanical shock and the ensuing mechanical damages. Meanwhile, these small springs will absorb and store the excessive electrostatic energy when the switch membrane touches down, and provide additional restoring elastic forces to overcome contact stiction when the switch membrane bounces back. Because these small springs are placed within the uncontrollable zone where the electrostatic force dominates the elastic forces, this approach will not increase the actuation voltage. Due to the mechanical nature of this approach, it has the potential to improve the reliability of both ohmic contact and capacitive coupling switches no matter what lead to the earlier failures.

**GEORGIA 3**  
Friday, October 27 | 10:30am-10:55am  
**Photography education: At the intersection of the future and the past**  
Dr. Erica Walker, Clemson Univ.

The first photograph using light sensitive chemicals on a permanent surface was created in 1827.
There were rapid scientific developments during the next 60 years until, in 1889, roll film was first manufactured bringing about the age of modern film photography. Today, smartphone cameras can outmaneuver all but the highest end cameras and lenses and artificial intelligence can render impressive visual imagery directly from words, so exploring historic processes in the classroom may seem irrelevant. However, in graphic communications education, there are sometimes great lessons in removing the opportunity for modern, computer-based tools in order to build an understanding of basic principles. In photography, this creates a transferable understanding of how light, color, and imagery work, no matter what tools creators use, to produce the powerful visual stories we see in advertisements and on social media today. In fact, in our department, students are increasingly expressing interest in historic processes such as letterpress and film by requesting special topics courses and additional research opportunities.

This presentation will explore methods I have been exploring with undergraduate students to leverage their interest in historic processes as teaching and research tools that encourage physical exploration in an age where photography and video creation increasingly lean into automation and artificial intelligence. Attendees will gain knowledge about historic processes with a range of complexity that could be integrated into course work at varying levels depending on the number of students and with consideration regarding access to chemistry and appropriate space. We will introduce current designs for 3D printed pinhole cameras created by undergraduates and a dark room box that allows for development without a full darkroom. Both these and other options explored in this session can provide inexpensive ways to integrate these ideas into the classroom.

GEORGIA 5
Thursday, October 26 | 10:30am-10:55am

Estimating Inventory Impacts after Catastrophes: Comparative Evaluation of Methods

Dr. Nilesh Joshi, Morehead State Univ.

After catastrophic events, accurately estimating inventory impacts helps companies assess losses, develop recovery strategies, and resume operations effectively. This presentation provides a comprehensive analysis of inventory estimation methods used to evaluate inventory impacts in such scenarios. It examines the challenges organizations face when quantifying inventory losses due to natural disasters, supply chain disruptions, and unforeseen incidents. The comparative evaluation includes commonly used estimation methods, such as counting physical inventory, analyzing past records, use of statistical models, using external data sources, and seeking expert opinions. The study examines the strengths, limitations, and factors that influence accuracy, data accessibility, and time requirements for each of these methods. Additionally, the research explores the applications of these estimation methods in various industries, such as manufacturing, retail, logistics, and healthcare. It highlights the unique considerations and challenges encountered when estimating inventory impacts post-catastrophe within these sectors. The findings of this study provide valuable insights to practitioners, decision makers, and researchers involved in inventory management, disaster recovery, and business continuity planning. By enhancing understanding of best practices in inventory estimation and facilitating the selection of suitable estimation approaches, this research supports effective decision making and promotes prompt recovery and resilience in the face of various post-catastrophe scenarios.
Artificial Intelligence: A Vision of the Future of the Project Management Profession in 2035

Dr. Neil Littell, Ohio Univ.
Ken Maglosky, Industrial affiliation of Accenture

Technological advances abound in the modern workplace. One of these technologies, Artificial Intelligence (AI), proposes significant disruption over the next ten years and beyond. Because AI is such a new technology, many struggle to understand how it could fit into the future workplace. In this presentation, the author will explore AI for the field of project management, and the potential impact on how AI will contribute to help project managers engage with stakeholders, monitor project performance, and make quicker decisions. This presentation is focused on the how artificial intelligence could impact the future of how projects are executed.

A vision of the future with respect to artificial intelligence (AI) will be presented. Different aspects of AI will be presented and explored. The capabilities of each technology will be discussed within the context of project management and similar management roles.

This presentation will identify and present core capabilities offered by artificial intelligence (AI) solutions. The author will project these capabilities forward through time to the year 2035 and how these solutions could enhance the abilities of a project manager as well as other stakeholders working with the project manager. The end result for the audience will be a deeper understanding of AI and how AI will impact the future workforce, and what they can do to begin to prepare for an AI augmented career.

Major bulleted points of the presentation
• Implications of Artificial Intelligence (AI) for the future of project management and similar professions
• The vision and value proposition of AI-assisted work in the year 2035
• Technologies to keep in mind as we work with our faculty and students to remain to be current and relevant

The Importance of Evaluating Alternative Project Costs for ATMAE Accredited Graduates

Dr. Dennis Jones, The Univ. of Texas at Tyler
Dr. Mark R. Miller, The Univ. of Texas at Tyler
Dr. Heshium Lawrence, The Univ. of Texas at Tyler

This presentation will show how relevant costs can be used by administrators in educational institutions or by business managers to make more informed financial decisions about the use of money and technology. Feedback from graduates and advisory board members informed the department that more time in the curriculum was needed to be devoted to this topic because most of the graduates were required to determine project costs. Cost-volume-profit analysis is used to predict net revenue for a given level of service. Time value of money and present value effect on planning and investment decisions were also noted as being important. The methods to cost services through time-driven, activity-based costing was also an important topic noted by graduates and advisory board members.

Decision makers in any organization need to base financial decisions on relevant costs. These include only the estimates of future cash flows that differ among alternatives. When cash flows from investment decisions that occur over a longer period of time, techniques should also be used to equate these amounts back to their present values. Time-driven activity-based-costing is a useful and relatively powerful method to inform the powers at be about pricing decisions. With increased interest in online learning and greater reliance on revenue-
generating activities, all of these concepts discussed are a useful means to analyze the financial decisions that all institutions of higher learning face.

While managing cost, the project manager is primarily concerned with estimating and earned value management, including both schedule and cost estimating. Earned value analysis is another example of a technique that can be used for both cost and schedule management. This presentation should help one understand how each part of cost management fits into the overall project management process that program graduates deal with on a daily basis. Estimating is initially done during planning while earned value management (EVM) is used to control costs and possibly resources and procurement throughout the project. Also, it makes individuals think about how decisions around funding and financing resources might affect project risks and other project constraints. These decisions will influence how well you plan the project across all knowledge areas and how work will be completed.

Major Bulleted Points of Presentation:
- Discussing the importance of various project costs
- Direct and indirect costs
- Fixed and variable costs
- Cost-Volume-Profit (CVP) relationships
- Time value of money and relevant costs
- Activity-Based-Costing (ABC) and Earned Value Management (EVM)
- Integrating project costs in coursework

GEORGIA 5
Thursday, October 26 | 2:00pm -2:25pm
Leadership Styles and Traits of STEM Faculty

Umama Nadeem, Southeast Missouri State Univ.
Dr. Sophia K. Scott, Southeast Missouri State Univ.

Within any organization, its leadership plays a pivotal role by having authority, responsibility, and the delegation of power (Alkaabi et al., 2022) over its employees. This has a strong psychological impact on the employee’s perception and behaviors which affects how well they perform at their job. The employee’s perceived support from their superiors reflects on their in-role performance, organizational spontaneity, and enhanced organizational
commitment (Eisenberger et al, 2001). Since every leader has a unique set of traits they exhibit, they all have different leadership styles. These varying leadership styles can sometimes make employees feel less supported by their superiors, and this lack of perceived support hinders their optimal performance. The purpose of this presentation is to explore the leadership traits and leadership styles of STEM faculty.

In light of previously conducted studies, this presentation will explore varying leadership styles, and traits in higher education. It will discuss leadership and shed light on the different traits they exhibit. Further, this presentation will describe leadership styles and traits. In addition, this presentation will explore how employees perceive support from their superiors and the impact.

This presentation has implications for the ATMAE audience by illustrating various leadership styles and their impacts on perceived support of faculty. The hope is that a link between faculty’s perceived support from their superiors and their job performance will be established in higher education. This approach can also be applied to industries as they examine perceived support of their supervisors and performance.

Major bulleted points of the presentation:

- Leadership in higher education.
- Traits of leaders.
- Leadership Styles.
- Results of a questionnaire on perceived support of faculty and their leaders.

GEORGIA 5
Thursday, October 26 | 2:30pm-2:55pm

Teaching Project Management using Computerized Simulation

David Stec, Central Connecticut State Univ.

A typical undergraduate course in project management will cover the fundamental knowledge areas of the Project Management Body of Knowledge (PMBOK) and use hands-on experiential projects as the basis for which students can apply project management processes in practice. With the shift to course delivery to online and/or hybrid delivery, the current model for delivering this type of project management course is insufficient at providing an integrated and coherent experience for all students. Insufficiencies include: a) a delivery model & experiential project that is accessible only to in-person students, b) an experiential project content and scope that varies and provides no shared platform for learning, c) an experiential project that only allows for one execution cycle during the semester, and d) project management software activity aligned with a textbook, but not with experiential project activity.

This work presents a model for an undergraduate course in project management offered in any modality that provides an integrated set of activities centered on use of a computerized project management simulation as the main experiential activity any course delivery modality. The simulation acts as the shared platform for the learning and application of project management processes aligned with the selected text, and provides multiple learning cycles for the students to better understand the complete set of project management skills necessary for project success.

- The course model is experiential-based using a computerized project management simulation facilitating access and participation to all students regardless of course delivery modality.
- The course model promotes an integrated set of project management simulation activity, text exercise activity, and project management software exercises.
- The project management simulation provides a common learning platform for students and allows for multiple learning cycles within the semester.
- The course model has students manage a project within a project in the planning and executing of course deliverables.
- The course model, activities, sample outputs, and opportunities for continued improvement will be shared.
Innovation in entrepreneurship is a multifaceted and complex concept that involves the creation of new ideas, products, services, and processes that contribute to the development of successful businesses. Innovation in entrepreneurship can take many forms, such as technological, social, and environmental innovation, and it can be driven by a variety of factors, such as changes in consumer behavior, shifts in market conditions, and advances in technology. Innovation in entrepreneurship strongly correlates with economic growth, job creation, and sustainable development. This paper will explore the various dimensions of innovation in entrepreneurship, including its benefits, challenges, and opportunities.

This presentation shares qualitative research results of interviews with new start-up owners in a specific midwest region. The researchers’ methodology and results will be discussed, namely the participant perceptions regarding innovation and suggestions for fostering innovation.

- Discuss existing literature on the importance of innovation in leadership
- Share qualitative methodology and results
- Suggestions for practice and further research

This presentation describes the ongoing evolution of graduate academic programs in the strategic and operational management of basic science, technology development, enterprise performance and applied engineering. We are sharing this information to reintroduce ourselves to interested parties throughout the general public. However, others who have an interest in the ongoing development of similar academic programs that address the integration of Engineering, Technology, Management and Applied Engineering (ETMAE) may also find our story of some benefit since we have included our experience with critical issues to be anticipated and pitfalls to avoid along the way. Both graduate students and student employers may recognize some opportunities that can be pursued in the management of their careers and enterprises.

While there are other academic programs at Virginia Tech that could also have been addressed, this presentation focuses on our graduate degrees and graduate certificates in Engineering Administration and Systems Engineering. Distance learning, instructors of practice, employer relations and freedom to innovate have played an important role in the evolution of these global academic programs. Integrating the opportunity push of Technology Management with the requirements pull of traditional Systems Engineering has also been an important consideration.
**ORAL PRESENTATIONS**

**GEORGIA 5**  
**Thursday, October 26 | 4:30pm-4:55pm**  
**Teaching and Learning Innovations: Application of Arena Simulation for effective teaching of Value Stream Mapping in Undergraduate Lean Six Sigma Class.**

Dr. Swapnil Patole, Mississippi State Univ.  
Dr. John Wyatt, Mississippi State Univ.

Lean Six Sigma (LSS) has become an important topic these days in continuous process improvement. LSS is a combination of Lean principles of waste reduction and Six Sigma methodology of variation reduction. Combined, Lean Six Sigma becomes an immensely powerful tool for process improvement in today’s highly competitive markets wherein quality, productivity and cost are all important for customer satisfaction. A value stream map (VSM) is one of the most important and the most complex tool in lean.

Traditional teaching of VSM in undergraduate Lean Six Sigma class is achieved by firstly mapping the As Is state of the process and then converting the As Is VSM into a To be VSM by applying lean tools of Kanban, pull system and continuous flow has demonstrated lower student learning outcomes. So, herein we have discussed a new instructional strategy of using simulation software ‘Rockwell Arena’ to enable effective student learning in class. A simulation of As Is state VSM of a manufacturing process is prepared in Arena and displayed in class after completing traditional teaching of Value stream mapping topic. Further, students in the class suggest and discuss modifications to As Is state VSM in Arena Simulation, eventually forming the To be VSM of the process. To encourage student participation in class, instructional techniques like think, pair, share are used wherein students are paired in groups to think about a problem and later share their findings with the class.

A student questionnaire comparing student learning before and after instruction using Arena simulation are compiled. It is evident from data that student learning is greatly enhanced with the use of Arena simulation for teaching Value Stream Mapping in undergraduate Lean Six Sigma class.

**GEORGIA 6**  
**Thursday, October 26 | 9:00am-9:25am**  
**Continuous Improvement Model for a Graduate Program**

Dr. Eli Aba, Univ. of Wisconsin-Stout

Customers have needs. Our graduate programs are designed to meet the needs of customers. CI is employed to track the needs of the customers and respond to them. Great graduate programs are accredited by accreditation bodies. One of the requirements of the accreditation bodies is that there should be continuous improvement (CI) of the graduate programs. This is needed so that the graduate programs will continue to meet the needs of their customers. Therefore, the presenter will discuss a CI model that can be employed to collect data from the customers and the analysis of the data. The major points of the presentation include background information on the graduate program, program advisory committee, accreditation body requirements, continuous improvement model, creation and deployment of the survey instrument, statistical tests, discussion of findings, and benefits of the CI model. The presentation will be about how to deploy the CI to monitor whether the program is meeting the needs of the customers. The data for the CI will cover a 1-year period. Statistical analyses will be performed on the data. Real-world example will be provided. The presenter will present findings on how their graduate program does the CI. Attendees will relate to the CI model of a graduate program. The model and findings may help program directors and instructors to deploy a CI model that will enable them track if their programs are meeting the needs of their customers. It is important that our programs are continuously improved to meet the needs of our customers.
GEORGIA 5  
Thursday, October 26 | 9:30am-9:55am  
**Developing a Mentorship Program to Connect Students with Alumni and Industry: A Framework for Promoting Career Development and Networking**

Dr. Mahmoud Al-Odeh, Eastern Illinois Univ.

Mentorship is an effective way to create career and networking opportunities, particularly when connecting students with alumni and industry members. This presentation provides framework for a strategy to help educators develop a mentorship program that connects students with alumni and industry. This strategy is developed based on best practices used in several colleges and universities.

The framework includes six steps to ensure the success of the program. These six steps include establishing goals, selecting mentors, recruiting mentees, training, facilitating, and evaluation. This strategy can be used in other universities to build connections between students, alumni, and industry. Mentorship programs are important to create a supportive and engaging environment that encourages students to explore their interests and connect with potential mentors and employers.

GEORGIA 6  
Thursday, October 26 | 10:30am-10:55am  
**Accreditation’s Long Pole: Implications for ATMAE**

Dr. Robert (Bob) Chin, East Carolina Univ.

During the pursuit of accreditation or reaffirmation of accreditation, sight is frequently lost of the forest for the trees. As a consequence, the majority of the recommendations made by visiting teams to the Board of Accreditation following a visit is “accreditation with a report in 2 years”. While based on anecdotal evidence, a case could be made that the Board of Accreditation’s minutes would support this observation. The recommendation occurs, it can be argued, because many of us are overly enamored with the pursuit of the self-study report that we lose sight of what accreditation means.

During the presentation, we will look at the model on which ATMAE’s standards of accreditation is based—the Universal Systems Model. The presentation will focus on what is metaphorically known as accreditation’s long pole, because of its length and because it is the accreditation process’ critical path. The presentation will close with a potential course of action or a way of proceeding.

What precipitated this presentation is a belief that many programs/options lose sight of accreditation’s long pole: its critical path. Audience members should expect to engage in a meaningful, productive, and thought provoking discussion. In response, it is anticipated, the audience’s take-away will be a greater appreciation for the accreditation’s long pole: the accreditation process’ critical path. In the greater scheme, a fundamental change in our approach or underlying assumption about the pursuit of accreditation or reaffirmation of accreditation will be forthcoming.

Major bulleted points of presentation:

- Role of accreditation.
- ATMAE accreditation in a nutshell.
- The Universal Systems Model and its adoption by ATMAE’s Board of Accreditation.
- Accreditation’s long pole: its lengthiest part and the critical path.
- At one time, the most frequently cited standard with which programs/options were out of compliance…. Why?
- Collecting and analyzing data and drawing conclusions? Ok, well, so what.
- Way forward.
Scaling Mt. ATMAE: Joining forces across departments and programs to create a unified accreditation self-study

Prof. Vigs Chandra, Eastern Kentucky Univ.
Dr. Michael Kennedy, Eastern Kentucky Univ.
Dr. Dennis Field, Eastern Kentucky Univ.
Dr. Ray Richardson, Eastern Kentucky Univ.

Undertaking the ATMAE accreditation self-study development is a significant undertaking by any program. Adding multiple programs, spread across multiple departments to the mix, as well as going online with the core phases of its development, offer potential efficiencies, but also increase the complexity of the effort. Working with colleagues spread across various units on campus requires effective communication of priorities and timelines and anticipating areas where the process may require additional resources and further action. The time-sensitive nature of obtaining certain documentation must also be considered. While starting well in advance of the submission is not a guarantee of success, it does enable the opportunity to identify the “big rocks” early, and act on them according to the availability of resources.

Like climbing a steep mountain, the ATMAE accreditation self-study development process is challenging. As one proceeds, though, the effort’s value becomes increasingly evident: participants gain new and different viewpoints of their surroundings. In climbing ‘Mt. ATMAE’, a program gains a refreshed perspective to the numerous dimensions of student success. It involves stakeholder input, analyzing numerous reports, leading programs to make meaningful changes in their operating procedures. The crux of the process is extracting information from the different sources where it is held, consolidating it in actionable form takes expertise in rendering it useful, making data informed decisions. Development team members recognize the need to be cautiously ambitious in our goals, and if anything, over-prepare for the work being undertaken. The experience of summiting the climb is a unique one, recognizing that we have given it our best efforts under the constraints we are operating under. Additionally, the accreditation process presents unexpected rewards, insights, the camaraderie experienced among those who work diligently over the extended timespan that such a task necessitates. New connections and associations were formed between colleagues who work in different areas, pooling expertise together for this venture. The sense of shared ownership in a significant venture bonds colleagues together, ready to take on the steeper grade sections together, coming to each-other’s aid frequently, enjoyably.

The view from the summit is well worth the effort! A special feeling, known by others who may have ventured into similar territory. Actively participating in the process gives us a clearer perception of the landscape our students are venturing into, recognizing that technology is transforming it. With many moving parts involved in the accreditation self-study process, some under one’s control, others only peripherally so, it is important to get an early start on the accreditation on the planning process. Starting with familiarizing oneself with the specific standards, identifying the ones that are vital to its success, allowing sufficient time for collecting the data, analyzing it, using it thoughtfully, documenting the actions taken along the way. We recognize that the strength of the team derives from its members, delegating crucial tasks such as data analysis, editing, organizing to specific members with interest and aptitude for these. Putting in place multiple pieces of protection, check-ins, and multi-person groups with leads accountable for specific tasks is important, so that opportunity for success for the tasks we choose to undertake are not only possible, but it is also likely. It is vital to maintain confidentiality and security of the documentation throughout the process. Maintaining perspective, both regarding overall process and specific strengths and vulnerabilities at different points along with path, allows us to make
informed decisions about what is under our control and what we may let go of.

Major points:

• Zoom’s the word: Accountability meetings early and often keep the focus front and center on the documentation

• Focusing on outcomes: extracting information from different sources regarding employment, job advancement, employer satisfaction of graduates, and advisory committee involvement

• Document, document, document: Tracking improvements in program and course offerings back to specific

• Newton was right! Inertia’s a real thing: Faculty are not immune to its effects, getting the standards authored, reviewed, and revised takes time and effort, as does putting together resource room materials

• Online tools can help: Tremendously. Information about the ones we used will be shared.

• Reflecting on parts of the process that were ably navigated and those we need to pay closer attention to in the future

GEORGIA 6
Thursday, October 26 | 1:30pm - 1:55pm

I can’t get no satisfaction: Significance of student satisfaction in higher education

Dr. Justina Buck, Univ. of Arkansas Fort Smith
Monique Bracken, Univ. of Arkansas - Fort Smith
Kiyun Han, Univ. of Arkansas - Fort Smith

The Student Satisfaction Inventory (SSI) seeks feedback from students regarding their college experience in areas such as enrollment management, campus life, and academic affairs. This inventory measures student perceptions based on both satisfaction and importance. Universities can use this data to recognize their internal strengths and challenges as well as compare themselves nationally. SSI allows colleges to view how satisfied students are within the context of what truly matters to them (Bryant, 2006, p. 26). Additionally, SSI can play a vital role in providing outcome measures that can be used to improve programs.

In this presentation, researchers from one four-year regional Univ. will investigate results from SSI surveys administered in 2020 and 2023. The analysis and comparison of student satisfaction results, pre- and post-COVID, will focus on ATMAE accredited programs.

The implications of this study and presentation have the ability to provide fellow ATMAE programs an example on how they can approach student satisfaction in fulfilling their accreditation requirements, including creating short and long-term goals and strategic planning.

Attendees of this presentation will be able to:

• Understand the top priorities for strengthening the student experience

• Recognize the importance of student satisfaction on retention and quality of programs

• Identify areas of strength and concern for student satisfaction in specific ATMAE programs

GEORGIA 6
Thursday, October 26 | 2:00pm - 2:25pm

From ATMAE for ATMAE: Internship Features Self-Reported by ATMAE Members

Monique Bracken, Univ. of Arkansas
Dr. Justina Buck, Univ. of Arkansas Fort Smith

Whether you are still in beginning stages of creating your internship program or you have been facilitating your campus internship program for years, this presentation is for you! Come hear our survey results on how other ATMAE programs coordinate their internship programs and gain knowledge of common practices to better align with other programs. This presentation will utilize the diversity of perspectives from different disciplines and campuses to provide an overview of shared internship components with the goal of gathering information for creation, maintenance, or improvement of your program.
Research over the years has shown the many benefits on having an internship program, but much of this research does not include the configuration of these programs. To design an internship program that is successful, we must participate in meaningful discussions about key components, successes, and challenges of these programs. This presentation will review the results of the “Designing a Success Internship Survey” that was administered to ATMAE members in March and April of 2023. The survey was designed to explore the delivery and structure of internship experiences across ATMAE programs.

Learning outcomes for this program include:

- Explore internship components and structures used by ATMAE collegiate members.
- Identify key elements of internships to create, maintain, or improve your program.
- Recognize challenges and unique features that make some programs successful.

GEORGIA 6
Thursday, October 26 | 3:30pm-3:55pm
If you want to teach in our program, change majors

Mr. Jake Hildebrant, Murray State Univ.

Tenure and Promotion Requirements for Engineering Technology Faculty

Most universities require faculty to possess a Ph.D. in their discipline for tenure and promotion. Four-Year Engineering Technology, or Applied Engineering, degrees are unlike other Univ. disciplines. There are very few Ph.D. opportunities for someone with an Engineering Technology undergraduate degree, yet many colleges and universities still require faculty in these programs to possess a Ph.D. to become a ranked faculty member. The requirements often result in the colleges hiring a faculty member with a theoretical Engineering Ph.D. to teach in Engineering Technology programs. Other disciplines at colleges and universities that have limited Ph.D. offerings allow a Master’s degree for tenure and promotion.

The author experienced this problem at their Univ. and has witnessed a very high faculty turnover rate among the Engineering Technology programs at the Univ., which is due to both theoretical Engineering faculty becoming frustrated with the high levels of application required to teach Engineering Technology and faculty with Engineering Technology degrees not having a pathway to tenure and promotion. As a result, when students ask the author for directions to prepare them to teach in an Engineering Technology program, the author advises the students to change majors to a theoretical Engineering program to give them a direct pathway to more Ph.D.s. Students should never have to change majors to teach in their discipline, but this is where Engineering Technology programs have evolved due to the confusion of the discipline.

This paper will examine current hiring practices in Engineering Technology programs and look at examples of universities that create alternative pathways to tenure and promotion for faculty with Engineering Technology degrees. The paper will also examine ways to encourage more faculty with Engineering Technology degrees to apply for faculty positions in the discipline.

GEORGIA 6
Thursday, October 26 | 4:00pm-4:25pm
Administrators in the Classroom: Why and How

Dr. James Jones, Ball State Univ.
Dr. Tarek Mahfouz, Ball State Univ.

As administrative burdens seemingly increase without end, faculty are often pulled out of their teaching and scholarship roles to meet these requirements. At the same time, budget and hiring concerns have increased the difficulty of adding new faculty members to the team to cover this
gap. Understanding the balance and importance of teaching in leaders’ professional roles can have a critical impact on the overall effectiveness of an administrator of a technology program.

As many institutions are increasing their assessment, data collection, reporting, and other requirements, administrators often find themselves pulled between their role as a faculty member in front of the classroom and meeting these new challenges. At many institutions, these administrators are also some of the most seasoned instructors in the classroom and have a direct interest in remaining involved in the program curriculum, and there are sometimes no additional faculty to cover classes in other cases. This presentation examines the balance of administration and teaching to best benefit technology program administrators at their own institutions.

Presentation attendees will understand the balance between administrative and teaching roles at their technology programs. Successes and challenges from the administrator-instructor’s viewpoint will be shared, preparing attendees to implement these approaches in their own programs.

Major Points:
- Understanding the challenges of balancing administrative and teaching roles
- Constraints and demands
- Importance of the administrator-instructor
- Alternative approaches to maintain instructional involvement
- Conclusions, recommendations, and discussion

GEORGIA 6
Thursday, October 26 | 4:30pm-4:55pm
Assessment of Scheduling Student Learning Outcomes: Challenges and Solutions

Dr. James Jones, Ball State Univ.
Natalie Sanchez, Ball State Univ.

Scheduling is a critical component of effective construction project management, and proper assessment is therefore an important task of program administrators. Developing an effective curriculum to develop student ability in construction scheduling, and then creating an effective way to measure this ability, can be a daunting task for program administrators. Understanding the importance of this ability for graduates’ future careers and properly developing this ability can have a significant impact on the overall reputation of the construction program.

Administrators and faculty members in construction programs are charged with developing appropriate curricula to prepare students for careers in industry. Scheduling is typically viewed as one of the most important abilities for these graduates, and there are a wide range of approaches to teach and measure this ability. This presentation examines the curriculum, summative student learning outcome, and assessment methodology for construction scheduling for technology program administrators to implement at their own institutions.

Major Points:
- Understanding the importance of scheduling ability
- Curricular approaches for construction scheduling
- Development of appropriate student learning outcomes for scheduling
- Assessment of scheduling student learning outcomes
- Industry input and involvement in the process
- Conclusions, recommendations, and discussion
This presentation will be focused on a case study about the initial phases of a project aimed at attaining accreditation for a legacy Industrial Technology program. The program is housed at a regional state Univ. that also has Engineering Technology programs accredited by ABET TAC. Historically, the program has served as an outlet for students who were seeking to transfer out of an Engineering Technology program but continue their studies within the department. Previous department chairs have resisted the idea of attaining accreditation for the program. Leadership is now in favor of attaining accreditation. This program’s curriculum is structurally different from the department’s ABET-accredited programs, and one of its purposes is still to serve as an alternative path for some students transferring from those programs.

Given the program’s curriculum, ATMAE was a logical choice as the agency with which to seek accreditation. The project phases highlighted in this presentation start with the decision to seek ATMAE accreditation. One faculty member has considerable experience as an ATMAE visiting team member. This faculty member took the lead in conducting a gap analysis, defining the work to be completed, gaining buy in from faculty and staff, re-establishing an advisory board, and performing the project planning for seeking an initial accreditation visit. The presentation will conclude with an overview of these activities and a summary of the project’s status.

Recovery from the shut-downs and restrictions associated with the COVID-19 pandemic has been plagued by thousands of flight cancelations and delays by commercial airlines domestically and internationally due to crew shortages (Natalie B. Compton, Washington Post 2022). The airline staff shortage involves not having “enough people to fly the planes, serve the passengers or unload their bags” (Joann Muller, Axios 2022) as well as crew shortages in Air Traffic Control towers. The described crew shortages and their concomitant impact on flight cancelations and delays raise questions about safety in aviation that require attention and redress.

The presentation will review the extent and scope of flight cancelations and delays at large hub airports in America as well as leading international airports overseas, such as London Heathrow and Gatwick, and Amsterdam Schiphol. After reviewing the extent and scope of flight cancelations and delays, the presentation will discuss causality with a particular focus on crew shortages through the lens of flight safety before concluding with viable remedies from a safety perspective to address and solve the problem. Failure to address and solve the problem effectively can lead to catastrophic losses, which are avoidable when safety remains paramount in decision making and strategic management of airports.

The audience will benefit from insights and understanding of a problem that impacts everyone directly and indirectly since most audience members traveled by commercial airline service to attend the conference or will travel by air to engage in other academic, economic, medical, or recreational activity.
ORAL PRESENTATIONS

Major bulleted points of presentation:
- COVID-19 early retirements and safety implications
- COVID-19 furloughs and safety implications
- Post COVID Flight cancelations
- Post COVID Flight delays
- Flight safety analyses
- Crew preparedness
- Safety implications
- Safety remediation

GEORGIA 4
Friday, October 27 | 9:30am-9:55am
Risks and Challenges Faced by Commercial Female Drone Pilots

Dr. Burchan Aydin, Texas A&M Univ. - Commerce
Dr. Nicole Farris, Texas A&M Univ. - Commerce

Drones have emerged into recreational, commercial, and public safety sectors rapidly in the last decade with over fifty applications. However, public is still at a consciousness raising stage for the drones. Several survey studies showed that public perceived drones as killer machines, or as privacy interrupters. Commercial and hobby applications of drones receive mostly negative public attitudes. Thus, the authors of this research hypothesized that the lack of public trust for drones could create not-safe, risky working conditions for commercial female drone pilots. Additionally, as with other Science Technology Engineering and Math (STEM) fields, drone industry shows a lack of gender diversity. Currently, only 8% of 304,256 certified drone pilots are female. The objectives of this study are to determine the working conditions of the female drone pilots in a man-dominated industry, risks and challenges faced, safety at work, their earnings, job satisfaction, job security and opportunities, and to understand the differences between male and female drone pilots’ attitudes towards drones and perceived risks.

A mixed-method survey methodology was used and distributed via Qualtrics. The participants were recruited from a random sample of drone groups across the US and Amazon mechanical Turk was utilized to increase participant numbers. The results of the study show the need to improve the working conditions of female drone pilots, their lack of job safety, and limited opportunities to grow, and what could be done to accomplish these objectives.

The attendees will gain understanding of the current working conditions of commercial female drone pilots, and discuss how safety and job satisfaction could be improved.

Major bulleted points of presentation
- Safety perception of female drone pilots with regards to their job duties
- Challenges faced by female drone pilots while on duty
- Job satisfaction of commercial female drone pilots
- Gender’s effect on attitudes towards drones

GEORGIA 4
Friday, October 27 | 10:00am-10:25am
Innovative projects using mixed methods data collection approaches

Dr. Gretchen Mosher, Iowa State Univ.

In planning scientific experiments, quantitative and generalizable data are generally the goal. However, much can be learned in research projects using both quantitative and qualitative data collection methods. Using mixed methods often uses a smaller, but more in-depth sample that can provide a different perspective of the problem. Mixed methods approaches can be used in safety, quality, and academic environments to engage with stakeholders, prioritize and quantify input variables for a mathematical model, and provide an in-depth understanding of process components.
This presentation discusses the mixed method methodology as applied to current and previous projects focused on student success, occupational safety, and quality management processes. The focus and goals of each project will be discussed, with a specific focus on the role of mixed methods data collection approaches. Implications for researchers will conclude the presentation.

The audience will learn how mixed methods data collection approaches can have been used while maintaining appropriate rigor and validity in research projects. Recommendations and implications for ATMAE researchers will conclude the presentation.

Major points of the discussion:
- Mixed method data collection approaches
- Examples of projects where mixed methods were utilized
- Implications for applied researchers

Community Resilience: Technology used for Advanced Education, Training, and Preparation

Dr. Jessica Murphy, Jackson State Univ.
Dr. Donna Pearson
Dr. Yalanda Barner

Natural disasters across the nation continue to intensify at alarming rates. Life and property destroying tornados, catastrophic hurricanes, torrential flooding, blazing wildfires, and other atmospheric events poses constant threats to communities. Such natural disasters cause significant hardships, from mental and emotional trauma to financial distress. Smith (2021) from NOAA’s National Centers for Environmental Information (NCEI) reported that 22 separate billion-dollar weather and climate disasters across the United States. Smith further asserted that events of 2020 included a record 7 disasters linked to tropical cyclones, 13 to severe storms, 1 to drought, and 1 to wildfires. The 22 events cost the nation a combined $95 billion in damages. In considering such impacts, some communities may struggle with their ability to bounce back from such devastation.

The purpose of this project is to discuss a multi-disciplinary approach to emergency and disaster preparedness and response with technology being at the forefront. The technology tools used in Emergency Management’s functions, proper messaging and notifications, psychological and emotional disaster management considerations, and public safety. This will also reveal how emergency and disaster preparedness is an academic program, and how it can be complementary as concentration in the Technology discipline.

Developing an effective technical presentation course for student needs

Dr. Scott Abney, East Carolina Univ.

Developing an effective technical presentation course for student needs

One of the most important elements of both business and education is in the form of effective communication. For instance, creating and developing presentation skills allows the student to express their points and ideas to their peers within an academic setting. In business an effective presentations can assist in selling others on products, implementing projects, and navigating business structures. Furthermore, the rise of remote and hybrid work since Covid-19 has soared and is expected to grow to 80% in the near future which creates a need for the future workforce to be able to effectively create presentation skills through alternative means such as online meetings.

To help meet this need, this presentation goes in depth of how a technical presentation course was
created to meet Quality Matters (QM) standards while integrating sections of presenting that students will see not only in their current studies, but in their future careers as well. Topics that were created for this course were as followed: determining purpose and audience, cross-cultural communication, researching topics & organizing ideas, online meeting etiquette, and working in small groups. Since this was the first time the course was offered in this format, students were asked to complete a survey for feedback on how effective they believed the course was in developing presentation skills and effectiveness of the course layout. This survey was distributed to students that completed the class in both face-to-face (FTF) and online settings.

Major points:
- Developing the course to meet QM standards
- Creation of projects and rubrics used for the course
- Effectiveness of utilizing video interaction from teacher perspective
- Comparison of student responses of FTF and online students
- Improving the course to continue to meet student needs

GEORGIA 7
Thursday, October 26 | 9:00am 9:25am
Artificial Intelligence-Powered Chatbots for Stakeholder Analysis in a Project Management Course

Dr. Neil Littell, Ohio Univ.

Project managers should complete a stakeholder analysis as a best practice in the project management industry. Typically, this exercise in an academic environment involves roleplaying or providing people with videos of people to have them develop the stakeholder analysis. In many of these cases, the behaviors of the individuals are relatively leading, which could devalue the student experience of performing an actual stakeholder analysis. For this presentation, an instructor developed a lab where students interact with AI-powered chatbots. The students interact with these individuals and develop their stakeholder analysis based on the conversations held with the AI chatbots. We will also present how to easily build free chatbots for other academic deployments.

In this presentation, the author will describe the current state of stakeholder analysis in an academic setting and the weaknesses of typical methods of roleplaying or video-based stakeholder analysis. The author will present how they easily developed AI-powered chatbots for deployment within their undergraduate and graduate-level project management courses. Student experiences will be discussed and the author will teach the attendees how to easily build AI chatbots without needing to know how to code. Lessons learned will also be presented.

This presentation will illustrate a no-code option for faculty members to create realistic AI-powered chatbots that their students can use to practice engagement and reflection upon those engagements. Faculty will learn how to replicate this experience as well as adapt the experience for their curriculum.

Major bulleted points of presentation
- Overview of Artificial Intelligence from a chatbot perspective
- How to build a chatbot using character.ai
- Live demonstration of the chatbots
- Discussion around the lab activity and the preliminary results observed

GEORGIA 6
Thursday, October 26 | 9:30am 9:55am
Course Design Lessons Learned from COVID-19 Pandemic

Dr. Eli Aba, Univ. of Wisconsin-Stout

Course design is very important to the success of students in a course. COVID-19 has made us reflect
more on the way we design our courses. We must design our on-campus courses in such a way that switching to an online platform will be seamless. COVID-19 pandemic has had an impact on the way we design courses now. During the height of COVID-19, almost all our on-campus courses switched to online platform. We had to creatively meet the needs of our students. A lot of lessons have been learned. These lessons are the new normal on some campuses. The presentation will be about the lessons learned during the pandemic and how we can apply these lessons to our future courses. The major points of the presentation will include background information on course design, COVID-19 impact, on-campus courses, COVID-19 lessons, application of the lessons, and benefits of the application. Therefore, the presenter will discuss how the lessons learned could be applied as a model to improving a course design. Attendees will relate to the COVID-19 lessons. The lessons may help instructors to design courses that will help learners improve upon their performance. This will help our course design for the any future switching of course delivery platforms.

GEORGIA 7
Thursday, October 26 | 9:30am-9:55am
Implementing a Digital Engineering Strategy with a Four-Year Institution
Dr. Neil Littell, Ohio Univ.
Yuqiu You, Ohio Univ., Ohio

A companies strive to design, develop, and manufacture advance products with advanced features, we face increased constraints to engineering design, the SOP (Start of Production), and product support. In response, companies are relying on their digital engineering strategy to assist with the launch and sustainment of their products. In this presentation, professors from a Midwestern Univ. will present the digital engineering strategy and initiatives being pursued within the college. We will discuss the curricular impact as well as the impact to research and our strategic partners including industry and Department of Defense collaborators.

In this presentation, we will discuss digital engineering at a midwestern Univ. and how we are working to align our curriculum to the industry need for employees who are capable of working within a digital engineering environment. We will discuss industry partnerships, curriculum alignments to digital engineering competencies and present a roadmap for the digital transformation at XXX Univ..

Digital engineering will be defined, and the end state goals of digital engineering will be presented. The digital engineering transformation project ongoing at XXX Univ. will be presented with discussions on how others can start such initiatives within their programs.

Major bulleted points of presentation:
- **Definition of digital engineering**
- **Description of digital engineering at XXX Univ. and our digital engineering initiatives**
- **Advice for faculty who wish to start digital engineering and transformation efforts**

GEORGIA 7
Thursday, October 26 | 10:30am-10:55am
The Importance of Data Governance in Lean Six Sigma: A Focus on Data Privacy in Higher Education
Manal Alduraibi, Purdue Univ.
Chad Laux, Purdue Univ.
Dawn Laux, Purdue Univ.

The purpose of this study is to investigate the role of data governance, particularly data privacy, in Lean Six Sigma (LSS) within the context of higher education. The study aims to explore how data privacy can impact the execution of LSS projects and highlight the importance of data governance in the information age. The importance of data privacy has been overlooked in the Quality Management literature, and there is a need for more attention
to be paid to this aspect by LSS scholars and practitioners.

This study employs a descriptive methodology, which includes a review of management, data governance, and LSS journal articles from the primary management science publishers. The findings of the study provide insights into the role of data governance, specifically data privacy, in planning and executing LSS projects. The study also offers recommendations for LSS practitioners and instructors regarding data privacy, given the lack of studies in the existing literature.

The research limitations of this study include its descriptive and theoretical nature, as it relies on the current literature and the authors’ subject matter experiences in both the higher education and industry sectors. Further empirical study is recommended to provide reliable findings regarding the role and importance of data privacy in LSS.

The originality and value of this paper lie in its contribution to the existing literature, given the limited studies on the role of data privacy in LSS projects. While many scholars have emphasized the importance of data quality in LSS, this study sheds light on the significance of data privacy, which can be highly beneficial to LSS instructors in higher education and practitioners in the industry. The findings of this study also serve as a call to action for LSS scholars and practitioners to incorporate data privacy as an integral part of their projects.

GEORGIA 5

Thursday, October 26 | 11:00am-11:25am

Engaging Students through Active Learning in a Gaming Course

Dr. Devang Mehta, North Carolina A&T State Univ.

To align skills and knowledge learned in a gaming course with the industry trend, an assignment was given to the students to evaluate their games. Students developed video games in the gaming course. A questionnaire was prepared to survey their games. Their video games were assessed using the five-point Likert scale on the following user experience (UX) characteristics: (1) visual design, (2) game rules, (3) game controls, (4) audio, and (5) game playing experience. The students in the gaming course created two digital games. The two games were different in objectives however, they had common necessary game features. The goal of the first game was to reach the destination by avoiding obstacles. Whereas, the players had to drag the colored balls to their corresponding colored goals by overcoming challenges. The students were given the flexibility to apply their creativity and make them unique from other games. A questionnaire was supplied to students to obtain players’ opinions about their games on various UX traits. The students asked players to play their games and later, asked them to evaluate the games using a questionnaire. The players were the participants who agreed to take part in the survey. There was a mix of participants in terms of gender, age, occupation, and hours spend playing various types of video games. The results of the survey will be shared with the audience.

The presenter will disseminate the data about the usability testing of digital games. This presentation covers the game players’ opinions about user experience characteristics of video games. These video games were created by students. As a part of the course and learning activity, the students were asked to conduct a survey on their created games. The survey consisted of questions on the UX principles of digital games. The students selected the participants to play their games and fill out the survey. Thus, the students were engaged in active learning from creating games to testing them so that they can improve their games. The data were collected and analyzed to study the user’s preferences for video games.

This presentation will help educators to actively engage students in their courses through a learning activity. Also, this presentation will be helpful to students and video game developers to create games to meet users’ or players’ preferences.
Major Bulleted Points of Presentation:

- Introduction
- Review of Literature
- Research Method and Data Analysis
- Findings and Conclusions

GEORGIA 8
Thursday, October 26 | 11:00am-11:25am

Rewriting a Product Design and Development Course to Focus on Quality Planning and Assurance

Dr. Darren Olson, Central Washington Univ.

This presentation will detail the results of refocusing a Product Design and Development course, that formerly provided a broad overview of the topic. The course is part of an Industrial Engineering Technology program. It is now focused on the quality planning and assurance activities that occur between the final stages of design and the beginning of production, during the phases which are referred to in some industries as the production part approval process (PPAP). The bigger picture of the entire design and development cycle is still a secondary focus, providing context for the primary content of the class. This presentation will focus on the updated content and course outcomes, explaining why the course will be a better fit for the program’s curriculum, and why it will better prepare graduates for future employment. Details will include the following:

- The nature of the program
- The types of positions attained by graduates
- Historical focuses of the class, and why key needs were not met
- Refinement of course outcomes
- Navigating the curriculum change process
- Why the revamped course is now a better fit for the program and its graduates
- Selection of a text
- Structuring of course work

GEORGIA 3
Thursday, October 26 | 11:00am-11:25am

Can AI Replace College Teachers - The Challenge of ChatGPT

Dr. Rendong Bai, Eastern Kentucky Univ.
Dr. Vigs J. Chandra
Dr. Ni Wang

I has the potential to transform higher education by providing personalized learning experiences, improving access to educational resources, and enhancing teaching and assessment. However, there are also some potential threats that need be considered:

Job Displacement: AI has the potential to automate many tasks that are currently performed by human workers, including tasks performed by college professors and staff.

Bias and Discrimination: AI systems can perpetuate and even amplify biases and discrimination present in the data used to train them.

Privacy and Security: AI systems require large amounts of data to train and operate effectively, and the collection and storage of this data could raise concerns about privacy and security.

Over-reliance on Technology: This could lead to a lack of critical thinking skills and the inability to function without technology, which could have negative consequences for students’ personal and professional lives.

The rise of AI (artificial intelligence) can be attributed to several factors, including advancements in computer processing power, the increasing availability of large amounts of data, and breakthroughs in machine learning algorithms.

As computer processing power has increased over time, it has become possible to process and analyze large amounts of data much more quickly and efficiently. The rise of the internet and digital technologies has resulted in the creation of vast
amounts of data that can be analyzed by AI systems. This data can be used to train machine learning algorithms, enabling AI systems to learn and adapt over time. Advances in machine learning algorithms, such as deep learning, have enabled AI systems to analyze and interpret large amounts of data with high levels of accuracy. There is a growing demand for AI technology across a wide range of industries, including healthcare, finance, transportation, and manufacturing. The potential for cost savings, efficiency improvements, and competitive advantages has led to increased investment in AI research and development.

While AI can be a useful tool in education, it is unlikely to replace the unique contributions and skills of human college teachers in the near future. There are several reasons why technology students should learn AI, even if they do not plan to pursue careers in AI or technology fields.

AI is becoming increasingly prevalent across a wide range of industries, including healthcare, finance, transportation, and manufacturing. Many jobs in these industries are being transformed by AI, and employers are seeking candidates with AI knowledge and skills.

Learning AI can provide students with a competitive advantage in the job market and increase their career prospects. In some fields, such as data science and engineering, AI knowledge is a prerequisite for entry-level positions and career advancement.

As AI becomes more prevalent, it is important for students to understand the potential impacts of AI on society, including issues such as ethics, privacy, and bias. This understanding can help students make informed decisions about the use and development of AI in their future careers.

AI requires skills such as critical thinking, data analysis, and programming, which are valuable skills for any career. Learning AI can help students develop these skills, which are in high demand across a wide range of industries.

Major points: While AI has advanced significantly in recent years, it is unlikely that AI will completely replace college teachers in the near future. College teachers provide a variety of services that go beyond the delivery of lectures or course content. They offer support and guidance to students, mentorship, feedback, and personal interaction that is critical for student success.

AI is already being used in some educational settings to assist teachers in tasks such as grading, preparing assessments, and providing personalized learning experiences. However, the human touch and nuanced understanding of students’ needs and emotions is still best provided by a human teacher.

Furthermore, college education is not only about acquiring knowledge but also developing critical thinking, problem-solving, and communication skills. These skills require active engagement, practice, and feedback, which cannot be replicated by an AI system.

GEORGIA 7
Thursday, October 26 | 1:30pm 1:55pm
Ethical hacking using Chat GPT and Raspberry Pi
Dr. Chafic BouSaba, Guilford College

ChatGPT (Generative Pre-trained Transformer) is an AI-based (Artificial Intelligence) chatbot system developed by OpenAI. ChatGPT uses NLP (Natural Language Processing) to generate or simulate a human conversation. However, ChatGPT’s capabilities are far more than just natural language processing. It has also been trained on an extensive amount of data related to ethical hacking, specifically pen testing, which results in making it an invaluable resource for training cybersecurity professionals and for identifying potential vulnerabilities and exploits. ChatGPT will be installed on a Raspberry Pi 4, a low cost,
credit-card sized computer, and utilized to create an easy-to-use and comprehensive ethical hacking roadmap by generating and running practical scripts for open source, industry standard tools such as Nmap, Metasploit, Wireshark, and Burp Suite. The comprehensive testing roadmap will cover the five penetration testing phases: reconnaissance, scanning, vulnerability assessment, exploitation, and reporting. Combining ChatGPT with the flexibility and power of a Raspberry Pi creates a functional and a game-changing ethical hacking tool to test a system’s resiliency, to maintain compliance with tools and regulations, to train cybersecurity professionals, and to identify potential security holes to prevent costly and harmful cyberattacks.

GEORGIA 8
Thursday, October 26 | 1:30pm -1:55pm
How to Use the ATMAE Certification Review and Training Sessions to Supplement Your Courses
Dr. Mark Miller, The Univ. of Texas at Tyler
Dr. Dennis Jones, The Univ. of Texas at Tyler
Dr. Heshium Lawrence, The Univ. of Texas at Tyler

As graduates from ATMAE accredited programs move on to careers in various industries, it is imperative to assess their knowledge to ensure they are properly prepared. ATMAE certifications were developed from task analyses of industry professionals to create a body of knowledge that could be used by academic programs to better prepare their graduates. However, as programs tweak curriculum from suggestions of local industries, some deviation may occur and students may not perform well on certification exams. In order to guarantee that students still learn the basic body of knowledge determined by industry professionals, ATMAE review sessions are now becoming available.

This presentation will focus on how to integrate ATMAE certification exam review sessions into the curricula of ATMAE accredited programs. In addition, a review of the content covered in the first of several review sessions will be explained and the methods of delivery. Moreover, the initial testing of these review sessions will be discussed as well as their impact on passing rates for certification exams.

ATMAE certification exam review sessions are an easy, convenient, and affordable way for students to properly prepare for ATMAE certification exams. The comprehensive review will not only help the students achieve better scores on the certification exam, but also better prepare them for interviewing for positions in industry after graduation. Better prepared students will enhance their marketability, thereby, meeting the demands of industry and generating more interest for technology majors across the nation.

Major Bulleted Points of Presentation
• Overview of how ATMAE certifications were developed
• Growing importance of certifications
• Explanation of ATMAE certification exam review sessions
• Review of content and currently available ATMAE certification exam review sessions
• Suggestions for integrating ATMAE certification exam review sessions into academic curriculum

GEORGIA 8
Thursday, October 26 | 2:00pm -2:25pm
Proven Motivational Techniques for Online Courses
Dr. Mark Miller, The Univ. of Texas at Tyler
Dr. Dennis Jones, The Univ. of Texas at Tyler
Dr. Heshium R. Lawrence, The Univ. of Texas at Tyler

Because online courses have the flexibility of allowing students to complete their assignments at their convenience, methods for engaging students are not as easy when lecturing to a class face-to-face in real time. Due to the time constraints placed on instructors to prepare an online course, these courses are typically set up quickly where there is
little to no interaction with the instructor. Without the interaction of an instructor to inform students as to what information is important and how it will affect them on the job, many students lack the interest and desire to fully engage in the course and do not adequately learn the curriculum content being presented.

This presentation will provide proven strategies for motivating students to actively participate in online courses and successfully learn the content that is presented by the instructor. The presenters will go over motivational strategies that they have integrated into their online technical courses and review their effectiveness. Furthermore, tips on continuously improving online courses will be discussed as well as techniques to prevent plagiarism.

A properly developed online course can be just as effective in conveying curriculum content as a face-to-face course if certain protocols are adhered to and certain motivational strategies are integrated into the course. Typically, technical students from ATMAE accredited programs are used to face-to-face courses, so they expect more one-on-one interaction with instructors to learn how to safely use equipment and complex software. This interaction can still be accomplished with online instruction if done properly.

Major Bulleted Points of Presentation:
- Review of strategies to motivate students to actively engage in online courses
- Demonstration of motivational strategies integrated into online technical courses
- Illustrate the techniques and programs available to assist with eliminating plagiarism.
- Discussion on how to continuously improve courses based upon student feedback

GEORGIA 7  
Thursday, October 26 | 2:00pm - 2:25pm

Artificial Intelligence and Its Effect on Teaching in a Construction Program

Dr. Tamer Breakah, Ball State Univ.
Dr. Jennifer Warrner, Ball State Univ.
Dr. Mohsen Goodarzi, Ball State Univ.

Artificial intelligence (AI) is rapidly transforming the world, and education is no exception. With the new tools that are being introduced recently and their availability for use by students and instructors, new opportunities and challenges evolved. In this presentation, the opportunities and challenges of new artificial intelligence tools will be discussed. The presentation focuses on both the instructor’s and student’s perspectives. Artificial intelligence tools like ChatGPT and Bard were used in this study to evaluate the opportunities and threats for both students and Instructors. AI is being used to personalize learning, automate tasks, and provide new insights into student performance. AI can also be a helpful tool in lecture preparation. It can also be used to automate tasks that are currently done by instructors. This can free up teachers to spend more time on activities that require human interaction, such as providing feedback and guidance to students. For example, AI can be used to grade essays, create lesson plans, and answer student questions. Students can use AI to support their learning, help them organize their ideas, and understand topics that they did not completely understand in class.

The main problem of relying on artificial intelligence is the potential misuse of the technology by the instructors and the students. This might lead to some ethical implications. There is also the potential of presenting wrong information or having bias in the data provided by the AI tools.

Major points of the presentation:
- Artificial intelligence in education
- Opportunities of using AI in education
ORAL PRESENTATIONS

- Threats of using AI in education
- The ethical implications of using AI in education

The audience of this presentation will be introduced to the use of artificial intelligence in education. A discussion of the opportunities and threats of artificial intelligence in the field of education with some examples from different artificial intelligence platforms.

GEORGIA 8
Thursday, October 26 | 2:30pm-2:55pm

An Instructional Framework for Simulation of Direct Shear Tests with Realistic Corn Kernels Using a Computational Physics Engine

Dr. Joshua Peschel, Iowa State Univ.
Zhaohui Li, Hantao He
Vernon R. Schaefer

This article describes an instructional framework for simulating direct shear test results for corn kernels using a physics game engine. Existing simulation approaches rely on simplified particle shapes, usually spheres, and do not fully capture the geometry of irregular particles such as corn kernels. The physics engine framework introduced in this work was adapted from Project Chrono and leverages the use of realistic geometries of corn kernels. Direct shear simulations of 100, 200, and 300 kPa normal pressure settings were conducted using 750 corn kernels of varying 3D shape. Coincidence force ratio and vertical displacement curves of simulation and experiment results show the physics engine framework satisfactorily simulates the direct shear test for corn. Pearson correlations of corresponding confining pressure curves all greater than 0.8 demonstrate suitable correlation between the simulation and experimental data. The results also uniquely show the micro behaviors of the corn kernels including degree of rotation, number of contacts, and contact normal forces, which cannot be readily observed in laboratory experiments. This topic is of interest to students in the fields of grain science and production systems. The exercise is part of a special topics class taught to students in science and engineering, but who have a limited background in computational modeling; the exercise occurs approximately half-way into the semester and basic familiarity with mechanics of materials relationships, along with some basic programming knowledge, is required.

GEORGIA 7
Thursday, October 26 | 2:30pm-2:55pm

Development of Virtual Reality Educational Tool in Engineering Economics

Dr. Ulan Dakeev, Sam Houston State Univ.
Lain Sowell Yannis Lagrosa
Olivia Walton Aysenur Mazibas
Faruk Yildiz Reg Pecen

Virtual reality (VR) technology has shown enormous potential for enhancing educational experiences. In this paper, we explore the development of a VR educational tool for teaching engineering economics. The tool aims to provide an interactive and immersive learning experience that engages students and facilitates their understanding of complex economic concepts.

The development of the VR tool involved several stages, including the design of the learning objectives and content, the creation of a 3D environment, and the integration of interactive elements such as simulations and quizzes. The content was developed based on the standard engineering economics curriculum, and the tool was designed to supplement traditional classroom instruction.

The VR tool was evaluated in a pilot study with a group of engineering students. The study found that the tool was effective in improving students’ understanding of engineering economics concepts and increasing their engagement with the material. Students reported that the VR tool made the
learning experience more enjoyable and helped them to visualize and apply economic concepts in a real-world context.

The development of this VR educational tool has several implications for engineering education. The tool provides an innovative and engaging approach to teaching economics that can complement traditional classroom instruction. It also demonstrates the potential of VR technology to enhance the educational experience and improve learning outcomes.

GEORGIA 7
Thursday, October 26 | 3:30pm-3:55pm
Leveraging Digital Tools for Workplace Readiness
Mrs. Melinda Doty, East Carolina Univ.

Being tech savvy is more than a trend. According to The National Association of Colleges and Employers (NACE), technology, communication, and teamwork are among the top eight competencies that employers are looking for in employees. A key priority in higher education is engaging students in the learning process, which increases retention, and prepares them for sustainable careers after graduation. Students today are digital natives. They use technology in all areas of their lives; however, that does not mean they have the required digital literacy competencies needed for the workplace, upon graduation. Some of these necessary skills include critical thinking and decision making. In this session, we will explore how to leverage technology in the classroom to increase students’ digital literacy skills, thus translating as career currency. Technology can also increase accessibility, engagement, and persistence, helping our students transition from college to the workplace, upon graduation. I’ll provide curricular strategies that can be implemented immediately and are specifically designed to align tech tools with workplace competencies. Are you ready to increase engagement and prepare your students for their future workplaces? If so, this session is for you.

GEORGIA 8
Thursday, October 26 | 3:30pm-3:55pm
STEM Outreach Utilizing Integrated Summer Youth and Teacher Robotics Workshops
Mr. Norman Philipp, Pittsburg State Univ.
Randy Winzer, Pittsburg State Univ.
Erik Mayer, Pittsburg State Univ.

This paper reviews the ongoing Adventures in Robotics (AIR) Program Summer Youth and Teacher workshops at Pittsburg State Univ. (Pittsburg, KS). The summer youth workshops are for students 9-13 years old and consists of two week-long sessions providing hands-on STEM related activities on the topics of teamwork, programming, brainstorming, construction techniques, robotic basics, and mechatronics. These workshops have been ongoing for 20+ years and provide a STEM alternative to athletics-related summer camp options in the southeast Kansas region. Metrics on student engagement and STEM exposure are presented. In addition, as part of the ongoing development of the AIR summer workshops, the AIR Teacher workshop was developed and implemented in 2022 with the support of a teacher workshop subaward from the Kansas NASA Space Grant Consortium. In the 11-day teacher workshop, teachers work with the LEGO Education Spike Prime set, a STEAM learning tool designed for grades 6-8, which combines Lego with easy-to-use hardware and a drag-and-drop programming language based on Scratch. Teachers received hands-on training in a one-day bootcamp at the start of the workshop to familiarize them with the LEGO SPIKE system and AIR curriculum materials. Participants then assisted through the two week-long summer youth workshops, gaining hands-on teaching experience by mentoring teams of students. This provided a unique hands-on training environment for the teachers simulating utilization of the AIR workshop
materials in a classroom environment. The focus of the teacher and youth workshops align with the interests of the NASA Science Mission Directorate. Continued work towards the development of a mobile roadshow version of the AIR workshops will also be presented as well as how the AIR workshops may be applied towards promoting Diversity, Equality, and Inclusion (DEI) in school districts.

GEORGIA 7  
Thursday, October 26 | 4:00pm-4:25pm  
Learning with a Smile – Modified Ride-on Cars for Children with Mobility Limitations  
Dr. Kiyun Han, Univ. of Arkansas Fort Smith

Go Baby Go is a program started at the Univ. of Delaware that modifies off-the-shelf ride-on toy cars for physically disabled children. As children begin to move, they explore their surroundings. They learn things about the world including visual and depth perception, trunk stability, postural reflexes and responses, and cause and effect. Their mobility motivates them to continue learning. However, children with mobility limiting disabilities lag in these forms of development. Research shows that independent mobility positively impacts motor, cognitive, language, and social-emotional development, particularly from birth to five years of age (Go Baby Go workshop, 2015). The modified ride-on cars do more for children than just providing mobility. Children who achieve self-directed mobility can experience more interactions with others, leading to better communication and social skills. Through community engagement, one Univ.’s Electrical Engineering Technology team makes accessible and personalized vehicles that enable independent mobility at a low cost.

This presentation explains how the Univ. team delivers modified toy cars to children with mobility limitations. The project directs the training and education received at the students’ Univ. towards benefiting children in their local community who suffer from these issues. The implications of this presentation could provide an example on how to introduce students to STEM disciplines and show how these technologies can be applied in real-life engineering experience. Also, the project can give the students an opportunity to benefit their community by engaging in community service.

Attendees of this presentation will be able to:
• Recognize how this project offers assistance for children with mobility limitations.
• Understand how convenience technologies can be repurposed towards benefiting those with mental or physical challenges in our society.
• Identify how this project can help students gain real life engineering experience, benefit the community, and gain motivation to study.

GEORGIA 8  
Thursday, October 26 | 4:00pm-4:25pm  
I Think My Students Are On Artificial Intelligence!  
Dr. Ray Richardson, Eastern Kentucky Univ.  
Dr. Vigs Chandra  
Mr. Alex Richardson

AI tools (or bots) such as Chat GPT are very popular with writers and illustrators in many fields of work and education. However, in higher education, it is valued for the student to display knowledge by composing an essay or paper. At times, this may be a primary measure of learning. With the dawn of AI bots for composition and writing, it can be difficult to determine what information is written by the learner, and what might have been generated by AI. With such a powerful tool, it is difficult to discern a successful demonstration of student learning from that which has been generated by an artificial intelligence.

AI is a huge influence in many professional and academic areas. This will provide information for teachers and trainers ranging from an overall...
exposure to AI and how it might be used in education (for good or bad), relevant examples, possible detection, and some ideas to effectively use such a tool in work or the classroom.

To the uninitiated, work submitted by a student that was generated by AI, might be taken as student working independently. When (in reality), an AI bot may have generated a surprisingly large body of the content. How to deal with this, and other such implications need to be investigated.

Major Points:
- The Current Status of AI
- Some Of the Major AI Writing Tools, with Characteristics
- Detection of AI
- The Downside of AI bots
- The Upside of AI bots
- Discussion of future implications this might have for technical educators

GEORGIA 8
Thursday, October 26 | 4:30pm-4:55pm

Modernizing manufacturing curriculum to prepare the next generation of manufacturing professionals: Robotic part tending

Dr. Saxon Ryan, Iowa State Univ.
Chad J. Dolphin, Iowa State Univ.

Modernizing manufacturing curriculum to prepare the next generation of manufacturing professionals: Robotic part tending

With the fourth industrial revolution, Industry 4.0 (I4.0), manufacturers gain connectivity, real time management and control of systems, and instantaneous feedback allowing manufacturers to assess, understand, and control their systems in real time. To achieve these advancements, manufacturers have had to adopt new technology with a focus on programming, electronics, and data analysis and management. There are currently limited people in the manufacturing workforce that possess the ability to properly manage, maintain, and optimize these new systems. It is the role of educational institutions to start addressing these gaps in knowledge so that the next generation of workers is prepared to excel in the modern I4.0 manufacturing environment.

This work sought out to modernize an introductory and advanced manufacturing course through the implementation of robotic part tending. Robotic part tending consists of core modern manufacturing principles that are introduced at various levels. When introducing robotics, programming and logic to complete a manufacturing task can be introduced in a practical hands-on format. In addition to the programming and logic, the introduction of robotics in the manufacturing lab has implications for every core manufacturing concept that is taught. This presentation will share the process of implementing robotics into both an introductory and advanced manufacturing course. Additionally, considerations for continuity and advancement between the introductory and advanced courses will be discussed.

The audience will learn about the modernizing manufacturing environment and the areas where educators are falling behind. Methods for implementing robotics to address the gap and modernize manufacturing curriculum will be shared. Implications for the manufacturing workforce and educational institutions will be discussed.
ORAL PRESENTATIONS

GEORGIA 7
Thursday, October 26 | 4:30pm-4:55pm

AI-Enhanced Learning: Analysis of Technical, Ethical, and Legal Considerations for Instructional Content Generation

Dr. Armen Ilikchyan, Utah Valley Univ.
Dr. Ahmed Alsharif, Utah Valley Univ.

Introduction: Artificial intelligence (AI) to generate instructional content can potentially revolutionize the field of higher education. However, using AI in education raises complex technical, ethical, and legal questions that must be carefully considered.

This presentation will comprehensively analyze the technical, ethical, and legal aspects of AI-generated instructional content. We will examine the current state of AI technology and the various algorithms and techniques used to generate instructional content. We will discuss the potential benefits of using AI to create personalized learning experiences and explore ethical implications, such as the risk of bias and discrimination. Finally, we will evaluate the legal framework surrounding the use of AI-generated instructional content, including potential liabilities and intellectual property issues.

Our presentation will be relevant to the ATMAE audience as it explores the intersection of AI and education. We aim to provide insights and guidance for educators looking to integrate AI-generated instructional content into their teaching practices.

Major bulleted points:

- Overview of the current state of AI technology for instructional content generation.
- Analysis of various AI algorithms and techniques used in higher education.
- Discussion of potential benefits and risks of using AI-generated instructional content.
- Examination of ethical implications, including the risk of bias and discrimination.
- Evaluation of the legal framework surrounding the use of AI-generated instructional content in education.

GEORGIA 7
Thursday, October 26 | 5:00pm-5:25pm

An exploratory evaluation of bootcamp-style instructions for Technical Topics

Dr. Faisal Kalota, Ball State Univ.

The Fourth Industrial Revolution, also known as Industry 4.0, will impact not only blue-collar jobs but also white-collar jobs and society as a whole. There are arguments on both sides of the aisle that this will displace many workers or create new employment opportunities. In either case, businesses and society must take appropriate steps to be prepared for the technological revolution. It is important that people constantly update their skills to stay with the pace of technological advancements. However, the reality is that not everyone can go back to school in the traditional format, nor can everyone attend accelerated workshops due to their learning styles. This paper is a continuation of Kalota & Allam (2022), an ongoing study, that explored the effectiveness of teaching computer programming in a bootcamp style vs. a traditional 16-week semester. Additional data will be collected by the end of June-2023, and findings from that data will be shared in this presentation.

GEORGIA 8
Thursday, October 26 | 5:00pm-5:25pm

Re-engaging the disengaged student in the Technology Management classroom

Dr. Sophia Scott, Southeast Missouri State Univ.

The pandemic has caused disruption in classrooms. Students are more disengaged in the higher education classrooms. Engagement especially in online classes should be intentional, find appropriate technology, and create a community (Grossman, 2022). Effective education should help the student to engage with the instructor, engage with the content and engage with peers. Students today prefer online classes and 99% own a smartphone. A technology tools that can help students is Nearpod, engagement tool that
allows the instructor to engage students through interactive activities inside and outside of the classroom.

This presentation will provide a demonstration of using Nearpod for engagement in technology management courses. Benefits and lessons learned will also be shared.

Engaging students in the classroom can help retain and prepare students for their future. The Nearpod tool allows students to take charge of their own learning. One major aspect of adding Nearpod in the class is that it can capture the student’s attention and encourage participation. The Nearpod tool also shows and saves the student progress. Instructors can fully engage students in a Nearpod lesson making learning active and collaborative in the classroom environment.

Major bulleted points:
- Using Nearpod to enhance lecture
- Using Nearpod to encourage student participation
- Using Nearpod for assessment
- Creating engaging lessons using Nearpod

**GEORGIA 2**  
**Friday, October 27 | 9:30am-9:55am**

**Fostering empathy through assistive technology design challenge in a CAD modeling course**

*Dr. Ying Ying Seah, Oakland City Univ.*

Empathy plays a crucial role in design because it allows designers to have the ability to better understand their user needs, and consequently, create effective user-centered design solutions. Based on literature, various pedagogical techniques have been developed and implemented to foster empathy within design curriculum. Some of these techniques include the element of design thinking, service-learning, communication, and collaboration. In this study, the author aimed to promote empathy among students by incorporating an assistive technology design challenge in a CAD modeling course. As students learned how to create CAD models, they were actively engaged in a design challenge where they had to collaboratively work with their team members to design a 3D printable prototype to improve the day-to-day life of someone with a disability or the elderly. In this challenge, all students had direct contact and communication with the actual users they were designing the prototypes for.

This study will focus on the following main points:
- The process of implementing the design challenge throughout the entire course
- The students’ interactions with their users throughout the design challenge process
- The students’ reflections on their understanding of empathy and the challenges they encountered while trying to empathize with their users
- Recommendations for better implementation of such pedagogical technique in the future

ATMAE attendees can learn from the author’s experience and implement similar pedagogical techniques to foster empathy among students in their own design courses.

**GEORGIA 7**  
**Friday, October 27 | 9:30am-9:55am**

**Beating the Machine: Overcoming Problems with AI Writing Engines**

*Dr. John Wyatt, Mississippi State Univ.*  
*Dr. Swapnil Patole*

Currently, at Mississippi State Univ. we are working on getting our new online master’s program in industrial technology approved. However, as we go through this process, we have become aware that we will need to modify the courses and the overall plan for the program as soon as we have approval to offer it. This is because of the generative pre-trained transformer (GPT). These artificial language creation engines allow the possibility of a student to just type in the question we wish them
to write about and the GPT will scan the internet and write an original piece of work. This has become a problem as even though anti-plagiarism software such as Turnitin has recently launched its AI detection software, there is still no real proof that it will be effective in catching all GPT generated assignments. This has become even worse as now with the launch of GPT 4 you can put in a picture of the contents of your refrigerator and the GPT will give you recipe ideas just from scanning the picture.

To overcome this the writing side of our new master’s program will have to be weighted to a significantly small portion of the overall grade for each course and new assessment’s which tests not only research skills, but the application of those skills will have to be brought in. In addition, to make the program more relevant to industry we are thinking of doing away with the comprehensive examinations, and going to a project portfolio system so that each student submits their entire project and assignment work for finals, and they are orally examined to see if they understand what is in the portfolio and how it can be used in their future career.

This presentation will discuss some of the alternatives we are considering and ask the audience what they are planning to do to overcome this rising problem with AI plagiarism.

GEORGIA 6
Friday, October 27 | 9:30am-9:55am
Budget Saving through DIY in Technology Program

Dr. Ni Wang, Eastern Kentucky Univ.
Kenneth Foltz, Eastern Kentucky Univ.
Rendong Bai from Eastern Kentucky Univ.
James Glass, Eastern Kentucky Univ.

Have you experienced a lack of budget in the program? And you must cancel the purchase request for the lab renovation because the program budget cannot cover the supply cost? Have you ever felt that

the advanced manufacturing equipment sits in the lab without fully functioning? Do you ever wonder why educational-purpose equipment is so costly and way more expensive than the market price? Do you ever look for a real-world project for students? This presentation will focus on the possibility of saving the budget through DIY in the technology program. The authors will use aviation and manufacturing programs to demonstrate how DIY can help save program costs. It is an explored idea for the faculties in the technology program to think about the chance to apply their expertise and use the existing facilities to DIY educational-purpose equipment and material supplies.

- Need for budget saving through DIY
- Understand why the supply related to Aviation is so costly
- Discuss whether the currently existing facilities are efficient in helping DIY
- Demonstrate the possibility through case studies
  a. Piper fuel checker; b. Pneumatic training
- Discussion for the potential resources, including grants and websites for DIY
- Sharing the experience and suggestions
A typical undergraduate curriculum in manufacturing management contains courses in production systems, supply chain & logistics management, lean manufacturing, project management, etc. The content and learning activities delivered in each course are typically disparate and each course may introduce students to different scenarios and cases in which the student must get acclimated before readily applying course-specific knowledge. Each course typically requires its own unique set of resources (e.g. textbooks, learning platforms, simulations, case studies) which are not aligned or integrated though the series of courses and is not cost effective for the student.

This work presents a model for creating connected content within undergraduate courses in production systems, logistics & supply chain management, lean manufacturing, and project management. The connected course model provides common/shared case studies, learning activities, and leveraged simulations to enhance student achievement of learning outcomes. Students can focus on the application of “new” knowledge to familiar contexts and scenarios which allows them to reduce their reset to a new case or scenario. The common cases and learning activities form the shared platform for learning and is aligned with supporting the manufacturing management curriculum.

- The course model promotes an integrated and shared/common set of cases, simulation exercises, and learning activity.
- The model focuses student attention the application of newly acquired knowledge using a consistent business context or scenario providing continuity through a sequence of courses and derivative courses.
- The course model, case studies, simulation exercises, and activities will be shared as well as opportunities for improvement.

The 3 + 1 academic program model presents students with an exceptional opportunity to enhance their educational experience by pursuing three years of study at their two-year institution, followed by one year at a partnering four-year institution. This innovative approach has the potential to revolutionize access to affordable education while fostering robust academic collaborations. However, its implementation inevitably faces a myriad of challenges and opportunities.

In this study, we delve into the insights from an exhaustive survey encompassing key stakeholders such as students, faculty, administrators from two-year and four-year institutions, and relevant employers. The survey’s primary objectives are to evaluate the program’s overall effectiveness, pinpoint potential areas for improvement, and inform the development of future collaborations. By comprehensively understanding the diverse perspectives of those engaged in the 3 + 1 program, this study seeks to contribute significantly to the sustained growth and success of such trailblazing educational initiatives.
GEORGIA 6  
Friday, October 27 | 10:30am-10:55am  

Students’ scientific argumentation on model classification outcomes through machine learning  

Dr. Hector Will, Oakland City Univ. / Purdue Univ.  
Lucas Wiese, Purdue Univ.  
Alejandra Magana, Purdue Univ.  

The emergence of revolutionary artificial intelligence (AI) and machine learning (ML) technologies impact national and global affairs across multiple industries. As the manufacturing industry prepares to digitalize its operations to maintain global competitiveness, part of the strategy is to focus on workforce development efforts. As such, evidence-based educational research can provide a foundation for upskilling the future workforce to prepare for increasingly complex and novel problems. To build this foundation, this study investigates learners’ conceptual understanding of ML through the theory of scientific argumentation. In this study, scientific argumentation serves as a proxy to gain insight into student conceptualization and as a scaffold for student learning. Embedded within a computational notebook, nineteen students experiment with neural network ML models to make a visual claim, then they use textual elaboration to provide evidence and reasoning. Accordingly, the researchers extracted qualitative data to analyze elements of scientific argumentation by conducting a thematic analysis of salient features of students’ claims, evidence, and reasoning. While students were able to effectively identify characteristics and behaviors of ML models (model fitness), the analysis indicates student difficulty in building a deep foundation of reasoning and evidence to support their claims. Overall, this study provides a novel contribution to the cross-section of literature on AI/ML education and scientific argumentation. This may lead to future work in the advancement of valid education efforts and to broaden conceptual understanding of AI/ML technology.

GEORGIA 5  
Friday, October 27 | 9:30am-9:55am  

How to Start a Student Organization for Women in Manufacturing  

Mrs. RaeJean Griffin, Univ. of Texas at Tyler  

Building a diverse team = The best team. Having a variety of team members in your organization builds the best team. Diversity has become a strong topic these past few years, but figuring out the best way to implement a diverse team can be a challenge. You can start making this change with your current students by adding a student organization for women in manufacturing. Not only does it build great relationships it also gets students involved. The Women in Manufacturings mission is to promote, and empower others through educational and social development.  

• How to start a student chapter for Women in Manufacturing  
• How to get student’s involved in the student organization  
• How to promote and empower each other
POSTER PRESENTATIONS

Multiple LiDAR Systems Integration for Distributed Control, Low-Speed, Self-Driving Robots

Mr. Ian Troop, Millersville University of Pennsylvania
Mr. Zane A. Weaver, Millersville University of Pennsylvania
Dr. John R. Wright, Jr., Millersville University of Pennsylvania
Dr. John R. Haughey, Millersville University of Pennsylvania

Self-Driving vehicles require many sensors to function effectively. One of those sensors, LiDAR, is often used for object detection or range measurements in predetermined zones. LiDAR stands for laser imaging, detection, and ranging. When utilizing industrial LiDAR units such as the SICK LiDAR system for object detection, a limitation encountered is the limited number of digital outputs that may be used to determine where objects are relative to the sensor (one output/zone). This limitation would typically necessitate extensive development of a mapped environment to be interpreted by the robot as to the optimal heading angle for navigation.

This talk discusses how to increase the resolution of a robot’s LiDAR/object detection capability by adding additional LiDAR sensors to the front of a mobile robot forming a digital array of zones for improved detection sensitivity.

This research shows a method for increasing the number of LiDAR detection zones without extensive mapping techniques or complex code development. The work is applicable to all low-speed, self-driving robots where collision avoidance and autonomous navigation is required.

Major points:
- Integration and benefits of multiple LiDAR systems for Low-Speed Self-Driving Robots
- Utilizing a distributed control methodology with LiDAR
- Performance results from the Intelligent Ground Vehicle Competition (IGVC)

Research on Energy Harvesting and Wireless Charging Technology for the Internet of Things (IoT) Applications

Mr. Aidan Ray, Morehead State University
Dr. Anindita Paul, Morehead State University

This ongoing research intends to build and test a prototype of a typical system that harvests energy from the environment and wirelessly transfers this energy to Internet of Things (IoT) devices. The availability of the harvested energy varies mainly with time in a non-deterministic manner. Multiple energy-scavenging sources will be considered to alleviate this problem for an uninterrupted power supply to the network. The photovoltaic energy harvesting technique was adopted as the stepping stone to building foundational knowledge and test ideas. A Photovoltaic cell was used for harvesting photons from solar and other light sources. A 9V rechargeable battery was used to store the harvested energy. Two copper coils were used to transfer energy near the field. In near-field wireless power transfer, magnetic fields transmit power over short distances through inductive coupling (electromagnetic induction) between wire coils. The maximum distance that could cover was 6 inches through the experimental setup. The significant findings from the ongoing experiment are that: 1) the harvested energy is very noisy. So for powering a noise-sensitive analog block, a low dropout regulator must be designed to suppress noise and volatility efficiently in the harvested energy. 2) An antenna must be designed to transfer energy efficiently at least a distance of 10 ft.

The outcome of this project can solve various disruptive effects depending on its applications (e.g., disruption in farmers’ crop harvesting, a heart patient’s pacemaker malfunction, and losing self-driving vehicles’ navigational control) due to the failure in battery power.
This presentation will discuss the followings:

- Motivation Behind Design
- Current Options
- Proposed Solutions
- Experiment/ testing/ Results
- Conclusions to culminate the presentation

**Novel Li-ion Battery Structure for Fast Charging**

*Automation, Electrical, and Computer Systems*

*Professor Qingzhou Xu, Morehead State University*

Lithium-ion batteries are the dominant energy storage devices for electric vehicles (EVs). As EVs are increasingly enter our life, fast charging becomes the requirement for their success. The factors limiting fast charging are the migrant speed of Li ions from cathode to anode and the various degradations associated with the fast Li ion flow. The degradations include cathode powder cracking, low active material utilization, electrolyte-electrode side reactions, Li plating at the anode, etc. Numerous methods have been investigated to address these problems and achieved success to various degrees, but the charging speed has not yet reached the commercially viable charge rate of 4C (15 minutes for 80% state of charge(SOC)), let alone the desired extreme fast charge 6C (10 minutes for 80% SOC) or greater. The current fastest charge rate is 30 minutes for 80% SOC. To tackle the problem, this research proposes a new battery configuration, which has the optimized anode/cathode area ratio and offers better heat management. The optimized anode/cathode area is used to avoid the over-potentials that occur during fast charging, thereby alleviating Li plating on the anode, cathode powder cracking, low active material utilization, and electrolyte-electrode side reactions. The better heat management is used to ensure the fast transportation speed of Li ions through the electrolyte layers while avoiding the side reactions between electrode materials and electrolytic chemicals.

**Face Recognition Attendance System**

*Automation, Electrical, and Computer Systems*

*Mr Kesava Prajwal Chekka, Eastern Illinois University*

*Dr. Toqeer Israr, Eastern Illinois University*

Facial recognition attendance systems (FRAS) have gained popularity in recent years due to their accuracy and cost-effectiveness. Such systems use machine learning algorithms to detect and recognize human faces in real-time, enabling organizations to track attendance without relying on traditional methods like paper-based or card-based attendance systems.

Python, a popular programming language for machine learning and artificial intelligence, is commonly used for building facial recognition-based attendance systems. The OpenCV (Open-Source Computer Vision) library in Python gives a strong arrangement of devices for picture handling and PC vision errands, including face identification and acknowledgment.

Facial recognition-based attendance systems typically involve capturing a live video feed from a camera and processing it in real-time to detect and recognize faces. The system then matches the detected faces with a pre-existing database of employee or student faces to mark their attendance automatically.

FRAS can detect the proxies (unknown faces) and filter them into a separate database. So that we can make attendance more accurate. The system is able to mark attendance for 100 students in less than a minute, this shows how it is far better and faster than the traditional approach by calling each and every student with their names. The system can be plugged into real time student mailing system and attendance will be captured in their student portal without any delay once the lecturer’s confirmation.
DataFacts - Data Anomaly Detection Tool

Automation, Electrical, and Computer Systems

Mr Kesava Prajwal Chekka, Eastern Illinois University

In the Big data era, huge data are getting dumped into databases frequently, we could see lots of data issues in terms of volume, variety, and velocity, due to pipeline breakage, writing, documenting, and data feed mismatches. So, more data, more problems. For example, consider you have a column with invalid emails, and phone numbers, duplicates in it, and you trying to launch a marketing campaign with invalid users, at last, you have spent 10000$ and find it’s vain in sending advertisements for fake emails after a few weeks. If we could have identified this before launching the campaign, we could have saved almost 50% of the budget. To solve all these combined and complex issues and to enrich data quality, we are going to introduce this solution. DataFacts is a data anomaly detection tool, that can detect anomalies in the raw data, residing in different data sources like MYSQL, SQL, Postgres, Azure Gen2, S3 Buckets, GCP Big Query, Real-time Customer platforms like Adobe Experience Platform (AEP). This plugin tool is further categorized into 3 types of detections i.e., Validity checks, Completeness checks, and Data Deduplication checks. In Validity checks, the tool is going to scan the huge amount of data, run a generic profiler on top of it to get insights like column schema, column detailed types (phone number, email, URL, geo locations, regex), assigns rule-based generic expectations (validation rules) and finally automatically does the validations based on expectations that are assigned in the profiler step and generate a report in tabular format. Second, Completeness checks are designed using a time-series forecasting machine learning model, that predicts the anomalies by considering volume as one of the metrics, which shows how much abnormal drop and rise of data has occurred within a time frame. This is very useful to detect if any data ingestion pipeline is broken. At last, the main detection is data deduplication, in many customer platforms, marketing analysts, and data scientists are messed up with lots of duplicates (similar records) in their customer-related data. Some straightforward methods simply remove strict duplicates but it is tricky and quite complex to identify and match similar records (kind of entity resolution). Using this tool, end-user can identify both exact as well as slight similarity (having common attribute values) duplicated profiles effectively. The future implementation that is going to be added to this tool is to identify the patterns in data columns and assign appropriate regex validations automatically using an advanced machine learning model.

Development of Smart Waste Management System for City Application

Automation, Electrical, and Computer Systems

Mr. Lawrence Fraction, Morehead State University
Dr. Anindita Paul, Morehead State University

The rising solid waste worldwide has created a need for efficient waste management solutions. This project utilizes the Internet of Things (IoT) framework to address this problem to facilitate city waste retrieval. An ultrasonic sensor and ESP32 are used to check the status of the garbage container. The status of the garbage container is updated in the network using Bluetooth Low Energy (BLE). The ultrasonic sensor detects an object thrown in the trash can. It sends the results of the object detection to the ESP32 controller. The ESP32 will send a status (Empty/Full) to show whether a receptacle is ready for retrieval. To handle the wide span of the coverage area for a city, this application uses ESP32 module networks to handle the relay of statuses for the garbage containers. The person responsible for collecting the trash receives the status of the containers on their cell phone. This will alleviate unnecessary travel for the disposal of vehicles, which can save gas and time. The BLE option is adopted to make this system power efficient for
Transmitting information within the network. The use of BLE, in conjunction with alternative energy sources, provides a tangible way to improve the devices’ lifespan and reduce the maintenance needed over time due to battery replacement and carbon footprints. This implementation should show the effectiveness of using IoT for city purposes and the benefits that can be gained; for the environment and the people living within a city using it.

This presentation will discuss the following:
- An Internet of Things solution that could alleviate solid waste management.
- The essential components and functionality of a working implementation.
- Possible network solutions.
- Feasibility of a smart waste management solution within a city.

**Sentiment Analysis Using Machine Learning Approach**

*Automation, Electrical, and Computer Systems*

Dr. HuiRu Shih, Jackson State University

Sentiment analysis is an approach of analyzing text data and retrieving the sentiment. Sentiment analysis has many applications in various fields. Machine learning-based sentiment analysis is gaining prominence recently. Analyzing sentiments is a task of natural language processing. We use several kinds of machine learning classifiers to analyze text data and help determine opinion about certain topics.

Sentiment analysis includes several steps. The raw data is unstructured in nature. We need to clean the data. Data cleaning involves tasks such as punctuation removal, stop word removal, tokenization, stemming, etc. The dataset has many distinctive properties. After data cleaning, features are extracted from the processed dataset. There are different feature extraction methods with text data, such as Bag of Words - Count Vectorizer and TF-IDF (Term Frequency - Inverse Document Frequency). The extracted features after preprocessing the data are then classified using various classifiers, such as Support Vector Machine, Decision Tree, Random Forest, and Naïve Bayes. In this study, the performance of classifiers is evaluated.

The effects of various feature extraction methods on the performance of classifiers are also studied. The comparison of the performance of the classifiers is made based on the classification metrics, such as accuracy, precision, recall, and F1-score.

**Major points:**
- Sentiment Analysis
- Machine Learning
- Feature Extraction
- Classification Algorithms
- Evaluation of Sentiment Classification

**Study of Transient Stability of the Grid System under a Fault Condition with Utility-Scale Solar Photovoltaic (PV) Interconnection using Switched Capacitor Banks for Voltage Recovery.**

*Automation, Electrical, and Computer Systems*

Shaibu Ibrahim, Pure Power Engineering, Inc

Dr. Steven W. Daniels, Eastern Illinois University

Dr. Jerry Cloward, Eastern Illinois University

Transient stability is the ability of the electric grid to return to normal operating or equilibrium conditions after a fault is cleared. Voltage collapses at the fault point and fluctuates at other locations in the event of a disturbance in an electric system. The system must recover voltage in the shortest possible time to remain in synchronism with the entire grid. Integrating solar photovoltaic (PV) generation into the electric grid comes with interoperability challenges such as maintaining voltage, angle, and
POSTER PRESENTATIONS

frequency stabilities within steady-state conditions at all times. A balanced and stable electric grid is essential to reliably integrate large solar PV power plants into an electric network. In this study, a proposed 85 MW solar PV plant is modeled to replace the generator at bus 3 of the IEEE-9 bus system for the investigation of the transient stability of the grid. Two cases were established for the analysis of this experiment. In the first scenario, a three-phase fault was simulated at 1.0 seconds on a high-voltage bus 7 and the disturbance cleared at 1.7 seconds. The system never achieves stability for the entire simulated period of 60 seconds. Capacitor bank size and bus voltage constraints inequality functions were set and implemented in case 2 after the fault was removed in various test iterations. Switched capacitor banks within the range of the constraint function recovered the system voltages, angles, and frequency at varying simulated times. The objective of the study is to investigate the impact on power system stability with switched capacitor bank(s) post-fault clearing in an electric grid. The results obtained demonstrate that switched capacitor bank(s) at a suitable location(s) in an electric grid is capable of supporting voltage recovery after a system disturbance.

Evaluating Green Building Design and Performance: A case study of a LEED Platinum Renewable Energy Center

Energy Management

Mr. Nana Duncan, Eastern Illinois University

As the world grapples with climate change and its environmental impact, green buildings have emerged as a potential solution for reducing carbon emissions. However, the effectiveness of these buildings in meeting sustainability goals is still debated. This study will evaluate the performance of green buildings through a case study of the LEED Platinum Renewable Energy Center at Eastern Illinois University, using a quantitative analysis of energy and water usage data. By examining the performance of this state-of-the-art facility, this study will provide insights into best practices for sustainable building development and promote sustainable behavior among building occupants.

Again, this study is justified as buildings are a major contributor to global energy consumption and greenhouse gas emissions, requiring evaluation to identify improvements and develop strategies for reducing environmental impact. Additionally, universities have a critical role in shaping sustainability practices for future generations, and this study can provide insights into best practices for sustainable building development and promoting sustainable behavior among building occupants.

Implication for the ATMAE audience: For universities, the study underscores the role of educational institutions in leading by example and promoting sustainable practices. The insights gained from the LEED Platinum Renewable Energy Center at Eastern Illinois University could inform future building projects and sustainability initiatives, and could also serve as a model for other institutions to follow.

For building occupants, the study will provide insights into sustainable behavior and the benefits of sustainable building practices. It could encourage individuals to adopt sustainable practices in their daily lives, such as energy conservation, waste reduction, and the use of renewable energy sources.

Major Points:
- Synergies between energy performance and indoor water usage in the context of LEED v4.
- Peak energy demand and contemporary solutions.
- Building design and energy efficiency nexus
- Veracity of green building practices.
POSTER PRESENTATIONS

Capacity for a hypervelocity gun to simulate meteoroid ejecta in the lunar environment

Construction
Mr. Jacob Yates, University of North Dakota
Jacob Rogers, Texas A&M University
Paul Mead, Texas A&M University
Sidney Davis, Texas A&M University
Dr. Tom Lacy, Texas A&M University
Jim Casler, University of North Dakota

Hypervelocity guns potentially have the capacity to simulate meteoroid ejecta in the lunar environment for future surface operations. NASA and commercial enterprise are at various stages of planning for impinging surface operations on the Moon. Hypervelocity guns have been tested for meteoroid hazards for over a half century, including hazard assessments by legacy NASA missions. However previous studies of the meteoroid hazard modeling the lunar surface have focused on primary strikes, not the post-impact ejecta debris. The recent discovery (Robinson et al., 2015) of the hazard that impact ejecta poses in greater length scales via both azimuth and distance (102 – 104 m) from point of impact is of great concern. A series of experiments involving the gun at the Hyper-Velocity Impact Lab (HVIL) will be used to test the post-impact ejecta environment as a simulator for the lunar environment (April 24 –28, 2023). One of the goals of this experiment is to ascertain how precise a hypervelocity gun can simulate high-speed particles on the lunar surface. This research goal will focus on the criteria and threshold of meeting the objective of attaining lunar surface-type conditions: (1) gravity, (2) pressure, (3) temperature, and (4) topography. The HVIL gun is able to accommodate pressure, topography, and to some extent temperature of the lunar surface. Assessment adjustments will need to be made for partial gravity in terms of ballistic trajectories. The materials used in the hypervelocity tests will simulate: Extra-Vehicular Activity (EVAs), Habitats, and Rovers (crewed and uncrewed). Meteoroid ejecta particles will simulate the 2 x end member types of ejecta: 4 x mm Fe meteorite remnant and 8 x mm impact glass. Therefore, if the materials can survive those two hazard types, then the lesser hazard types encountered diurnally will be survivable. Results will be presented at the ATMAE conference in October.


Manufacturing Systems
Dr. Mustafa Shraim, Ohio University
Dr. Yuqiu You, Ohio University
Andy Van Auken, Ohio University

Additive Manufacturing through 3D printing offers a variety of advantages over traditional manufacturing methods including rapid prototyping and the ability to create more complex geometry. During 3D printing of original PETG print filament, it is common to produce defective or imperfect products. To minimize waste, such products can be recycled into usable filament and used again. The goal of this project is to utilize Taguchi’s designed experiments to find the best 3D process settings that allow recycled PETG print material to match the performance of virgin PETG print material.

This presentation will introduce a study of applying Taguchi’s method in performance optimization of recycled PETG 3D printing material, with the goal of matching the performance of virgin 3D printing material. The printer being used for this experiment is the MakerBot Replicator Z18. The response variables being considered are functional and surface defects, a critical dimension, and cycle time. The goal is to have a defect-free functional product with the dimension of the critical characteristic close to target while minimizing printing time. The control factors being considered are Layer Height,
Infill Percentage, Number of Shells, Extruder Temperature, Feed Rate, and Travel Speed. The response variables will be evaluated using the noise conditions of recycled PETG vs. the virgin PETG.

Major takeaways from this study include how to use the plan-do-study-act (PDSA or Deming Cycle) and the Taguchi orthogonal array in process optimization. In the “Plan” phase, the experimental design will be set up, followed by the “Do” phase where the experimental runs are conducted, and data collected. The “Study” phase includes analysis of results such as means plots as well as signal-to-noise (S/N) ratios. Best settings are then decided based on consistent performance across noise conditions. Recommendations for future work will be summarized in the “Act” phase.

Major Points of Presentation
- Background information about 3D printing
- System overview – material and machine
- Plan-Do-Study-Act Cycle
- Experimental design
- Data collection
- Data analysis and results
- Conclusions and Recommendations

AFM Characterization of Latent Prints: The introduction of polymers and AFM imaging for more precise identification markers and debris in dactyloscopy
(Patent pending with the University of Texas at Tyler, 2023).

Micro/Nanotechnology

Mr. Joseph Wright, Drexel University
Dr. Dominick Fazarro, University of Texas at Tyler
Glen Johnson, Salt Lake Community College
Dr. David Scott, University of Texas at Tyler

Professionals in both the nanotechnology and forensic sciences disciplines have been attempting to perfect techniques in latent finger identifications. The current techniques have been the application of nanomaterials (nano particles, quantum dots, or fluorescent particles) relying on oleophilic bonding which degrades over time. The following phase is to perform optical or fluorescent microscopy to produce a 2D image of the latent print with resolution on a microscale. The limitation is this process cannot use EDS/EBSD due to nanomaterial contamination. The testimony of fingerprint analysis “experts” is often relied upon in criminal trials. Even if an analyst does not claim that the identification of a suspect through a fingerprint is 100 percent accurate, they will often imply that this evidence is infallible or state that they are certain about a person’s identity based on the latent fingerprints at a crime scene. This will often give juries the idea that the testimony of a fingerprint analyst is completely reliable without considering the potential for errors. Studies have found that while fingerprint analysis is generally valid, it should not be relied upon in a criminal case without also considering the potential error rates.

This research proposes a different approach:
- Apply a lithographic polymer to reproduce a print entirely.
- Relies only on curing a polymer in physical contact with oils, will perhaps improve over time as oils dry out.
- Performs atomic force microscopy to produce a 3D heightmap of the fingerprint, includes depth + resolution on nanoscale.
- Performs SEM EDS/EBSD to characterize debris in print.

The implications for the ATMAE audience will be a method of latent print analysis that can be used in criminal justice, biomedical research, and security. Furthermore, this pending patent opens up new applications such as portable/handheld AFM that could be used at crime scenes or in medical research.
POSTER PRESENTATIONS


Mr. Manurith Shamakura, University of Central Missouri
Mr. Rohith Kummari, University of Central Missouri
Mr. Gowtham Vangala, University of Central Missouri
Dr. Joleen Watson, University of Central Missouri
Mr. Victor Ricketts, University of Central Missouri

Students engaging in scholarly research have access to opportunities for professional development beyond the classroom. Research projects open the door to competitions, symposiums, and speaking engagements where students share their scholarly work with the world. An interdisciplinary approach to integrated curriculum ensures students’ exposure to research methods is not limited to research or capstone courses. This presentation discusses options for the integration of research in curricula. For illustration, by having students frame a strategic framework project as phenomenological research the case of India Burger was selected to present at a graduate research symposium at the students’ university. The students will present their analysis leading to strategies of Indian Burger, a burger company based in India, for expanding into the US market.

• Scholarly work benefits students
• Integrated curriculum increases opportunities for research
• Options for integrating research in existing curriculum is discussed
• Students present a course project they elevated to a research symposium presentation

A data regression model approach for predicting steam supply at various outside temperature conditions: A case study of Eastern Illinois University Campus.

Operational, Project, and Technology Management

Mr. Taher Garamanli, Eastern Illinois University

This study analyzes the amount of steam consumed by the Eastern Illinois University campus that has been supplied from an Energy Center affiliated with the University. The steam is supplied through a 14-inch diameter pipeline to fulfill the thermal needs of the 40+ University campus buildings to keep the internal thermal conditions within the comfort zone.

There are many key factors that do affect the amount of steam produced, however, these factors can be mainly classified into two categories; the variations of the outside temperature surrounding the buildings envelop, and the internal thermal loads inside the building such as buildings’ occupancy, lighting, and other miscellaneous equipment.

In this regard, the outside temperature is assumed to be playing the major role among other factors. Hence, the aim of this study is to examine the relationship between the amount of steam produced by the Energy Center on one hand and the outside temperature of Charleston, IL on the other, over a period of four consecutive years which covers the available steam production data obtained from the Energy Center.

Based on the outside temperatures acquired and the steam produced, the data was analyzed and fitted into a regression model - a model designed to predict the expected future needs of steam to be produced in accordance with the temperature variation for the City of Charleston.
Role of Industry 4.0 in Operations Management in Manufacturing and Service Organizations

Operational, Project, and Technology Management

Dr. Kay Morgan, Mississippi State University

Industry 4.0 progressively affects the manufacturing and service organizations who make our world. Digital transformation can help operations managers improve their operations in tangible ways. This is because industrial 4.0 helps manufacturing and service organizations gain real-time visibility of their operations. It helps streamline operator workflows, automate data collection, and drive continuous improvement. Thus, industry 4.0 is not simply about technology, it is also about the workforce on the shop floor. Operations managers count on the data to process their operations. Evidence gathered about operator and machine performance updates everything from supply chain to inventory schedules to hiring and training to long-term strategic initiatives. Therefore, without data, improvement initiatives will eventually fall flat. Industry 4.0 technologies give operations managers valuable manufacturing data: continuous, real-time visibility into every process and system in a factory. This level of data connectivity is already a reality in many industries. Internet of Things have enabled devices to communicate detailed performance data as they function. Cloud infrastructure keeps that data in centralized, easily accessible locations. Artificial intelligence and machine learning give manufacturing and services organization engineers and technologies powerful tools to make sense of their data. However, there is the limitation: the best data in the world cannot be of any use unless one understands how to use it to enterprise awareness. The role of industrial 4.0 is to supply better connectivity in the manufacturing factory or service organization to produce the crucially large data sets about workforce so management can go into meaningful insights of workforce performance to locate new areas for improvement from the visual processes in real-time. The better management learn to work with large data sets provided by industrial 4.0, the more influence their initiatives will be.

Improvement of Student Learning Outcomes via a Rapid Assessment Process

Program Administration and Accreditation

Dr. Didem Yamak Congress, DeVry University
Sarah Dubowsky, DeVry University

Student outcomes describe what students are expected to know and be able to do by the time of graduation. They capture the skills, knowledge, abilities and behaviors attained through program progression. Regularly reviewing student assessment data helps institutions improve and enhance learning experiences while also allowing instructors feedback on their teaching methods and practices.

Traditionally, this process has been slow, retro-active, and manual. These obstacles can be overcome by employing digital tools available to educators today. Learning management systems (LMS) often employ rubric features built into their platform with scoring data available for analysis. Software analytic tools can then be employed to reduce, analyze and visualize many data attributes for final evaluation.

The College of Engineering and Information Sciences at DeVry University employs signature assignments with built-in rubrics in the LMS to evaluate multiple learning outcomes as mapped to student outcomes. These rubrics are self-explanatory and require minimal faculty training, creating a culture of proactive assessment, and a seamless way to demonstrate continuous improvement for accreditation bodies.
POSTER PRESENTATIONS

Course level assessment data is reviewed on a Power BI dashboard at the end of each eight-week session. It is noteworthy that various courses are taken by students enrolled in different certificate, associate, and bachelor’s programs. The dashboard allows for the granularity to visualize learning outcomes as mapped to student outcomes by program, enabling the detection of program-specific gaps. The preliminary evaluation of assessment data has facilitated agile action leading to immediate improvement in student outcome assessment results for engineering technology students in math and physics courses. Provided in this presentation are:

- The direct outcome assessment methods and procedures,
- A summary of the automated data collection and analytics process, and,
- Examples of continuous improvement cycles to address learning outcome deficiencies.

Living on the Edge of Mars

Teaching and Learning Innovations

Dr. Kristin Tardif, University of Arkansas Fort Smith
Dr. Justina Buck
Dr. Emily Foss

Living on the Edge of Mars: Is leadership more important than the hard sciences?

Space travel is no longer contained in the pages of science fiction novels. Advancing technology has already taken the human race to the far reaches of the solar system. In the near future, it is likely that a permanent human settlement will be established on Mars. Technology, physics, engineering, chemistry, and geology are all necessary to not only get us to Mars but to sustain us while we are there. However, will they be enough? Mars’ unforgiving environment will cause humans to experience extreme stressors. Stressors such as extreme temperatures, living and working in confined locations, and building a community from the ground up will test the limits of the humans in the settlement. Coaching, mentoring, problem-solving, and various other leadership skills will be necessary to foster collaboration and establish the sense of community that will be needed for a Mars settlement to be successful. This presentation will explore how leadership skills and theories are necessary for humans to be successful when they are living on the edge of the next new frontier.

WIP: Integrated STEM Learning and Students’ Attitudes and Career Choices in Middle School

Teaching and Learning Innovations

Ms Fatima Perwaiz, Purdue University
Dr. Paul Asunda

In order to build and sustain student interest in STEM disciplines, it is important to first ascertain the existing trends in their career choices and attitudes including factors influencing them. This study explored how teachers model integrated STEM instructional practices that engage middle school students learning, consequently influencing their career choices and attitudes. Middle school is a pivotal time for both boys and girls as they start forming identities and career choices and can begin to select both elective courses and extra-curricular activities, based on interests (Webb & Rosson, 2013), and yet, these early years are given low priority in iSTEM education discussions (C-STEMEC, 2013). Social constructivist scholars (e.g., Rubbin, 2007; Urieta, 2007; Yackel & Cobb, 1996) believe that how teachers and students position themselves in a classroom setting determines how much they interact with one another and with the content and concepts – which is a precursor to what knowledge they develop. Our work was guided by the following research question; How do teachers’ instructional practices and students’ engagement...
in integrated STEM learning environments in middle school inform students’ career choices and attitudes? Seventeen (17) teachers and 300 students in a mid-west state participated in the study. Data was collected using the Student Attitudes toward STEM (S-STEM) Survey, classroom observations, and teacher interviews. Collected data was then analyzed through Cluster analysis and thematic coding.

**Unleashing Academic Excellence: How a Labor Union Partnership Elevated TecNM/ITQ Educational Standards in Mexico**

**Teaching and Learning Innovations**

M.C. Hernando Chagolla-Gaona, TecNM/ITQ

Jöns Sánchez, TecNm/ITQ

Kourosh Jenab, Morehead State University

Everado Santiago, TecNM/ITQ

Angela Jimenez, TecNm/ITQ

“In 1943, Mexico established a national labor union to represent the collective interests of workers in the education sector. Nowadays, academic quality is a crucial goal for higher education institutions, and the SNTE has included it in their bylaws. However, traditionally, few local committees were concerned with improving educational quality without demeriting labor rights. In contrast, the Local Committee of TecNM/ITQ worked to defend the labor rights of education workers without neglecting educational quality. The Local Union of the SNTE consists of professors, lecturers, and staff members who work together to achieve a common goal of educating young people at the undergraduate and graduate levels. This article describes some best strategies that the Local committed union labor has implemented for higher and graduate education in TecNM/ITQ. These strategies include building networks for collaboration on projects, developing a strategy for new experiences to help students develop soft skills, and promoting accreditation to four engineering programs. Expolingenierías is one such strategy that allows the development of creativity, innovation, solidarity, and soft skills for students and teachers. These events generate opportunities for professors and lecturers to develop their skills in research, organization, and project management, which allows them to participate in the calls for professor’s promotion. This article provides a vision of union labor called SNTE/ITQ and describes key strategies for improving academic quality to achieve sustainable development in Mexico.
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