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Dear Current and Future Members of ATMAE,

Welcome to Orlando, Florida for the 53rd Annual Conference of the Association for Technology, Management and Applied Engineering, with the theme: *Building Blocks for a Future Workforce*. While you are here, please take the time to visit and enjoy the beautiful city of Orlando and all it has to offer – you will be glad you did!

As we kick off this annual conference, I hope that you will use this time for networking and for developing new friendships and partnerships with your peers. The ATMAE annual conference is a great venue to share your learning experiences with like-minded individuals, to capture memorable moments and to synergize efforts in exciting new scientific ventures, which will create more skilled job opportunities and scientific development in America and beyond.

This conference has several breakout sessions for you to attend along with some remarkable workshops in Leadership, and in specialized technical areas such as Six Sigma, Arduino, commercial Drone applications, and essential areas such as leadership and research publication. I hope you will be able to take advantage and join all of them.

I am happy to welcome you all; your work and collaboration gives us reason to look forward to the future of ATMAE with joy and excitement. With your continued support, ATMAE will continue to progress as a premier American organization with a strong network and with global influence.

I wish you all a wonderful time together, and I hope you will forge new relationships and new partnerships that will steer our work and development forward for years to come.

*Dr. Kamal Shahrabi*
## SCHEDULE AT A GLANCE

### WEDNESDAY, NOVEMBER 3, 2021

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 5:00 PM</td>
<td>Conference Registration</td>
<td>Registration Desk</td>
</tr>
<tr>
<td>7:30 AM – 2:00 PM</td>
<td>Board of Accreditation Hearings</td>
<td>Seminole A&amp;B</td>
</tr>
<tr>
<td>9:00 AM – 11:00 AM</td>
<td>Reshaping the Leadership Discipline as a Prominent Program</td>
<td>Universal C1</td>
</tr>
<tr>
<td>11:00 AM – 1:00 PM</td>
<td>Student Track: Robotic Team Check In</td>
<td>Registration Desk</td>
</tr>
<tr>
<td>11:00 AM – 2:00 PM</td>
<td>Student Track: Robotics Prep</td>
<td>(Exhibit Area) Universal B</td>
</tr>
<tr>
<td>12:00 PM – 12:45 PM</td>
<td>Board of Accreditation Lunch</td>
<td>Gold Coast 2-4</td>
</tr>
<tr>
<td>12:00 PM – 12:45 PM</td>
<td>Board of Directors Working Lunch with Division Leaders</td>
<td>Seminole C</td>
</tr>
<tr>
<td>1:00 PM – 2:30 PM</td>
<td>Board of Directors Meeting</td>
<td>Seminole D &amp; E</td>
</tr>
<tr>
<td>2:00 PM – 2:30 PM</td>
<td>Refreshment Break Sponsored by Iowa State</td>
<td>Universal A &amp; B</td>
</tr>
<tr>
<td>2:30 PM – 3:00 PM</td>
<td>Accreditation 101 Workshop</td>
<td>Universal D1</td>
</tr>
<tr>
<td>2:30 PM – 3:30 PM</td>
<td>Student Track: Student Division Opening Meeting</td>
<td>Seminole D &amp; E</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td>Accreditation Self Study Workshop</td>
<td>Universal D2</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td>Certification Board Meeting</td>
<td>Space Coast I</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td>JTMAE Board Meeting</td>
<td>Space Coast III</td>
</tr>
<tr>
<td>4:00 PM – 6:00 PM</td>
<td>Exhibits Open</td>
<td>Universal B</td>
</tr>
<tr>
<td>4:00 PM – 6:00 PM</td>
<td>Student Track: Robotics Prep and Judging</td>
<td>Universal A</td>
</tr>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td>Opening Reception and Robotics Viewing Sponsored by Boeing</td>
<td>Universal A &amp; B</td>
</tr>
<tr>
<td>6:00 PM – 7:15 PM</td>
<td>Opening Session: “Smart Manufacturing: Crucial for Manufacturers”</td>
<td>Seminole C-E</td>
</tr>
<tr>
<td>7:30 PM</td>
<td>Student Track: Student Night Out</td>
<td></td>
</tr>
</tbody>
</table>

### THURSDAY, NOVEMBER 4, 2021

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 5:00 PM</td>
<td>Conference Registration</td>
<td>Registration Desk</td>
</tr>
<tr>
<td>7:00 AM – 8:30 AM</td>
<td>Division Member Breakfast Meeting Led by Division Leaders,</td>
<td>Seminole C-E</td>
</tr>
<tr>
<td></td>
<td>Sponsored by Proctor Free</td>
<td></td>
</tr>
<tr>
<td>7:00 AM – 9:00 AM</td>
<td>Accreditation Business Meeting</td>
<td>Seminole A &amp; B</td>
</tr>
<tr>
<td>7:30 AM – 9:00 AM</td>
<td>PhD in Technology Management Breakfast</td>
<td>Cypress Boardroom</td>
</tr>
<tr>
<td>8:00 AM – 5:00 PM</td>
<td>Exhibits Open</td>
<td>Universal A &amp; B</td>
</tr>
<tr>
<td>9:00 AM – 10:00 AM</td>
<td>Breakout Sessions</td>
<td>Universal C1-C3; D1 – D3; E1-E2</td>
</tr>
<tr>
<td>9:00 AM – 11:30 AM</td>
<td>Student Track: Introduction to Arduino Workshop - $80 Fee</td>
<td>Universal F123</td>
</tr>
<tr>
<td>10:00 AM – 10:15 AM</td>
<td>Refreshment Break Sponsored by Boeing</td>
<td>Universal A &amp; B</td>
</tr>
<tr>
<td>10:00 AM – 11:00 AM</td>
<td>Accreditation Standards &amp; Accreditation Committee</td>
<td>Seminole A &amp; B</td>
</tr>
<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Getting Your Great Research Published: Best Practices For</td>
<td>Universal E3</td>
</tr>
<tr>
<td></td>
<td>Smooth Submission to the Journal of Technology, Management,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Applied Engineering (JTMAE Workshop)</td>
<td></td>
</tr>
<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Breakout Sessions</td>
<td>Universal C1-C3; D1-D-3; E1-E2</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td>Location</td>
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</tr>
<tr>
<td>11:00 AM - 12:00 PM</td>
<td>Accreditation P&amp;P Committee</td>
<td>Seminole A &amp; B</td>
</tr>
<tr>
<td>12:00 PM - 2:00 PM</td>
<td>Lunch and Robotics Competition <strong>Sponsored by SME</strong></td>
<td>Seminole C - E</td>
</tr>
<tr>
<td>2:00 PM - 3:00 PM</td>
<td>Robotics Competition: Robot Tag</td>
<td>Seminole C - E</td>
</tr>
<tr>
<td>2:00 PM - 3:00 PM</td>
<td>Breakout Sessions</td>
<td>Universal C1-C3; D1-D3; E1-2</td>
</tr>
<tr>
<td>2:00 PM - 4:00 PM</td>
<td>Accreditation Visiting Team Training</td>
<td>Seminole A &amp; B</td>
</tr>
<tr>
<td>2:00 PM - 5:00 PM</td>
<td>Epsilon Pi Tau Board Meeting</td>
<td>Space Coast III</td>
</tr>
<tr>
<td>3:00 PM - 3:30 PM</td>
<td>Break</td>
<td>Universal A &amp; B</td>
</tr>
<tr>
<td>3:30 PM - 4:00 PM</td>
<td>Poster Presentation Session</td>
<td>Universal A</td>
</tr>
<tr>
<td>3:30 PM - 5:30 PM</td>
<td>Student Track: ITIQ Competition/ Haig Vahradian Technology Challenge</td>
<td>Universal F123</td>
</tr>
<tr>
<td>4:00 PM - 6:30 PM</td>
<td>Breakout Sessions</td>
<td>Universal C1-C3; D1-D3; E1-2</td>
</tr>
<tr>
<td>4:30 PM - 6:00 PM</td>
<td>Accreditation Visiting Team Chair Training</td>
<td>Seminole A &amp; B</td>
</tr>
<tr>
<td>5:00 PM - 6:00 PM</td>
<td>Overview of Boeing Career Opportunities for Graduates of ATMAE-Accredited Degree Programs</td>
<td>Seminole C - E</td>
</tr>
<tr>
<td>6:30 PM - 7:30 PM</td>
<td>Epsilon Pi Tau Reception and Initiation</td>
<td>Space Coast 1-2</td>
</tr>
</tbody>
</table>

**Friday, November 5, 2021**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 9:30 AM</td>
<td>ATMAE Breakfast and Business Meeting <strong>Sponsored by SME Education Foundation</strong> (Open to All)</td>
<td>Seminole C-E</td>
</tr>
<tr>
<td>9:30 AM - 12:30 PM</td>
<td>Epsilon Pi Tau Board Meeting</td>
<td>Space Coast III</td>
</tr>
<tr>
<td>9:30 AM - 12:00 PM</td>
<td>Breakout Sessions</td>
<td>Universal C1-C3; E1-3; E1-2</td>
</tr>
<tr>
<td>10 AM - 10:15 AM</td>
<td>Refreshment Break <strong>Sponsored by Proctor Free</strong></td>
<td>Universal AB</td>
</tr>
<tr>
<td>10:00 AM - 11:00 AM</td>
<td>Student Track Activity – Career Panel (Hosted by NIAC) <strong>Sponsored by SME</strong></td>
<td>Universal F123</td>
</tr>
<tr>
<td>12:30 PM - 1:30 PM</td>
<td>Awards Luncheon <strong>Sponsored by SME</strong></td>
<td>Seminole C-E</td>
</tr>
</tbody>
</table>

Thanks to East Carolina University, Central Missouri State University and Goodheart-Wilcox Publisher for Underwriting the Cost of the Plaques

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 PM - 6:00 PM</td>
<td>Preparing Students for the Commercial Use of Drones \nIn the Industry Workshop – ADDL $40 Fee **</td>
<td>Universal C1</td>
</tr>
<tr>
<td></td>
<td>Six Sigma Black Belt Using MINITAB Workshop – ADDL Fee: $500 PRO IND; $350 PRO ACAD; $150 STD. **</td>
<td>Universal C2</td>
</tr>
<tr>
<td></td>
<td>Paper Airplane Building to Demonstrate Push Versus Pull and Lean Manufacturing Principles and Techniques Workshop – ADDL Fee: $40 **</td>
<td>Universal D1</td>
</tr>
</tbody>
</table>
ATMAE BOARD OF DIRECTORS

Chair
Dr. Kamal Shahrabi, Chair
2020 - 2021
Rochester Institute of Technology
(908) 369-0436
kxscada@rit.edu

Vice Chair
Dr. Fred Barez, Vice Chair
2020-2021
San Jose State University
(408) 924-4298
fred.barez@sjsu.edu

Treasurer
Dr. Kouroush Jenab
2020 - 2022
Morehead State University
(606) 454-9767
kouroush.jenab@gmail.com

Secretary
Dr. Edem G. Tetteh
2020 - 2022
Rowan College of Burlington County
(304) 359-3255
etetteh@rcbc.edu

2-Year Representative
Mr. John Sluder
2019 - 2021
River Parishes Community College
(970) 640-6288
jsluder@rpcc.edu

Vice Chair
Dr. Fred Barez, Vice Chair
2020-2021
San Jose State University
(408) 924-4298
fred.barez@sjsu.edu

Treasurer
Dr. Kouroush Jenab
2020 - 2022
Morehead State University
(606) 454-9767
kouroush.jenab@gmail.com

Secretary
Dr. Edem G. Tetteh
2020 - 2022
Rowan College of Burlington County
(304) 359-3255
etetteh@rcbc.edu

4-Year Representative
Dr. Zaki Kuruppalil
2019 - 2021
Ohio University
(740) 593-0258
kuruppal@ohio.edu

Industry Representative
Mr. Walt Pozgay
2019 - 2021
GE Appliances
(502) 380-7207
walter.pozgay@geappliances.com

NIAC Representative
Mr. Mark Dotson
2020 - 2021
(423) 791-8986
markd9585@gmail.com

Student Representative
Mr. Thomas Buteyn
2020 - 2021
Morehead State University
(606) 6794668
tabuteyn@moreheadstate.edu

Past Chair
Dr. Tarek Mahfouz
2020 - 2021
Ball State University
(317) 645-5611
tmahfouz@bsu.edu
2020-2021 BOARD OF DIRECTORS

Chair
Mr. Glenn Rettig
Owens Community College
Glenn_rettig@owens.edu
2017-2021

4-Year Degree Program
Dr. Marvin Sarapin
Purdue University
msarapin@purdue.edu
2018-2021

2-Year Degree Program
Dr. Joyce Wilkerson,
CSTM, CPT, CSSYB
Ivy Tech Community College
jwilkers@ivytech.edu
2016-2022

4-Year Degree Program
Dr. Nilesh Joshi
Morehead State University
M1021701@moreheadstate.edu
2017-2023

2-Year Degree Program
Mr. Glen Roberson
IVY Tech Community College
groberson@ivytech.edu
2014-2023

4-Year Degree Program
Dr. Yuqiu You
Ohio University
youy@ohio.edu
2017-2023

2-Year Degree Program
Dr. Sam Rowell
Northeast State Community College
ssrowell@northeaststate.edu
2019-2022

4-Year Degree Program
Dr. Paul Resetarits
Central Connecticut University
resetarits@ccsu.edu
2019-2022

2-Year Degree Program
Dr. Sami Ghezawi
Pellissippi State Community College
ssghezawi@pstcc.edu
2019 - 2022

Master's Degree Program
Dr. Ahmad Zargari
Morehead State University
Ahmad.zargari@moreheadstate.edu
2019-2022
Chair
Mr. Glenn Rettig
Owens Community College
Glenn_rettig@owens.edu
2017-2021

4-Year Degree Program
Dr. Marvin Sarapin
Purdue University
msarapin@purdue.edu
2018-2021

2-Year Degree Program
Dr. Joyce Wilkerson,
CSTM, CPT, CSSYB
Ivy Tech Community College
jwilkers@ivytech.edu
2016-2022

4-Year Degree Program
Dr. Nilesh Joshi
Morehead State University
M1021701@moreheadstate.edu
2017-2023

2-Year Degree Program
Mr. Glen Roberson
IVY Tech Community College
groberson@ivytech.edu
2014-2023

4-Year Degree Program
Dr. Yuqiu You
Ohio University
youy@ohio.edu
2017-2023

2-Year Degree Program
Dr. Sam Rowell
Northeast State Community College
ssrowell@northeaststate.edu
2019-2022

4-Year Degree Program
Dr. Paul Resetarits
Central Connecticut University
resetarits@ccsu.edu
2019-2022

2-Year Degree Program
Dr. Sami Ghezawi
Pellissippi State Community College
ssghezawi@pstcc.edu
2019 - 2022

Master's Degree Program
Dr. Ahmad Zargari
Morehead State University
Ahmad.zargari@moreheadstate.edu
2019-2022
BOARD OF CERTIFICATION

Dr. Mark Miller
University of Texas at Tyler
Chair
mark_miller@uttyler.edu

Dr. Mark Doggett
Western Kentucky University
Technology Management
Exam Commission
mark.doggett@wku.edu

Dr. Isaac Chang
Illinois State University
Engineering Graphics
Exam Commission
ychan13@ilstu.edu

Dr. Jeff Cunion
Industry Review Committee
jeffcunion@sbcglobal.net

Dr. Redong Bai
Eastern Kentucky University
Manufacturing Specialist & Lean Six Sigma
Exam Commission
rendong.bai@eku.edu

Dr. Curtis Cohenour
Ohio University
Construction Management
Exam Commission
cohenour@ohio.edu

Dr. Mahmoud Al-Odeh
Bemidji State University
Lean Six Sigma
Exam Commission
Mahmoud.Al-Odeh@bemidjistate.edu

Dr. Jake Hildebrant
Murray State University
Learning Management System
Expert
jihildebrant@murrystate.edu

Dr. Lori Sussman
University of Southern Maine
Technology Management
Exam Commission
lori.sussman@maine.edu

Dr. Mahbub Ahmed
Southern Arkansas University
Engineering Graphics
Examh Commission
mkahmed@saumag.edu

Dr. Dr. John Haughery
Millersville University
Controls Exam Commission
John.Highery@millersville.edu

Dr. Mohammed Ali
University of Texas at Tyler
Manufacturing Specialist
Exam Commission
mohammedali@uttyler.edu

Dr. Dr. Denise Gravitt
Western Illinois University
Construction Management
Exam Commission
dd-gravitt@wiu.edu

Dr. Dr. Heshium Lawrence
University of Texas at Tayler
Lean Six Sigma
Exam Commission
hlawrence@uttyler.edu
JTMAE BOARD OF DIRECTORS

Chair
Dr. Gretchen Mosher
Iowa State University
gamosher@iastate.edu

At Large Member
Dr. Marion Schafer
Indiana State University
Marion.Schafer@indstate.edu

Student Representative
Joseph Wright
Drexel University
jrw435@drexel.edu

JTMAE EDITORIAL PANEL

2019 - 2021
Chief Editor
Dr. Randell Peters
Indiana State University
randy.peters@indstate.edu

2019 - 2021
Associate Editor
Dr. Ahmed Mohamed
Indiana State University
Ahmed.Mohamed@indstate.edu

Journal Administrator
Non-voting
Amy Good
ATMAE Officeadmin@atmae.org

FOUNDATION BOARD

Dr. Mahyar Izadi
Dean Emeritus
Eastern Illinois University
mahyar.izadi@yahoo.com

Dr. Dominick Fazarro
Professor
University of Texas Tyler
dfazarro@uttyler.edu

Dr. Charles Stevenson
Division Chair
Louisiana Delta Community College
cstevenson@LaDelta.edu

Dr. Nettey Richmond
Professor
Kent State University
inettey@kent.edu

Dr. Lynda Kenney,
2010-13 ATMAE BoD Chair
lynda.kenney@gmail.com
The NIAC was officially established under ATMAE’s bylaws in October 2009 when its membership was appointed by the ATMAE Executive Board. The NIAC provides consultation to the Board of Directors, its chair serves on the Board of Directors, and it is primarily composed of individuals from the business and industry sector.

**NIAC INITIATIVES:**

- Build a strong foundation between industry and ATMAE.
- Share best practices to enhance the profession and develop the new generation of workers.
- Support the education and career growth of ATMAE members.
- Increase ATMAE awareness and relevance to industry companies looking to develop the future workforce.
- Ensure recognition of ATMAE programs (Accreditation and Certification).
- Provide opportunities for Industry members to mentor and develop students.
- Members of the NIAC serve two-years and are elected by the ATMAE Board of Directors.

**MEMBERS**

**Mark Dotson, Chair**  
Adjunct Faculty, Northeast State Community College  
Industrial Development Board / Carter County, TN  
markd9585@gmail.com

**Ken Jurgensmeyer**  
Director of Manufacturing Operations  
MiTek USA  
kjurgensmeyer@mii.com

**Greg Chapdelaine**  
Boeing  
Gregory.p.chapdelaine@boeing.com

**Victor Brown**  
Distinguished Engineer  
IBM  
vicmcse@cox.net

**Dr. Dean Bartles**  
President & CEO  
Manufacturing Technol Deployment Group  
dean.bartles@mtdg.org

**Walt Pozgay**  
Senior Manager Engineering Labs  
GE Appliance  
wspozgay@gmail.com

**Steven Dunn,**  
CSTM, PMP, SMS, CMfgE  
Engineered Wire Products  
dunnsm98@yahoo.com

**Dr. Ugo Mgbike**  
umgbike@aol.com

**Eric Gallo**  
Nucor Corporation  
eric.gallo@nucor.com
CONSTRUCTION DIVISION

The Construction Division was established by the Executive Board at the 2009 ATMAE Conference.

Dr. Curtis Cohenour  
President: (2019 - 2021)  
Ohio University  
740-593-1554  
cohenour@ohio.edu

Dr. Denise Gravitt  
Vice-President: (2019 - 2021)  
Western Illinois University  
309-298-1091  
dd-gravitt@wiu.edu

DISTANCE LEARNING DIVISION

The Distance Learning Division (DL) was approved as a membership division by the ATMAE Board of Directors in December 2013.

Dr. Sid Martin  
President: (2020 - 2022)  
Southeastern Louisiana University  
985-549-3159  
sidmartin007@gmail.com

VACANT  
Vice-President: (2020 - 2022)

EECT DIVISION

The mission of the EECT Division of ATMAE is to carry out the purposes and objectives of the Association of Technology, Management, and Applied Engineering as they apply to professional personnel employed in EECT positions in business, industry, education, and government. The EECT Division was established at the 2002 NAIT Convention.

Lawrence Bosek  
President: (2020 - 2022)  
Indiana State University  
586-744-9774  
LBSECGS@Gmail.com

Jason Davidson  
Vice-President: (2020 - 2022)  
Indiana State University  
317-804-1658  
jdavidson21@sycamores.indstate.edu
SPECIALTY DIVISIONS AND FOCUS GROUPS

GRAPHICS DIVISION

The mission of ATMAE’s Graphics Division is to carry out the purposes and objectives of the Association as they apply to students and to professional personnel employed in graphic communications positions in business, industry, education, and government. The Graphics Division was founded in 1998 and includes members specializing in CAD/Engineering Graphics, Graphic Arts & Design, Photography, Printing and Publishing, and Multimedia (including web publishing). The Division does not include areas such as Distance & Online Learning (see Distance Learning Division), general Internet, or Computer Networking (see the EECT Division.)

Dr. Hope Carroll
President: (2019 - 2021)
Lenoir Community College
864-986-8168
mhcarroll05@lenoircc.edu

Dr. Isaac Chang
Vice-President: (2019 - 2021)
Illinois State University
309-438-3767
ychan13@ilstu.edu

MANAGEMENT DIVISION

The mission ATMAE’s Management Division of ATMAE is to carry out the purposes and objectives of the Association as they apply to students and to professional personnel employed in management positions in business, industry, education, and government. The Management Division was established in 2006.

Dr. Mark Doggett
President: (2020 - 2022)
Western Kentucky University
270-745-6951
mark.doggett@wku.edu

Dr. Sophia Scott
Vice President: (2020 - 2022)
Southeast Missouri State University
573-986-7383
sscott@semo.edu

MANUFACTURING DIVISION

Dr. Cynthia Horta Martinez
President: (2020 - 2022)
University of Kansas
660-238-4427
horta.cynthia@gmail.com

Dr. Dean Bartles
Vice President (2020 - 2022)
Manufacturing Technology Deployment Group
727-251-7671
dean.bartles@mtdg.org
SAFETY DIVISION

The mission of ATMAE’s Safety Division is to carry out the purposes and objectives of the Association as they apply to students and to professional personnel employed in health and safety positions in business, education, government and industry. The Safety Division was established in 2000.

Dr. I. Richmond Nettey
President: (2020 - 2022)
Kent State University
330-672-9476
inettey@kent.edu

Vice-President: (2020 - 2022)
Vacant

STUDENT DIVISION

The mission of ATMAE’s Student Division is to carry out the purposes and objectives of the Association for the benefit of students in technology, technology management, and applied engineering degree programs.

Joshua Stevens
President: (2020 - 2022)
Wilson Community College
919-656-3011
js4326@wilsoncc.edu

Dr. John Haughery
Vice-President: (2020 - 2022)
Millersville University of Pennsylvania
717-871-7225
john.haughery@millersville.edu

MICRO / NANOTECHNOLOGY FOCUS GROUP

The Micro/Nanotechnology Focus Group was established in December 2010 to promote the interests of and to develop programs in support of ATMAE members involved in this growing field.

Dr. Mohammed Ali
President: (2019 - 2021)
University of Texas at Tyler
903-663-8218
mohammedali@uttyler.edu

Dr. Matthias Pleil
Vice President (2019 - 2021)
SCME/University of New Mexico
505-272-7157
mpleil@unm.edu
WITMAE DIVISION
WOMEN IN TECHNOLOGY, MANAGEMENT AND APPLIED ENGINEERING

The Women in Technology, Management and Applied Engineering (WITMAE) Division’s vision is to encourage and empower women in the fields of technology, applied engineering, and management. The Mission of the Women in Technology, Management and Applied Engineering (WITMAE) Division is to recruit and engage women in ATMAE, and to promote and support ATMAE’s vision and mission by empowering women. The Women in Technology, Management and Applied Engineering (WITMAE) Division was established in 2009.

President: (2019 - 2021)
Vacant

Dr. Shweta Chopra
Vice-President: (2020 - 2022)
Ohio University
587-733-5549
schopra@ohio.edu

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SMART MANUFACTURING: CRUCIAL FOR MANUFACTURERS

SUMMARY:
Smart Manufacturing Technologies have been around for more than 10 years. However, they have been almost exclusively deployed at large manufactures since they have been too complicated and unaffordable for SMMs. In this talk, describe the impact of Smart Manufacturing technologies on productivity, responsiveness and resiliency, explore a new way to deploy Smart Manufacturing technologies at Small to Medium-sized Manufacturers (SMMs), and discuss why large manufacturers should actively help SMMs with their digital transformation to achieve supply chain resiliency. Dr. Biller will end with a vision of the future regarding mart manufacturing.

DR. STEPHAN BILLER is the CEO of Advanced Manufacturing International (AMI), a not-for-profit that aids Small and Medium Manufactures with their Digital Transformation. He is a member of the National Academy of Engineering and is currently co-chairing a National Technology and Science Board effort to establish a national strategy for AI-driven digital manufacturing to increase resiliency and efficiency of supply chains. Previously, he served as the Vice President of Product and Offering Management for AI Applications & Watson IoT at IBM, where he led IBM’s Industry 4.0 solution products, including IBM Maximo®, TRIRIGA®, Asset Performance Management and Operations Optimization using AI and Analytics to drive operational excellence into factories, supply chains and operations. He was recognized by SME as one of the 30 thought leaders of Industry 4.0 and Smart Manufacturing.

Prior to joining IBM, Dr. Biller served as the Chief Manufacturing Scientist & Manufacturing Technology Director at General Electric Corporation (GE), founding and leading GE’s Brilliant Factory® initiative to improve productivity, quality, and efficiency of GE’s manufacturing engineering, factories and supply chains. Earlier positions include General Motors (GM) Fellow & Global Group Manager for Manufacturing Systems. He holds a Dipl.-Ingenieur degree from RWTH Aachen, Germany; a Ph.D. in Industrial Engineering and Management Sciences from Northwestern University; and an MBA from the University of Michigan.

Dr. Biller is a founding Board member of the Smart Manufacturing Leadership Coalition. He is the recipient of two GE CTO Awards; five Boss Kettering Awards, GM’s highest innovation award; and four Charles McCuen Research Awards, GM’s highest research award. Dr. Biller holds 11 patents and is a certified Six Sigma Master Black Belt. He is a member of the Board of Director of MTConnect® and served on the Executive Committees of the Digital Manufacturing and Design Innovation Institute (now MxD), America Makes, the National Additive Manufacturing Innovation Institute, and the National Center for Manufacturing Science (NCMS).
2021 ANNUAL CONFERENCE

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Administration: Accreditation
THURSDAY, NOV 4
10:30 AM–10:55 AM
UNIVERSAL D3

REMOTE ACCREDITATION: WHAT HAVE WE LEARNED AND HOW ARE WE POSITIONED?

Dr. John Haughery, Millersville University of Pennsylvania
Dr. Mark Doggett, Western Kentucky University
Dr. Gretchen Mosher, Iowa State University
Mr. Jake Hildebrant, Murray State University

Many accrediting agencies that conducted accreditation reviews during the spring of 2020 were required to hold onsite visits remotely. Not only was this an ad hoc transition, but it was also made without full knowledge of the impact the shift in evaluation mode would have on the effectiveness and the quality of accreditation reviews against accreditation standards and criteria. Therefore, a critical need exists to evaluate the efficacy of the virtual mode of accreditation review.

This talk will present the results of data collected from ATMAE’s 2020 remote accreditation visits. Data include qualitative and quantitative feedback from the ATMAE Board of Accreditation, visiting team members, and contacts at institutions that participated in virtual accreditation visits. Results are expected to help characterize the effectiveness and quality of remote accreditation site visits amid the onset of the COVID-19 pandemic.

- Effectiveness of remote accreditation site visits
- Quality of remote accreditation site visits
- Advantages of remote accreditation site visits
- Disadvantages of remote accreditation site visits
- Opportunities to leverage remote accreditation site visits

Administration: External Relations & Partnerships
THURSDAY, NOV 4
10:30 AM–10:55 AM
UNIVERSAL E2

GAME OF THRONES - DEFEATING THE DRAGONS WITH UNICORNS

Dr. John Wyatt, Mississippi State University
Dr. Ryan Walker, Mississippi State University

There are many stakeholders (kingdoms) in the advancement of students from K-12 into the workforce. Each kingdom has its own advantages, challenges, organization, and rules, but no one sector can meet the demands of industry. How do you get all these little kingdoms to work together, leverage their strengths, set aside their differences, and meet the individual needs of their students?

The employee requirements of industry are immense, and the career pathways feeding are inadequately aligned to the need and insufficient in quantity. The biggest challenges in K-12 is inequity in access to quality technical programs, and a huge amount of red tape with respect to graduation requirements. Community college offer strong connections to industry but fail to offer credentials that offer upward movement in careers. University-based engineering programs have the quantity of students, but their curricula are not aligned to nor offer the required applied technical skills that industry desires. However, there is a unicorn. University-based technical programs have the potential to meet industry needs and offer the technical skills which are desperately needed.

- Lack of curricular alignment to workforce employment
- Different funding streams within silos/kingdoms
- Discuss solutions to transcend these boundaries

Administration: Other
THURSDAY, NOV 4
11:00 AM–11:25 AM
UNIVERSAL E2

INSTITUTION-WIDE PRACTICES FOR IMPROVED STEM STUDENT LEARNING: THE VOICES OF STEM STUDENTS DURING COVID-19 PANDEMIC

Dr. Andrea Ofori-Boadu, North Carolina Agricultural and Technical State University
Ms. Mercy Fash, North Carolina Agricultural and Technical State University
Ms. Rabiatu Bonku, North Carolina Agricultural and Technical State University
Dr. Alesia Ferguson, North Carolina Agricultural and Technical State University

Insights into the learning experiences of STEM students during the COVID-19 pandemic can inform the development of institution-wide practices for improved STEM learning and institutional resiliency during future pandemics.

The COVID-19 pandemic had negative impacts on the U.S. society. Institutions rapidly shut down and transitioned into
distance learning environments. STEM students struggled to learn in distance learning environments, while being isolated from STEM communities and dealing with COVID-19 related anxieties. STEM Administrators, faculty, and staff struggled to keep up with the continuous changes needed to sustain STEM learning during the COVID-19 pandemic. STEM students’ experiences, stresses, decisions, and performance can inform STEM administrators’ development of policies and practices to improve STEM student learning and institutional resiliency during future pandemics.

**Major Points:**
- Introduction
- Problem Statement
- Objectives
- Research Methods
- Results
- Conclusion

**Administration: Retention**
**THURSDAY, NOV 4**
**11:00 AM–11:25 AM**
**UNIVERSAL D3**

**DATA DRIVEN RECRUITING TO IMPROVE UNIVERSITY RETENTION**

Dr. John Wyatt, Mississippi State University
Dr. Ryan Walker, Mississippi State University

With national university first year retention being 50% and only 31.8% of students graduating by the end of year six, there is a significant need to retain more students. Currently, as a technical program, we are missing the opportunity to internally recruit students who are leaving the engineering disciplines as well as the university.

Using Mississippi State University student level data, we tracked engineering majors throughout their undergraduate educational career. We confirmed the national trend of most students leaving within the first four terms, and the numbers then plateau until graduation. Of these students we identified a potential recruiting pool of 490 candidates that entered the university with the intent of earning a baccalaureate degree in engineering. During this time, our industrial technology program, without any internal recruiting strategy, was able to acquire 7.75% of these students shepherding them to a 97.4% graduation rate by the end of year six.

- There is a need to help the students identify an efficient internal path through post-secondary programs
- As institutions we are responsible in helping these students find their pathway, which leads to a sustainable career
- We need to do our best to retain these students through graduation

**Administration: Recruitment**
**THURSDAY, NOV 4**
**11:30 AM–11:55 AM**
**UNIVERSAL E2**

**CAREER PIPELINES: RECRUITMENT & RETENTION OF STUDENTS IN OFTEN OVERLOOKED CAREER AREAS**

Dr. Benjamin Brachle, University of Nebraska at Kearney
Mr. Mike Rogers, Millard Public Schools

As college recruitment becomes more competitive, attracting and retaining students into career focused post secondary programs is intensifying. This presentation attempts to showcase efforts made by three institutions to recruit and retain students into a technical career area.

Presentation will focus on partnerships developed at all levels in education to recruit and retain students in technical areas related to distribution and logistics.

**Administration: Other**
**THURSDAY, NOV 4**
**11:30 AM–11:55 AM**
**UNIVERSAL D3**

**THE ATMAE LEARNING MANAGEMENT SYSTEM: YOUR USER FRIENDLY ONLINE CERTIFICATION AND TRAINING CENTER**

Dr. Mark Miller, The University of Texas at Tyler
Ms. RaeJean Griffin, The University of Texas at Tyler
Ms. RaeJean Griffing, The University of Texas at Tyler

With the implementation of ATMAE’s new Learning Management System (LMS), the opportunity for more creative and engaging content is needed. COVID-19 has made it apparent to instructors that they need to rethink the way in which they disseminate information to their students. Online content was instrumental in a student's success during this pandemic and with ATMAE’s new LMS, instructors can become even more creative in delivering educational content, particularly, that associated with the ATMAE certifications.

The new ATMAE LMS has the ability for individuals to create content to aid students to successfully pass an ATMAE certification exam. This presentation will focus on what those changes are and how you can play a role.

**Major Points:**
1. Demonstration on how the new LMS system functions
2. How to develop training sessions and what is in it for you
3. How training for students can be used as supplemental materials for a class
4. ProctorFree
• Do career academies actually get students launched into that specific career?
• What can Community Colleges and Universities do to help attract students and launch them into their chosen career.
• Our current collaboration setup between secondary and post-secondary levels, a case study between Millard Public Schools, Metropolitan Community College, and the University of Nebraska at Kearney.

Administration: Course Objectives
THURSDAY, NOV 4
2:30 PM–2:25 PM UNIVERSAL D2

USING VERTICAL CURRICULUM TO PREPARE STUDENTS TO ATTAIN SENIOR DESIGN PROJECT CLASS OUTCOMES
Dr. Riem Rostom, Indiana State University
Dr. Ahmed Mohamed, Indiana State University

Engineering design classes that include projects are an essential integral of most engineering technology programs. These classes serve as a capstone class for the program assessment and to measure the student outcomes.

During the engineering technology learning experience students have to take few design classes with a final project as their assessment.

In this research a study was conducted on two different types of classes. Engineering design and senior design project.

The comparison between these classes will emphasize on parameters such as distant or face-to-face, individual projects or group projects, final reports, final exams, presentations, and bi-weekly progress reports. The results include student outcomes attainment and grades will be the measurement used for these comparisons.

Students entering the OPT workforce face unique challenges. This presentation recommends interventions based on integrated literature review that will help students overcome these challenges and gain a competitive advantage.

This presentation will provide a research-based discussion on interventions universities can implement to provide their international students with a needed competitive advantage. Justification and discussion will be presented regarding the value of promoting Eudaimonic wellbeing along with practical and cost-effective recommendations.

Administration: Program and Curricula Development
THURSDAY, NOV 4
2:00 PM–2:25 PM UNIVERSAL D2

SUPPORTING STUDENTS ON THEIR JOURNEY TO OPT: PROMOTING PSYCHOLOGICAL WELL-BEING
Ms. MariEtta Byerline, University of Central Missouri
Dr. Ronnie Rollins, University of Central Missouri

Students entering the OPT workforce face unique challenges. This presentation recommends interventions based on integrated literature review that will help students overcome these challenges and gain a competitive advantage.

This presentation will provide a research-based discussion on interventions universities can implement to provide their international students with a needed competitive advantage. Justification and discussion will be presented regarding the value of promoting Eudaimonic wellbeing along with practical and cost-effective recommendations.

• Students entering the OPT workforce face unique challenges
• Universities can assist current international students in Eudaimonic wellbeing skills
• Skills promoting Eudaimonic wellbeing in students carry over their OPT experiences
• Wellbeing has a positive correlation with work performance
• Competitive advantage is achieved to help offset challenges in the OPT workforce

Administration: Program and Curricula Development
THURSDAY, NOV 4
4:30 PM–4:45 PM UNIVERSAL D1

HOW DOES ATMAE ACCREDITATION HELP IN ASSESSING STUDENT PERFORMANCE AND PROGRAM MEASUREMENT?
Dr. Suhansa Rodchua, University of Central Missouri
Dr. Roya Azimzadeh, University of Central Missouri

Engineering (ATMAE), which requires that program outcomes and assessments be in alignment for any accredited programs. This study will present a case study of 3 programs that have renewed ATMAE accreditation in 2020: the B.S. in Design and
Drafting Technology, the M.S. in Industrial Management, and the M.S. in Technology.

The major standards from ATMAE accreditation with program results will be covered as follows:

- Program learning outcomes identification and validation
- Student enrollment and graduate satisfaction with program/option
- Employment and job advancement of graduates
- Advisory board committees inputs
- Outcome measures used to improve program
- A summary of program operations

Administration: Program and Curricula Development

THURSDAY, NOV 4
4:30 PM–4:45 PM UNIVERSEAL E2

RE-SHAPING LEADERSHIP TO INCLUDE SENIOR CITIZENS AND KINDLE THE FIRE OF COLLEGE STUDENTS

Dr. Kristin Tardif, University of Arkansas Fort Smith
Prof. Monique Bracken, University of Arkansas Fort Smith
Prof. Justina Buck, University of Arkansas Fort Smith
Dr. Argie Nichols, University of Arkansas Fort Smith

This new program can be a new revenue stream for our university and increase retention for first year students and transfer students.

Northwest and Central Arkansas have been designated as one of the best places to live, work, and play. This is in part due to the fact that the cost of living is low and small, medium, and large businesses are thriving within the creative economy. A large number of seniors have migrated into the area, and the Arkansas Economic Develop offices say this trend is long term. As the University of Arkansas-Fort Smith is restructuring, new sources of revenue are being looked at.

The restructuring of the university began in September 2020. The results will be announced in March of 2021. The revenue generation committee decided to investigate designing a senior college, to reach out and meet the need of life-long learning of the growing senior community. A preliminary survey was conducted with a small number of seniors to determine if more research was needed. Moreover, to decide if this could be a viable option for revenue generation.

After hearing results of the Student Advancement committee, it was determined that perhaps senior citizens who are successful in the senior college could be trained to be mentors to incoming university students who often struggle with leaving home, balancing studies with social life, and time management practices. Research was conducted on university mentoring programs and mentoring programs involving students and seniors.

Preliminary research yields a wealth of data on successful programs pairing children, teenagers, and college students. Students I.Q and test scores increased, and seniors’ health increased. This preliminary data was strong enough to further research this topic and the viability of developing a program.

Approach:

Our approach is to research and define a senior college in our market area with a mentoring program for incoming freshman and transfer students. To begin, we need to know the demographics and psychographics of the senior community in central, west, and northwest Arkansas. Then research if there is a need for life-long learning and would this concept meet this need if it exists. We have performed preliminary research that has determined there is a need to develop better and stronger mentoring programs with incoming and transfer students. We will verify that research and further research how students will react to senior being mentors. Will they react to them as they would their grandparents or feel uncomfortable?

Three Model Programs:

Senior colleges provide “intellectual stimulation, practical knowledge, social interaction and fun”, for senior citizens. We interviewed: a senior college located in Bar Harbor, ME that is a successful community non-profit; director of a Senior College that is part of the University of Iowa; Senior College that is run with a Director and Board of Directors who are part of the city of Tallahassee. Included, is a new approach to seniors and universities, in which the university has primarily gone on-line and have buildings unoccupied, and they turned empty buildings into University Retirement Centers.

Acadia Senior College:

Acadia Senior College (ASC) began as a non-profit community project to provide "intellectual stimulation, practical knowledge, social interaction and fun" for older persons in the Mount Desert Island Region. In the spring of 2000, ASC was formally organized under the sponsorship of the University of Maine Ellsworth, which gave ASC crucial professional services (registrar, financial accounting, mentoring, and an office) in exchange for a percentage of revenues. During this period initial funds for an eventual endowment were raised from the community, a start-up grant was awarded by the Maine Community Foundation, and a group of volunteers created a curriculum of courses, lectures, and excursions for a "pilot" semester in the fall of 2020.

There is a membership fee, and non-credit classes are offered. Further research will determine if the membership and donations cover the cost. In addition, further research will determine grants and endowment opportunities and risks. The mission of the Acadia Senior College is an educational organization providing intellectual stimulation, practical knowledge, social interaction, and fun primarily for adults over 50.
University of Iowa:
The Senior College of the University of Iowa is a university program. The mission of Senior College is to provide high-quality educational opportunities for seniors. Courses cover a wide variety of topics in the humanities, sciences, and the arts and are taught by emeritus and current University of Iowa faculty members and the business community.

College is run by a committee of retired UI faculty and staff members. The volunteer committee works in cooperation with the Association of Emeritus Faculty and the University of Iowa Retirees Association and contracts with the Center for Advance-ment to host this webpage and handle registration (UI. 2020).

Tallahassee Senior College:
The Tallahassee Senior College is Tallahassee City program attached to the Senior Center of Tallahassee. This senior college is run by the city with a board of directors and tied to the local university which get the tuition and fees. The city provides the building. The have membership fee and newsletter. The mission of Tallahassee Senior College is to offer programs, activities, and opportunities designed to encourage active living, optimal aging, and social fitness for independent adult's age.

- Develop a revenue stream for a state university
- Increase retention for incoming and transfer students
- Meet the need of senior citizens in communities who are interested in life long learning
- Meet the need of both senior citizens and students who are struggling with being valued and needed.

Administration: Program and Curricula Development
FRIDAY, NOV 5
11:00 AM–11:25 AM UNIVERSAL C2

A VISION FOR A MORE ROBUST SKILLSET FOR APPLIED ENGINEERS IN THE FUTURE INDUSTRIAL WORKFORCE

Dr. Darren Olson, Central Washington University

This presentation will provide valuable insights for faculty members and administrators who are contemplating how to maintain robust, viable Applied Engineering programs as industry moves toward deploying autonomous, self-adjusting systems.

The purpose of this presentation is to illustrate the results of a broad content analysis of the skillsets common to many Applied Engineering programs that are preparing workers for the manufacturing sector, and to suggest guidelines for how faculty and administrators might provide a more robust skillset for graduates who, one-day, will work in autonomous, self-adjusting production environments.

- In the near future, production systems will evolve toward being autonomous and self-adjusting.
- Technologies that enable digital design, monitoring, evaluation and improvement of production processes, integration of enterprise activities, and management across the product life cycle already exist; in the near fu-
ture, these technologies will become more sophisticated and more tightly integrated.

- These technologies will be augmented by machine learning, artificial intelligence, and predictive analytics, enabling better decision making, and high levels of system autonomy.
- Research suggests that the workforce will become polarized, with a proliferation of low-skill jobs, and the continued need for high-level jobs that cannot be automated. Jobs in the middle, those requiring high levels of training but utilizing skills that can be codified, will become automated. This will lead to the transformation of some jobs, the loss of others, and the creation of new ones.
- Many of the skills employed by Applied Engineering graduates require higher-level reasoning and are difficult to automate, but many others can and will be codified.
- It is prudent to consider how to keep programs relevant and provide robust skillsets for graduates.

Construction: Other
THURSDAY, NOV 4
2:00 PM–2:25 PM UNIVERSAL C3

**ANALYSIS OF THE DIFFERENCES OF ACTUAL RUTTING PERFORMANCE AS COMPARED TO DESIGN VALUES**

Dr. Tamer Breakah, Ball State University
Dr. Sherif Attallah, Ball State University
Dr. James Jones, Ball State University

Accurate pavement design leads to cost savings. Knowing how the pavement will perform is crucial. In this study a comparison is done between the design of pavements and their actual field performance.

Attendees of this presentation will be introduced to the Long Term Pavement Performance Program (LTPP), its data and how to make use of them. LTPP has a wealth of data about pavements that can be analyzed. Design of pavements currently depends on a mechanistic-empirical approach. In this presentation, an analysis to study the difference in the pavement performance and design when it comes to rutting. The analysis was done to see the correctness of the design expectations as compared to the actual pavement performance.

- Long Term Pavement Performance (LTPP).
- Mechanistic-Empirical design.
- Analysis of field performance of pavements.
- Comparison of field performance to design.

Construction: Technology
THURSDAY, NOV 4
4:00 PM–4:25 PM UNIVERSAL C3

**POE APPLICATIONS FOR THE BUILT ENVIRONMENT AND IMPLICATION ON ELECTRICAL CONTRACTORS**

Sherif Attallah, Ball State University
Jennifer Warrner, Ball State University
Gary Birk, Ball State University

Power Over Ethernet (POE) is becoming more popular in buildings with advanced technologies behind this system. This may have impact on the way electrical contractors carry their scope of work. This presentation is planned to cover these applications and the possible impact on contractors.

The presentation includes definition and explanation of the POE technology and the history of developing this technology. Then, different applications in the built environment will be addressed along with some of the specifications for these applications. This will be followed by analysis of the possible ways that the electrical contractors can be affected by the expansion of this technology and how this will have impact on cost and time schedules for projects.

- Defining Power Over Ethernet
- POE applications
- Electrical scope of work
- Impact on electrical contractors
Construction: Technology
THURSDAY, NOV 4
4:30 PM–4:55 PM UNIVERSAL C3

COMPARISON BETWEEN CONSTRUCTION PROJECT MANAGEMENT SOFTWARE
Sherif Attallah, Ball State University
Tamer Breakah, Ball State University
Janet Fick, Ball State University

There are multiple programs that are promoted in the market for managing construction project documents and processes. These programs offer similar services to project owners, consultants and contractors. It's important for users to understand the difference in order to make the right decision on the software to be used.

The presentation starts with the background of software used for construction project management with examples of the documents and procedures that can be run using the programs. Then the most used programs will be discussed with a comparison of features. These programs might not be efficient for every project and for every project environment. Therefore, part of the presentation will be on the applicability and suitability of the different types of software for different projects and companies.

- Construction project management
- Project management software
- Comparing features of programs
- Applicability of software for projects

Construction: Other
THURSDAY, NOV 4
5:00 PM–5:25 PM UNIVERSAL C3

CONCRETE STRENGTH PREDICTION, MACHINE LEARNING VS. REGRESSION
Dr. Tamer Breakah, Ball State University
Dr. Tarek Mahfouz, Ball State University

Concrete strength is dependent on the proportions of its constituents. Prediction of concrete strength can help in proportioning and tweaking the mixture design, especially when mineral admixtures are used.

Attendees of this presentation will be introduced to concrete prediction models developed using machine regression and machine learning techniques. The presentation will introduce a background about the different techniques used, the developed models, and a comparison between the accuracy and practicality of the different models.

- Importance of concrete strength prediction
- Strength prediction using regression
- Strength prediction using machine learning
- Comparison between the results
Distance Learning/Teaching Innovations: Adopting New Technologies for Use in the Classroom as Well as Lab

THURSDAY, NOV 4
900 AM-9:25 AM UNIVERSAL E1

STAYING MOTIVATED IN AN EVER-CHANGING, ALWAYS-CHALLENGING WORLD OF TEACHING

Mr. William Allen, Northeast State Community College

The wise Instructor will stay highly motivated and will use this motivation to prepare students for even greater success.

Keeping yourself motivated can be very difficult. However, this is essential if we are to continually motivate our students, causing them to excel and to reach their full potential. This is challenging enough when you are face-to-face with them in the classroom. It is even harder to do so on-line. This presentation is meant to inspire teachers to continue doing what they do best - bring out the best in their pupils. Industry is constantly counting on us to provide them with top-notch, motivated candidates to fill very demanding jobs. Our graduates will perform much better in these jobs if they have been eagerly trained and zealously taught to succeed. Whether in-person, on-line, or hybrid format, Instructors must use every teaching method available to them as a means to “bridge the gaps” that have been made by increasingly difficult challenges.

Some of the inspiring points to be presented are as follows:

• Keep yourself excited. Keep your material fresh, up-to-date.
• Push everything with enthusiasm.
• Lose yourself in your teaching.
• Prove why your material is vitally important and why your students must master it.
• Anticipate your students’ success and lead them to be successful.
• Use every opportunity (on-line, face-to-face, etc.) to “bridge the gaps” caused by recent, unplanned upsets and challenges.
• Make the most of on-ground Labs, and any face-to-face class meetings.
• Remember the fact that the one doing the work is the one doing the learning.
• Do not rely on just one teaching method. Challenging yourself to explore more zealous teaching methods will also motivate your students to reach their potential.

DISTANCE LEARNING / TEACHING INNOVATIONS

Distance Learning / Teaching Innovations: Other

THURSDAY, NOV 4
9:00 AM-9:25 AM UNIVERSAL D1

A NEW BACHELOR’S DEGREE PROGRAM IN ADVANCED MANUFACTURING AND APPLIED ROBOTICS

Dr. Gregory Watkins, California State University Chico

Manufacturing education needs to keep pace and prepare graduates for today’s modern manufacturing workplace.

This presentation details a new Bachelor’s of Science Degree program in Advanced Manufacturing and Applied Robotics. The program, set to roll out in fall 2021, has three main thrusts: Robotics and Automation; Materials and Manufacturing Processes; and Business, Communication, and Management. The presentation summarizes curriculum development that was driven by industrial advisory board members, industry partners and faculty. It addresses student outcomes and plans for accreditation by ATMAE.

• A new Bachelor’s of Science Degree program in Advanced Manufacturing and Applied Robotics
• Curriculum development and content
• Focus area: Robotics and Automation
• Focus area: Materials and Manufacturing Processes
• Focus area: Business, Communication, and Management
• Accreditation by ATMAE
Distance Learning/Teaching Innovations: Support for Students

THURSDAY, NOV 4
9:00AM - 9:25AM UNIVERSAL C1

HELPING STUDENTS TO BE SUCCESSFUL DURING COVID 19: TEACHING HYFLEX COURSES- REFLECTIONS AND LESSONS LEARNED

Dr. Mahmoud Al-Odeh, Bemidji State University

Offering Hyflex courses provides agility and flexibility to our learners during this pandemic time. It is also considered a safe option for our learners. Students are given the option to attend in person, online via Zoom, or asynchronously using D2L. This presentation will summarize the lessons learned from teaching HyFlex courses.

• HyFlex modality teaching offer flexibility for students
• Students can take control over their learning using HyFlex
• Lessons learned during this experience will be shared
• Challenges of HyFlex teaching will be shared
• HyFlex instructional strategies chart will be explained
• Hyflex strategies used in my classes will be shared

Distance Learning/Teaching Innovations: Training & Support for Distance Instructors

THURSDAY, NOV 4
9:00 AM - 9:25 AM UNIVERSAL E2

WHERE DO WE GO FROM HERE? BUILDING STRATEGIES FOR STUDENT ENGAGEMENT IN DISTANCE LEARNING

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

Social distancing changed the world for students and educators in a way we never expected. Campuses closed, student activities ceased, and education shifted to full-online for everyone. Education had to react quickly during this unprecedented situation to find a balance between distance and education. The pandemic was a difficult transition that created a need to evaluate our transactional distance and create best practices to combat challenges that were brought to the surface as we now try to manage a continuously changing environment and learn how to adapt to our new normal.

An interactive presentation that utilizes student perspectives from one university’s survey data as the basis for group discussion and brainstorming. Presenters and participants will collaborate through a fast-paced idea-exchange exercise to create building blocks for best practices moving forward from the pandemic.

Through group interaction and discussion, participants will be to:

• Identify the impact of COVID-19 on student engagement in distance learning
• Analyze strategies on how to improve student engagement in online courses
• Create building blocks for engagement in distance learning post pandemic

Distance Learning/Teaching Innovations: Electronic Portfolio in Online Courses

THURSDAY, NOV 4
9:30 AM - 9:55 AM UNIVERSAL D1

INFORMATION TECHNOLOGY ENTREPRENEURSHIP PROJECTS - BUSINESS AND INDUSTRY PARTNERSHIP WITH ACADEMICS FOR ASSESSMENTS

Mrs. Savitha Pinneppalli, UTC
Mrs. Savitha Pinneppalli, Chattanooga State Community College

Most students graduating from a community college lack work experience and soft skills. The IT Entrepreneurship project addresses these problems by providing students opportunities to brainstorm ideas to create from scratch their own IT Company to either sell products or services.

Students are provided with the nuts and bolts to start their own IT business. They start with a business plan and create a logo and mission statement for the company. A group of 3 to 4 students form the team to run the company by creating an organization chart using Microsoft visio software. They create a testimonials and elevator pitch to summarize their skills. They create an ePortfolio with resume, cover letter, references, linked in profile and a business card as a personal branding activity. They complete a SWOT analysis of their company. They identify a problem in their community and provide solutions using their IT skills. They work on a Business Process data flow diagram. They set goals for their company and conduct present value and ROI (Return on investment) analysis. They conduct financial analysis on an excel spread sheet to determine the cost of running the IT company. They use Microsoft Project Management software to analyze Personnel, Resource and cost. They also assign tasks to personnel using the project management software. They look for funding opportunities and grants and write a RFP request for proposal to find future investors, stake holders and business partners. Finally, they pitch their idea via a 15 minute presentation to the Business and Industry personnel who hire the students as interns or for job placements. Students load all of
their work in to the digication ePortfolio system which they can access even after they graduate from the college.

**Students submit the following:**

- Resume, Cover letter, Business Card, LinkedIn profile, testimonials, video branding
- Project Charter - Executive Summary of their project
- SWOT Analysis
- Organization Chart
- Excel Budget - Financial analysis
- Project Timeline - Personnel, Resources and cost analysis, schedule personnel
- Data flow diagram - Business process model
- Database - Data storage
- Web site - Marketing
- Infographic - infomercial
- Marketing Materials – Brochures, book marks etc
- ePortfolio
- Presentation

**Distance Learning/Teaching Innovations:**

**Remote Laboratory Concepts for STEM Programs**

Dr. Faruk Yildiz, Sam Houston State University
Dr. Ulan Dakeev, Sam Houston State University

Remote laboratory concept has been one of the important research items during the Covid-19 pandemic where most of the institutions moved their classes to online and/or remote modalities. The impacts of Covid-19 pandemics were unexpected and the preparation for the remote lab concepts were minimal where face-to-face laboratory experiments have been common among Science, Technology, Engineering, Math (STEM) programs. For those academic programs who were not prepared for remote and online laboratory delivery have struggled to find out ways on how to deliver traditional face-to-face laboratory experiments to their students remotely where major equipment were necessary to utilize. Recently, researchers and companies have been investigating and working on remote laboratory concepts and integration to the curriculum. The popularity of remote lab is increasing due to Covid-19 pandemic and the improved speed of internet but still does not have much attention and knowledge about this area.

The continues improvement of the internet-based services and the speed opened new avenues to offer remote laboratory experiments with actual lab equipment and object of investigations. Traditionally, the laboratory experiments in STEM programs have been conducted in physical laboratory environments required student presence. In the remote lab concept, the physical laboratory equipment can be accessed via remote to conduct labs. Depends on the setup of remote lab environment, an interactive lab experiment offered to students where lab equipment (devices, instruments) can be accessed via web-based servers. The users can send control commands through web-based server to execute commands for their experiments and collect or visualize results without being near the actual lab equipment. Remote lab access still offers performing physical actions such as controlling with hands, pressing buttons, speaking to microphones, and turning knobs etc.) With the integration of cameras and sensors, the users can receive feedback and visualize the activities for the lab experiments.

- Investigate existing remote laboratory developments and concepts for STEM programs
- Introduction and background of remote and online laboratories in STEM education
- Investigate and present IoT, Industry 4.0, and Web 5.0 Remote Lab concepts
- Use of virtual reality (VR) and augmented reality (AR) for remote laboratory
- Simulation vs. remote lab
- Present pos and cons of remote laboratory
- Best examples and practices of existing remote labs

**Impacts of COVID-19 on Engineering Technology Students and Educators**

Dr. Riem Rostom, Indiana State University
Dr. Ahmed Mohamed, Indiana State University

There is no doubt that COVID-19 health crisis had a huge impact on students, educators, and the higher education institutions. Due to COVID-19 pandemic health restrictions all institutions had to abruptly move to remote learning with little preparation time in the spring of 2020.

Data for this study was collected before and after COVID-19 crisis for four different engineering technology classes. These classes are: Statics, strength of material, engineering design, and research and development. Using a comparison, this study measures the effect of COVID-19 on: Students outcomes, course objectives, grades, positive emotional engagement and quality of education.

- Impacts of COVID-19 on students
- Impacts of COVID-19 on educators
- Class mode
- Attendance
- Class participation
- Group team work
• Technology tools such as zoom and recorded videos
• Students outcomes
• Course objectives
• Grades
• Positive emotional engagement and quality of education.

Distance Learning/Teaching Innovations: Managing Growth in Distance Education

THURSDAY, NOV 4
10:30 AM-10:55 AM
UNIVERSAL D1

INNOVATIONS IN REMOTE ACADEMIC INTERNSHIPS DURING THE COVID-19 PANDEMIC

Dr. Lori Sussman, University of Southern Maine

The COVID-19 Pandemic substantially reduced the number of cybersecurity internships available to students. However, this experiential learning opportunity was a crucial component for the undergraduate cybersecurity program. The faculty had to innovate to make the experience enriching and sufficiently rigorous.

The presentation will cover the background leading to this innovation, developing sponsorship, pre-program planning, program pilot, navigating programmatic growing pains, sharing lessons learned, vision for the future.

• Research shows that hiring managers are looking for the following non-technical competencies that CAP promotes and enriches:
  • Developing positive customer relations
  • Facilitating teams and teamwork
  • Leadership abilities
  • Presenting skills
  • Written communication skills
  • Professional demeanor and appearance
  • Working effectively with peers
  • Using ethics in decision making
  • Training employees

Distance Learning/Teaching Innovations: Other

THURSDAY, NOV 4
10:30 AM-10:55 AM
UNIVERSAL C3

THE IMPACT OF COVID-19 ON THE UNDERGRADUATE WORK ETHIC: STRATEGIES TO REVERSE THIS TREND

Dr. Dennis Jones, The University of Texas at Tyler
Dr. Mark Miller, The University of Texas at Tyler

As COVID-19 spread throughout the world and changed our lives as we know it, its impact on education has had a detrimental effect. In general, students have become complacent and unmotivated with their coursework and grades have dramatically suffered consequently.

In order to counteract the tendency for students to underperform, strategies must be implemented in courses to motivate and keep students engaged. This presentation will focus on strategies that successfully improved student engagement and overall performance.

• Illustration of how the COVID-19 pandemic impacted the performance of students
• Strategies utilized to motivate and improve student performance
• Results from the strategies implemented into coursework to improve student performance
• Demonstration of strategies used to improve student performance

Distance Learning/Teaching Innovations: Development of “Soft skills”

THURSDAY, NOV 4
9:30 AM- 9:35 AM
UNIVERSAL D3

INDUCTIVE TEACHING METHODOLOGY TO PROMOTE STUDENTS’ PROFESSIONAL COMMUNICATION SKILLS

Dr. Ekaterina Koromyslova, South Dakota State University
Dr. Anna Sadovnikova, Monmouth University

The presentation will discuss a novel application of the inductive teaching methodology to support development of student professional communication skills highly demanded by industry.

Objectives of the presentation are:

• Propose a novel application of the inductive teaching methodology for development of students’ effective professional communication skills in STEM disciplines.
• Demonstrate the impact and efficacy of the proposed methodology on student learning outcomes (SLOs) with respect to their professional communication skills.

Attendees will learn novel approaches to integrate the inductive teaching methodology in engineering courses to promote student development in professional communication skills.

• Evidence for a strong need in industry for college graduates with effective professional communication skills;
• An overview of the inductive teaching methodology and its benefits for student development;
• A novel application of the inductive teaching methodology to enhance effective communication skills of engineering students;
MULTIDISCIPLINARY STUDENT COLLABORATION IN THE THREE-CLASS INTEGRATED CURRICULUM

Dr. Ekaterina Koromyslova, South Dakota State University
Dr. Anna Sadovnikova, Monmouth University
Dr. Gary Anderson, South Dakota State University

The presentation will discuss a framework for curriculum integration to address the employers’ expectations of multidisciplinary collaboration competencies of college graduates.

Objectives of this presentation are:

- Highlight industry needs on multidisciplinary collaboration skills in the workforce.
- Propose pedagogical approaches and curricular modifications at the college level to address the industry needs for student professional competencies.
- Discuss a designed and piloted teaching framework to promote development of the multidisciplinary collaboration skills in college students.

Attendees will be introduced to the teaching framework to promote multidisciplinary student collaboration. The discussion of the results of the pilot implementation of the framework, along with faculty and student feedback on the approach, will highlight practical benefits of the framework as well as potential challenges.

- An overview of industry needs and expectations on multidisciplinary collaboration skills in college graduates;
- An overview of the designed and piloted framework to promote multidisciplinary student collaboration at the college level;
- Empirical results to demonstrate the impact of the proposed framework on student learning outcomes and their progress in developing the multidisciplinary collaboration skills;
- Highlights of students’ feedback and perceptions of the multidisciplinary collaboration framework;
- Discussion of challenges in practical implementation of the proposed teaching framework;
- Conclusions, recommendations, and future work.

DISTANCE LEARNING/TEACHING INNOVATIONS: ADAPTING NEW TECHNOLOGIES FOR USE IN THE CLASSROOM AS WELL AS LAB

THURSDAY, NOV 4
11:00 AM-11:25 AM UNIVERSAL C3

Dr. Saxon Ryan, Iowa State University
Dr. Brian Steward, Iowa State University
Dr. Safal Kshetri, Washington State University

The rapid transition to online learning at the beginning of the COVID-19 Pandemic required educators to adapt quickly and effectively. Online lecture content was converted to videos or virtual meetings with students, but hands-on laboratory assignments required additional effort. Hands-on learning is especially important in courses where student have limited prior experience with the subject they are learning about. Commonly students have limited experience with fluid power systems and a large portion of their learning objectives for the course are solidified through the hands-on laboratory activities. Best practices for providing simulated hands-on laboratory experiences through online delivery are needed to reduce the potential learning gap.

This presentation shares the process of transitioning fluid power systems hands-on laboratory experiences to online delivery. The goal of simulating hands-on experiences was to reduce the learning gap during the transition from in person to online delivery. Multiple methods of online laboratory delivery were utilized to identify what methods best assist the students in meeting the learning objectives of the course. To simulate hands-on fluid power systems, lab presentation methods and first-person video styles were explored. Further, supplemental videos addressing common student questions were developed to better assist the students in exploring the material for the labs. The efforts of this work resulted in student self-evaluations of meeting the learning objectives for the course that indicated the gap in learning was minimized with simulated hands-on laboratory content.

In this presentation the audience will learn about the different methods that were utilized to simulate hands-on learning in a fluid power systems lab. Lessons learned from exploring the different methods will be shared. Implications for future development of online laboratory content will be discussed.

- There are multiple methods to deliver hands-on laboratory content online.
- Effort required to create simulated hands-on laboratory content can vary greatly depending on the methods.
- Simulating hands-on laboratory experiences minimizes the gap in learning.
- Recommendations and implications for future online delivery of hands-on laboratory content.
Distance Learning/Teaching Innovations: Training Students for Immediate Entry to Work Force

THURSDAY, NOV 4
4:00PM - 4:25PM
UNIVERSAL C1

NINE YEARS OF CREATING PROJECTS FOR LOCAL NON-PROFIT ORGANIZATIONS THROUGH IMMERSIVE LEARNING OPPORTUNITIES THAT APPLY STUDENTS’ KNOWLEDGE TO REAL-WORLD SITUATIONS

Dr. Jennifer Warner, Ball State University
Dr. Sherif Attallah, Ball State University

Students benefit from real-world experiences that immerse them in their community. Construction management, architecture and interior design majors will all work together in their future careers, so immersive, interdisciplinary classes provide a view of their future interactions. Local community non-profit organizations, including community centers, religious organizations and organizations rehabilitating or building low income housing, all require assistance in planning and implementing their projects.

Immersive learning classes are comprised of interdisciplinary, student-driven teams that are guided by faculty mentors to work collaboratively with local non-profit community partners to solve community challenges. These opportunities allow students to apply their knowledge to solving real world problems. Our program has nine years of experience, and over fifty individual projects, which provide these immersive opportunities.

- Challenges of introducing interpersonal skills to upper level technically-prepared students
- Options for introducing communication concepts into course activities
- Recommendations for undergraduate and graduate programs in engineering and technology

Distance Learning/Teaching Innovations: Adopting New Technologies for Use in the Classroom as Well as Lab

THURSDAY, NOV 4
5:00PM - 5:25PM
UNIVERSAL C1

THE NEXT GENERATION HANDS-ON LEARNING FOR DISTANCE EDUCATION

Mr. Jake Weihe, Illinois State University
Dr. Yi-hsiang Chang, Illinois State University
Mr. Jordan Osborne, Illinois State University
Mr. Alex Diffor, Illinois State University

Online course delivery over the Internet has become the only option of teaching not only for higher education sector, but also for K-12 schools to remotely conduct real experiments at the physical location of the operating technology, whilst the user is utilizing technology from a separate geographical location. Among these three formats of online laboratory, remote laboratory is more intriguing because it uses physical equipment and tools to conduct manipulations and collects authentic real-time data for analysis as opposed to simulation in a virtual environment or pure observation.

Applications of remote laboratory on a broader scale could open up a new avenue of offering lab-based courses over the Internet which could lead to increased revenue, enhanced equipment utilization, increased collaboration, and increased accessibility to lab-based classes irrespective of their location to include people with disabilities and other limitations. Most importantly, this type of application can bring real lab experiences to STEM students while physical presence in the laboratory is impossible due to situations like COVID-19.
The proposed presentation is to illustrate a study on implementing remote laboratory in an electro-hydraulics course and the comparison of the effectiveness of remote laboratory and traditional in-person laboratory. The remote laboratory has been developed to provide hands-on experiences on the study, operation and data analysis of a sequenced position control EH system remotely over the Internet. Students can remotely log onto the control station to operate, study, and analyze the system through a web-based HMI interface with a real-time video stream.

The presentation will demonstrate the system structure, hardware components, software programming, and system integration. The implementation, student evaluation process and surveys, and data analysis and comparison will be illustrated and discussed.

- Literature study and overview about remote laboratory
- System development which includes hardware components, software programming, and system integration
- Implementation of the remote laboratory
- Survey development and conduction
- Data analysis and comparison
- Discussion and future study

**Distance Learning/Teaching Innovations: Delivering Curriculum to meet Industry Partner Needs**

**THURSDAY, NOV 4**
**5:30PM - 5:55PM**
**UNIVERSAL C3**

**BUILDING A SERVICE-LEARNING TECHNOLOGY LAB**

Dr. Mark Angolia, East Carolina University
Ms. Natalie Aman, East Carolina University
Mr. Jeffrey Jessie, East Carolina University

Food insecurity on college campuses is a growing concern that universities have difficulty mitigating due to a lack of resources and infrastructure. This presentation will provide a model and structured approach to create a student-managed, service-learning lab to provide a peer-to-peer service while learning technology and processes vital to supply chain management.

An overview of the nationwide problem of food insecurity for college students will lead into a solution of establishing a student-run, service-learning food bank and separate food pantry for distribution of free food and hygiene products. The integration of experiential and service-learning is designed to provide students with hands-on learning using real-world scenarios that simulate a fully functioning distribution center while motivating student engagement by establishing a campus-wide support program in the form of a food bank. To further enhance experiential and service-learning, the incorporation of warehouse management system (WMS) software and automatic identification and data capture (AIDC) technology was added along with the application of total quality management concepts and techniques. A hardware and software list and budget will be provided to allow for replication at other college campuses.

- Service-learning lab
- Value of Experiential learning
- Warehouse Management System software
- AIDC (barcode and RFID) hardware and software
- Community engagement

**Distance Learning/Teaching Innovations: How to Address Industry Needs**

**THURSDAY, NOV 4**
**5:30PM - 5:55PM**
**UNIVERSAL C1**

**TEACHING FACTORIAL DESIGN OF EXPERIMENTS FOR STUDENTS WITH A MINIMAL BACKGROUND IN STATISTICS**

Dr. Darren Olson, Central Washington University

This presentation provides insights about how a DOE course can be incorporated into a program, even if the curriculum does not have much leeway available within credit-hour limitations.

This presentation illustrates how a one-quarter course has been used to teach students the effective use of DOE, by employing a mature software platform, a training-based text, rather than a theoretical text, and an affordable kit that was purposely designed to allow the quick setup and execution of experiments that involve multiple control factors.

- Mastering factorial design of experiments (DOE) requires going through a significant learning curve, even for students who have previously taken a formal introductory statistics course.
- For a student, whose only prior study of statistics was the completion of a quality control course, mastery of DOE can seem even more daunting.
- It is possible to teach a student who has limited statistical knowledge to conduct designed experiments, within a one-term course, and develop sufficient mastery to successfully employ DOE for improving processes.
- This presentation will highlight how a one-quarter course has been used to successfully teach DOE to students with a limited background in statistics so that they develop a sufficient level of mastery to employ designed experiments for process improvement.
Distance Learning/Teaching Innovations: Other
FRIDAY, NOV 5
9:30 A.M. - 9:55 A.M. UNIVERSAL D1
DEVELOPING A DIGITAL TWIN FOR HIGHLY FLEXIBLE LEARNING MODALITIES
Mr. Jeritt Williams, Illinois State University
Dr. Kevin Devine, Illinois State University

The need for teaching and learning with virtualized and simulated robotics systems integration environments bridges a gap between academia and industry. Very recent advances in technology, coupled with the near instant demand for hands-on lab replication brought on by the pandemic's shift to often fully remote learning, supports the pre-pandemic shift to the so-called “Fourth Industrial Revolution” (a.k.a. “Industry 4.0”) which places great emphasis on “digital twins” as a means to rapidly advance manufacturing design and improve processes. The deployment of digital twins in robotics systems integrations courses may contribute to increased flexibility when transitioning between course modalities.

In this presentation, the authors will discuss and provide examples of how the use of digital twins (virtual replicas of physical labs or workcells) as a simulation tool in courses involving robotics systems integration may serve as an effective and efficient teaching and learning strategy, especially when course modalities (e.g. face-to-face, online, hybrid) are subject to change and must be highly flexible. Reflections on cases from two levels of undergraduate courses will be shared.

- Due to the ongoing global pandemic, university course modalities were often shifted online without warning or preparation. Adjusting face-to-face, lab-oriented courses to 100% online courses created real challenges, thus a need arose for deploying course content that is highly flexible regardless of mode of instruction (modality).
- Deploying the “digital twin” concept (e.g. virtual robots and machines, I/O, and physics-enabled objects, etc. that mirror physical lab spaces or workcells) within robotics systems integrations courses may help ease the transition between various course modalities.
- Examples of teaching and learning methods in two types of courses: An introduction to robotics systems integration and the capstone-level course will be discussed in-depth.
- Academia-industry synergies and opportunities for further study will be discussed.

Distance Learning/Teaching Innovations: Delivering Curriculum to meet Industry Partner Needs
FRIDAY, NOV 5
10:00 A.M. - 10:25 A.M. UNIVERSAL C2
COLLABORATING WITH PROFESSIONAL TRADE ASSOCIATIONS FOR STUDENT GROWTH
Dr. Mark Angolia, East Carolina University
Ms. Natalie Aman, East Carolina University

Technology curriculums must constantly evolve to provide students with the knowledge needed to enter the workforce, yet sales and management skills are no less important. The instructor's challenge is to maintain currency for content and student experience.

This paper will present establishment of an ongoing relationship between a university and professional organization. The partnership has led to funded attendance at annual conferences, student exposure to business leaders, networking between students, and faculty networking with peer institutions. From a curriculum aspect, integration of an industry-funded, 3rd party learning management system into course curriculum leading to an industry-focused certificate of completion for students.

- Professional exposure for career guidance
- Development of networking skills required for career success
- Access to industry training
- Establishing aspirational goals for first-generation college students
- Student exposure to professional organizations
- Industry-recognized certificates of completion for students

Distance Learning/Teaching Innovations: Adopting New Technologies for Use in the Classroom as Well as Lab
FRIDAY, NOV 5
10:30 A.M. - 10:55 A.M. UNIVERSAL C3
TEACHING SENSOR APPLICATION IN ROBOTIC EDUCATION
Dr. Ni Wang, Eastern Kentucky University
Mr. Remon Benjamin, Eastern Kentucky University
Dr. Dennis Field, Eastern Kentucky University
Dr. Michael Kennedy, Eastern Kentucky University

Creating hands-on learning of sensor functionality and applications
Sensor plays a vital role in the robotic system. The industrial robotic arm has embedded sensors, but it is hard to demonstrate
how it works during engineering and technology education and training. This presentation will introduce some designed hands-on labs using Arduino and sensors to teach sensor applications in robotic systems. Lab instructions, experiment designs, students’ work, and course survey results will be presented.

- Importance of hands-on learning
- Using Arduino

• Creating Arduino based experiments to display sensor applications
• Creating a guidance for students to re-create one of the experiments displayed
• Implementing a feedback from the students

Electricity, Electronics, Computer Technology & Energy Issues: Automation and Control Systems
THURSDAY, NOV 3 11:30AM - 11:55AM UNIVERSAL C2

IGNITION IMPLEMENTATION PROVIDES A NEW WAY FOR STUDENTS TO LEARN HMI DEVELOPMENT

Dr. John Haughery, Millersville University
Mr. Eathyn Brennan, Millersville University

This presentation will show how Ignition was brought to Millersville University for students to use and grow with. This software allows universities to add to their curriculum, this addition comes at no extra cost. Many students were graduating with no HMI experience and were being put into positions that required them to learn it. The HMI industry is large enough now that students can get jobs in HMI development alone or even do freelance work in it.

- Ignition is a free software to use on trial with unlimited trials.
- Allows universities to add to their curriculum at no added cost.
- Provides students with the necessary skills for graduation and future careers.
- Opens new doors for automation projects.

• Overview of traditional industrial programming methodology
• The introduction of optimizing code through the use of variables
• Discussion of common stacking/unstacking industrial applications
• Distribution/sharing of tutorials, YouTube videos, and sample laboratory activities

Mr. Ryan Martin, Millersville University
Dr. John Wright, Millersville University
Mr. Ian Smith, Millersville University

Today's applied engineering students need to exposed to industrial robotic programming techniques. Controls/automation engineers utilize modern industrial robots when automating processes in order to help companies remain competitive in the global marketplace.
Electricity, Electronics, Computer Technology & Energy Issues: Robotics and Computer Vision
THURSDAY, NOV 4
4:00PM - 4:25PM
UNIVERSAL D2

**PERFORMANCE ANALYSIS OF MODIFIED FLOOD FILLED ALGORITHM**

Dr. Toqeer Israr, Eastern Illinois University

Our work analyzes various algorithms for a robot (or robot vehicle) which travels to an unknown destination in as little time as possible, while avoiding obstacles, and thus increasing efficiency and reducing cost.

This research analyzes the performance difference between the traditional flood filled algorithm and the modified flood filled algorithm. These algorithms are used for robot vehicles to traverse an unknown maze, to reach a destination, in the fastest fashion possible. Applications of such algorithms can be found in the academic micro-mouse contest as well as parts of this could be used for robots working in warehouses (such as Amazon warehouse).

- traditional filled algorithm vs modified flood filled algorithm
- analysis using simulation
- analysis using real-life example

Electricity, Electronics, Computer Technology & Energy Issues: Energy Conservation
THURSDAY, NOV 4
4:30PM - 4:55PM
UNIVERSAL E1

**APPLICATION AND ECONOMIC IMPLICATIONS OF A MODEL-BASED DRYING PROCESS CONTROL SYSTEM**

Mr. Branden Lewis, Iowa State University
Dr. John Haughery, Millersville University

In recent years, the increased demand for cage-free produced eggs has forced many egg producers to transition from conventional-cage hen housing systems to cage-free systems such as avaiaries. To address the increases in energy consumption associated with the manure drying process of avaiaries, a control system utilizing a mathematical model of the poultry manure drying rate was developed to reduce the energy consumption by modulating the speed of drying blowers. The potential economic implications of this control system will vary depending on one's geographic location, as weather patterns will affect the amount of energy consumed and different utility rates will determine the price of that energy. Therefore, the expected cost savings and payback period associated with implementing the control system cannot be generalized for a state as a whole. A more thorough analysis was done using GIS mapping software to analyze the economic impacts by geographic location. The results of these maps can be used to show egg producers the potential cost savings they may see after installing a blower-speed modulating control system.

This presentation will start by briefly introducing the methodology and results of an experiment that was performed to produce a mathematical model the drying rate of poultry manure with respect to ambient air temperature and air velocity. The remainder of the presentation will be focused a control system that was developed utilizing the model to minimize energy consumption in avaiary facilities. The design, verification, and economic implications of this control system will be discussed in more detail, along with a discussion on how a similar control system may be applied in other industries.

- Modeling of drying rate with respect to changes in temperature and air velocity
- Development and verification of novel model-based control algorithm for modulating blower speed based on environmental conditions
- Results of GIS analysis predicting potential cost implications for the state of Iowa

Electricity, Electronics, Computer Technology & Energy Issues: Robotics and Computer Vision
THURSDAY, NOV 4
4:30PM - 4:55PM
UNIVERSAL D2

**PERFORMANCE ANALYSIS OF LIDAR SENSOR FOR ROBOTICS NAVIGATION**

Dr. Wutthigrai Boonsuk, Eastern Illinois University
Dr. Peter Liu, Eastern Illinois University

LiDAR technology has become affordable and available for robotic applications. However, there is still a wide range of LiDAR sensors prices in the market that can be a barrier for users for implementing them in their projects. This study evaluates the performance of multiple LiDAR sensors that can aid users in deciding on their option.

Attendees will learn the background and basic concepts of LiDAR technology as well as examples of robotic applications where LiDAR sensors can be used. A method for analyzing the effectiveness of LiDAR sensor will be presented. Finally, the results of this study will be discussed. The study's results will assist students, instructors, hobbyists, and researchers in choosing suitable LiDAR sensors for their projects.

- The background and basic concepts of LiDAR technology
- Usability of LiDAR sensors in robotic applications
- Experimental process for analyzing the effectiveness of LiDAR sensor
- Comparisons of multiple LiDAR sensors performance
Electricity, Electronics, Computer Technology & Energy Issues: Robotics and Computer Vision  
THURSDAY, NOV 4  
4:00 PM - 4:25 PM  UNIVERSAL D2

**PERFORMANCE ANALYSIS OF MODIFIED FLOOD FILLED ALGORITHM**

Dr. Toqeer Israr, Eastern Illinois University

Our work analyzes various algorithms for a robot (or robot vehicle) which travels to an unknown destination in as little time as possible, while avoiding obstacles, and thus increasing efficiency and reducing cost.

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- traditional filled algorithm vs modified flood filled algorithm
- analysis using simulation
- analysis using real-life example

Electricity, Electronics, Computer Technology & Energy Issues: Automation and Control Systems  
THURSDAY, NOV 4  
5:00PM - 5:25PM UNIVERSAL E1

**AUGMENTING AUTOMATED MANUFACTURING SYSTEMS VIA HUMAN-MACHINE INTERFACES**

Mr. Robert Kiesel, Millersville University of Pennsylvania
Dr. John Haughery, Millersville University of Pennsylvania
Miss Katherine Pelcin, Millersville University of Pennsylvania

Most industrial processes are controlled using Programmable Logic Controllers (PLC's). By integrating a Human Machine Interface (HMI) into that process, it can allow for higher-order control schemes to be realized. Additionally, HMIs allow automated manufacturing system augmentation via human-in-the-loop monitoring and control. It is therefore valuable for graduates of 2- and 4-year control systems integration undergraduate programs to have a strong understanding and experience integrating HMIs into automated manufacturing workstations.

This research provided a means for students to experience integrating HMIs into automated manufacturing systems to better prepare them for a future dealing with these technologies. Specifically, this project integrated workbench technologies including PLCs, HMIs, and robotic agents via an Ethernet local area network (LAN) to allow all technologies to communicate.

- Integration of automated manufacturing systems
- Dynamic control of industrial robotic agents
- Local and remote control of automated manufacturing systems

Electricity, Electronics, Computer Technology & Energy Issues: Automation and Control Systems  
THURSDAY, NOV 4  
5:00PM - 5:25PM UNIVERSAL D2

**GRAPHICAL USER INTERFACE FOR SIMULTANEOUSLY CONTROLLING MULTIPLE MOBILE ROBOTS**

Dr. Wutthigrai Boonsuk, Eastern Illinois University
Mr. Luken Henness, Eastern Illinois University

Utilizing multiple mobile robots often essential for manufacturing production and supply chain distribution. Multiple robots are typically used to perform predefined tasks when a single robot usage is not enough or when time is a main factor in accomplishing certain goals. Previous study had proposed a simple control system for multi-mobile robots using ESP8266 and SQL database. However, inserting data into the database to control multiple robots is tedious and prone to errors. Therefore, the purpose of this study is to provide an easy and user-friendly way of interacting with multiple mobile robots through an intuitive graphical user interface (GUI) connected to SQL database.

Attendees will learn the importance of mobile robots for industrial applications. A framework of multi-robot control system that was integrated with SQL database will be presented. Attendees will also learn the development process of the proposed user interface. Finally, a demonstration of the user interface will be presented, and implications for classroom learning will be discussed.

- The essential role of mobile robots for industrial applications
- The framework of multi-robot control system using SQL database
- The development of proposed user interface and its demonstration
- Implications for classroom learning
Electricity, Electronics, Computer Technology &
Energy Issues: Simulation and Game Development

THURSDAY, NOV 4
5:30PM - 5:55PM UNIVERSAL E1

APPLICATION OF BAYESIAN METHOD IN
VIRTUAL REALITY ENVIRONMENT FOR SAFETY
AND OPERATION TRAINING OF EXCAVATORS

Dr. Kouroush Jenab, Morehead State University

The purpose of this project is to create a Bayesian Method controlled Virtual Reality Environment that can successfully teach excavator operators.

The idea of this presentation would be to present the findings of the last two years of the virtual reality environment research with Bayesian Method sensor data.

Virtual Reality, Training simulation, Excavator, Trainees, OSHA, Safety

Electricity, Electronics, Computer Technology &
Energy Issues: Automation and Control Systems

FRIDAY, NOV 5
10:00AM - 10:25AM UNIVERSAL D2

DESIGN OF A MANUFACTURING VIRTUAL
SCENARIO FOR TEACHING AUTOMATION AND
OPC COMMUNICATION CONCEPTS

Dr. Kouroush Jenab, Morehead State University

To present users with the same concepts required to handle automated industrial equipment used in areas like manufacturing in a safer environment that can offer flexibilities like remote monitoring of the data gathered from the virtual equipment and compatibility with physical devices like programmable logic devices (PLC) to enhance the learning process.

The following proposal will discuss the design and implementation of a manufacturing virtual scenario based on a training prototype to present the user the basic concepts of automation through the handling of devices like PLCs and vision inspection systems, and industrial communication protocols like OPC. The contents include a brief literature review and background about the research, the main methodology followed to complete the design and the results obtained from a test group that got access to the finished virtual scenario.

• Integration of VR/MR elements with automation devices
• Testing different levels of immersion
• Real time data transmission using open source software

Electricity, Electronics, Computer Technology &
Energy Issues: Sensor Networks

FRIDAY, NOV 5
10:00AM - 10:25AM UNIVERSAL E2

A LOW-COST SYSTEM DESIGN FOR CROP
STRESS AND ENVIRONMENT MONITORING

Dr. Jin Zhu, University of Northern Iowa

Smart farming consists of smart sensing and monitoring, smart analyses and planning, and smart control of farm operations that involve cloud-based management systems. It may not only improve the productivity and operations of farms, migrate risks, but also enhance environmental quality and system sustainability.

This presentation will discuss the system design of a Cyber Physical System (CPS) that connects Internet of Things (IoT) to monitor the crop and environment conditions in real-time. This low-cost, small size device will be self-powered through a flexible thin film solar panel. In the presentation we will discuss the design and implementation of the system prototype.

• smart farming technology overview
• the framework of a Cyber Physical System (CPS) that connects Internet of Things (IoT) to monitor the crop and environment conditions;
• the hardware and software design of the prototype;
• discussion on the prototype design and future work.

Electricity, Electronics, Computer Technology &
Energy Issues: Technologies

FRIDAY, NOV 5
10:30AM - 10:55AM UNIVERSAL C1

CONSTRUCTING HAPTIC GLOVES FOR
VIRTUAL REALITY-BASED MOTOR SKILL
LEARNING

Mr. Jordan Osborne, Illinois State University
Dr. Yi-hsiang Chang, Illinois State University
Mr. Jake Weihe, Illinois State University
Mr. Alex Diffor, Illinois State University

We will discuss the construction of vibration-based haptic gloves and how they can be used to improve motor skill learning in a virtual reality environment

While virtual reality technology has been proved effective for job training, the majority of VR-based learning environments rely on visual and auditory feedback. Without the support of touch sensation, such a learning environment is not ideal for learning motor skills. We will present a research project studying the impact of haptic feedback on human learning and discuss the design and construction of haptic gloves that can
properly support motor skill learning in a VR environment.

- An overview of VR-based learning
- The need for haptic feedback in learning motor skills
- Identifying the feedback mechanism, vibration patterns, and signal strength
- Construction of haptic gloves for VR-based motor skill learning
- Experimental design and expected findings

Electricity, Electronics, Computer Technology & Energy Issues: Data Mining and Machine Learning

FRIDAY, NOV 5
10:30AM - 10:55AM UNIVERSAL D3

DRIVERS OF CUSTOMER SATISFACTION: SENTIMENT ANALYSIS AND TOPIC MODELING OF ONLINE HOTEL REVIEWS

Mr. Cuibing Wu, University of Massachusetts Lowell
Mrs. Xiaoye Yang, University of Massachusetts Lowell

To explore the factors that impact on the consumer’s satisfaction would be an excellent way to help hotels perform better in a competitive and dynamic environment.

Graphs: Color Management
THURSDAY, NOV 4
9:30AM - 9:55AM UNIVERSAL C2

COLOR MANAGEMENT CONSIDERATIONS FOR OUTPUTTING ENGINEERING GRAPhICS

Dr. Carl Blue, Clemson University

This presentation aims to present color management procedures and considerations for ensuring the assigned colors in your engineering graphics, either for print or electronic display, are produced for consistency and repeatability.

There are several considerations for managing color when outputting and reproducing engineering graphics. In color management, color is measured and documented with electronic instruments to improve communications, ensure consistency, isolate problems, and detect a change in graphics quality.

Presently, there are technologies available to calibrate your CAD outputs devices and designate color profiles to control the color’s quality. To improve imaging quality and widen the project’s color gamut, it is best to assign digital profiles for input devices like cameras and scanners. Also, the calibration of color monitors and projection devices will provide additional quality and the calibration of color printers and plotters to a better level of quality of color reproduction. These color levels are based on several factors, including ink density, printability, substrates or media, and the overall measurement and control of the color with Spectro-densitometers. Overall, color management is a process to provide consistent, accurate color with increase communication throughout the process.

Engineering graphics that utilize color are supported by two-color theories when working in a CAD environment and outputting printed graphics: Additive Color Theory and Subtractive Color Theory.

- The Additive Theory is based on the addition of three colors Red, Green, and Blue (RGB). Equal percentages
of the RGB mixture produces white. Electronic monitors and projectors operate in a color gamut made up of RGB. All digital graphics are designed on an RGB color system. Once an electronic document is printed, this information is converted to a Subtractive Color system for reproduction.

- The subtractive color system is based on the concept of the addition of three colors, Cyan (C), Magenta (M), and Yellow (Y). Equal percentages of the CMY mixture produces black onto a white substrate. However, to increase tone, Black (K) is added to the CMYK four-color process to reproduce RGB computer-generated graphics. To reproduce color from an RGB monitor to a CMYK printer, color management considerations for quality and reproducibility are key.

- There are limitations to color management systems and reproducing quality engineering graphics outlined as part of this paper. These limitations include human-error in reproducing graphics in non-calibrated systems and human visual limitations associated with eye fatigue, colorblindness, age, and lighting conditions. All factors that can lead to limitations in reproducing color and consideration when employing a color management system in developing full-color engineering graphics for print or presentation.

- Examples where color is used in engineering design graphics.
- Descriptions of plotters that use CMYK color technology where color management is a consideration.
- Best practices for managing color usage in engineering design graphics for print.

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**Graphics: Mobile and New Media**

**THURSDAY, NOV 4**

**10:30AM - 10:55AM**

**UNIVERSAL E1**

**INTERACTIVE DIGITAL PROTOTYPING USING ADOBE XD**

Mr. Drew Graham, Bemidji State University

The ability to convey an initial idea clearly and effectively is a much-needed skill for designers and non-designers alike. The presentation will demonstrate how easily Adobe XD can be used to create exciting digital prototypes.

- What is UI/UX design
- Adobe XD Uses
- Creating Content in Adobe XD
- Importing Content into Adobe XD
- Creating Interactivity in Adobe XD
- Testing XD projects on PC and Mobile Devices
- Advanced and Future Features

**Graphics: Mobile and New Media**

**THURSDAY, NOV 4**

**10:30AM - 10:55AM**

**UNIVERSAL E1**

**AUGMENTED AND VIRTUAL REALITY EDUCATION ON A BUDGET**

Dr. Jerry Schnepp, Bowling Green State University

As augmented and virtual reality (AR and VR respectively) technology expands in relevance beyond entertainment and into engineering, design, medical, military and other fields, it is important for students to understand its capabilities and to be able to design and build prototypes that leverage this technology. This presentation will expound the semester plan for an augmented and virtual reality course offered to University students studying visual communication technology. It will share details about assignments, select lesson plans, a list of challenges and opportunities, and a selection of student work.

- The history of augmented and virtual reality provides students insight into technical and societal challenges that have been faced since their inception.
- Learning modern tools to create AR and VR experiences enables students to express their creative ideas.
- The skills students learn, specifically coding and working in 3D space, transfer to many other relevant domains.
- Students who are well-versed in cutting-edge industry trends will be better positioned to enter a competitive job market.

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**Graphics: The Graphic Communications**

**THURSDAY, NOV 4**

**11:00AM - 11:25AM**

**UNIVERSAL E1**

**TRENDS AND OPPORTUNITIES IN THE GRAPHIC COMMUNICATION INDUSTRY BASED ON PERSPECTIVES AND EFFORTS BY THE GRAPHIC COMMUNICATIONS WORKFORCE DEVELOPMENT COALITION**

Dr. Carl Blue, Clemson University

This presentation offers information on Graphic Communication (GC) trends and opportunities in the GC Industry from the perspective on efforts by the Graphic Communications Workforce Development Coalition (GCWC).

This presentation will share information and perspectives of the GC Industry’s efforts and goals through the Graphic Communications Workforce Development Coalition (GCWC). The purpose of the coalition is to coordinate the efforts of all organizations representing the broad scope of the graphic communications industry for creating awareness, recruitment of new people
into the industry, providing a framework for apprenticeship and training programs, and the retention of the existing workforce. By combining the separate efforts, experiences, and initiatives of various organizations, coordinating actions and the sharing of ideas and resources, it is expected that all will benefit.

- “Print Is Everywhere” Campaign
- Social Media Outreach
- Diversity &amp; Inclusion initiatives
- Visual and Print Technology Trends

Graphics: Multimedia
THURSDAY, NOV 4
11:30AM - 11:55AM UNIVERSAL E1

INTEGRATE AN EPUB PROJECT INTO VIRTUALLY ANY GRAPHICS COURSE
Prof. Donna Painter, Millersville University

With a growing need for graphics students have competency in multimedia, educators need to include experiences creating a variety of digital media in their courses. Integrating an EPUB project into a graphics course gives students experience creating a digital publication, increases their technical skills, and provides exposure to accessibility standards.

This presentation will begin with background information about EPUBs, an identification of prerequisite skills, and a description the tools required to implement a successful EPUB project. EPUBs meet accessibility standards, so they provide an opportunity to teach about the importance of making publications accessible to all readers. Strategies to integrate an EPUB project into virtually any graphics course will be explored, followed by a comparison of software applications that can be used to complete the project, and suggested assessment methods.

- What is an EPUB?
- Identify skills and tools needed to complete an EPUB project.
- Make connections to accessibility standards.
- Explore strategies for integrating EPUBs into virtually any graphics course—web design, graphic design, digital publishing, and traditional print courses.
- Compare software applications that can be used to implement the project.
- Examine various assessment methods.

Graphics: Graphic Innovations
THURSDAY, NOV 4
4:00PM - 4:25PM UNIVERSAL C2

PHOTOGRAMMETRY: LOW COST ALTERNATIVE TO 3D SCANNERS
Mr. Mahesh Kumar Pallikonda, Ohio Northern University
Dr. David Rouch, Ohio Northern University
Mr. Zachary Rondeau, Ohio Northern University

There is considerable need to provide 3D digitized data to model and simulate designs for construction, manufacturing automation, as well as for video game development. While small items may be accurately scanned with a lower cost scanner, larger environments and models are more costly. This presentation will describe a low cost reverse engineering technique as an alternative to 3D scanners/scanning.

This presents a study on the feasibility of using open-source software and a smartphone for digitizing physical objects and landscapes. Furthermore, the presentation discusses the differences in the capabilities of 3D scanning and photogrammetry techniques and their potential applications.

- Photogrammetry
- Digitizing physical objects
- Surveying
- 3D scanning
- Reverse Engineering
- Cost-analysis
partner agreement between the Graphic Communications Management program at ASU and the Print Media Technologies program at HdM. The agreement provides a framework for students from ASU and HdM to attend the partner University for a semester. The details of credit hours, substituting courses in the checksheet, where courses fit with the 4-year plan, housing, the International Office, and tuition will all be discussed.

- International Exchange
- European Credit Transfer and Accumulation System (ETCS) vs American Credit Hours
- Calendar Issues
- Lab Experiences
- Cultural Differences

Appalachian State University (Boone, NC, United States) and Hochschule der Medien (Stuttgart, Germany) developed an

Management: Project Management
THURSDAY, NOV 4
2:00PM - 2:25PM UNIVERSAL C1

BUILDING AN INTEGRATED PROJECT MANAGEMENT COURSE FOR IN-PERSON, ONLINE AND/OR HYBRID DELIVERY

Mr. David Stec, Central Connecticut State University

With the shift to course delivery to online and/or hybrid delivery, the current model for delivering an undergraduate course in project management for in-person delivery was insufficient at providing an integrated and coherent experience for all students and stakeholders. Insufficiencies include: a) a delivery model & experiential project that is accessible to only “in-person” students, b) the experiential project varies in content and scope and provides no shared platform for learning, c) the experiential project only allows for one execution cycle, and d) project management software activity is not aligned with project activity.

We believe it is important to understand the nature of employee burnout within the concrete industry for the purposes of (1) attracting and retaining strong talent for the industry and (2) helping concrete industry professionals thrive in their careers.

The presentation will share current research that we are doing to examine management challenges in the concrete industry. The study this presentation will focus on will be drawn from findings from current research that examines employee burnout and worklife context in the concrete industry. In addition to sharing some of the findings from this research the goal is also to highlight the need for more research like this in the concrete and construction industry - especially with more concrete industry degree programs seeking accreditation through ATMAE.

ATMAE is providing a unique platform for this type of work to be shared and built upon.

- Nature of the concrete industry
- Nature of employee burnout and worklife context
- Nature of our study
- Findings from the study

Management: People Management
THURSDAY, NOV 4
9:00AM - 9:25AM UNIVERSAL D3

EMPLOYEE BURNOUT AND WORKLIFE IN THE CONCRETE INDUSTRY: MASLACH BURNOUT INVENTORY AND AREAS OF WORKLIFE SURVEY

Dr. Jacob Avila, Middle Tennessee State University
Dr. Heather Brown, Middle Tennessee State University
Dr. Scott Dunbar, California Baptist University

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- Findings from the study

Graphics: The Graphic Communications
THURSDAY, NOV 4
4:30PM - 4:55PM UNIVERSAL C2

CREATING AN INTERNATIONAL EXCHANGE IN GRAPHIC COMMUNICATION PROGRAMS

Dr. Kevin Howell, Appalachian State University
Dr. Volker Jansen, Hochschule der Medien

The post covid era has increased opportunity for international collaboration. Faculty members need a roadmap to develop partner agreement. There are many issues that Faculty need to be aware of in terms of calendar, credit hours, housing, culture and costs.

Appalachian State University (Boone, NC, United States) and Hochschule der Medien (Stuttgart, Germany) developed an
This work presents a model for an undergraduate course in project management that provides an integrated set of activities centered on utilizing a computerized project management simulation as the experiential activity that is available to all participants with any course delivery modality. The simulation forms the shared platform for learning and applying the project management processes aligned with the text, allows for multiple learning cycles within the simulation, and is aligned with supporting project management software activity.

- The course model and activity set 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 used as experiential learning activity provides a common learning platform for students and allows for multiple learning cycles within the semester.
- The course model also provides student teams the opportunity to manage a "project within a project" in planning and executing their deliverables in the simulation.
- The course model, activities, sample outputs, student evaluation results, and opportunities for continued improvement will be shared.

Presentation attendees will be introduced to the theoretical model utilized in the graduate project and guided through the instructor’s process of developing the conceptual framework for the case scenario leading to the formation of the model. A primary intent of the project was to present students with a real-world, practical challenge requiring them to conduct relevant research and utilize advanced skills aligning with the student learning outcomes designated for the course. Students were required to create and submit mile-stone reports for project phases at specified intervals during the project appropriate for specified federal and state emergency response organizations identified as sponsors for this simulated project. The projects culminated with students preparing and sharing a final video presentation of their proposed solution to the assignment. Students were given an opportunity to view and evaluate their peer’s presentations. The activity further provided a general proof of concept for the theoretical facility model.

- Facilitate student engagement and learning of advanced Technology Management concepts
- Development of a practical simulation project assignment linked to relevant, real-world applications
- Opportunity for students to improve proficiency using advanced modes of electronic communication
- Proof of concept for theoretical model to plan for establishment of replicable, expedient response facilities in pandemics

Management: Leadership and Technology Portfolio Management.
THURSDAY, NOV 4
2:30PM - 2:55PM
UNIVERAL E2

THE PURDUE CYBER APPRENTICESHIP PROGRAM LEADERSHIP ACADEMY: IMPLICATIONS FOR LEADERSHIP DEVELOPMENT IN TECHNOLOGY MANAGEMENT

Mr. Flavio Lobo, Purdue University
Dr. Mesut Akdere, Purdue University

Technological, social, and industrial changes contribute to the increased complexity of leadership dynamics, requiring leaders who are grounded in technical expertise as well as organizational leadership skills.

In addition to technical cybersecurity knowledge, skills, and abilities, leadership competency is vital for the cybersecurity workforce, which relies on collaboration and coordination among employees with complementary skills (Deming, 2017). To fill this critical workforce gap, we have undertaken the development of an ePortfolio-based leadership development program for professionals entering fields in cyber-related areas. The Purdue Cyber Apprenticeship Program (P-CAP) Leader-
The P-CAP Leadership Academy is designed to develop the leadership competency of cybersecurity professionals who are participating in an apprenticeship program that includes both work and educational components.

- The leaders of today’s global world are expected to demonstrate competence in communication, collaboration, and self-regulation.
- Critical Self-Reflection (CSR) is a foundational requirement for the development of leadership competency.
- The P-CAP Leadership Academy is an interrelated group of activities enabling individual learners to develop their leadership competency through CSR.
- The Purdue Cyber Apprenticeship Program (P-CAP) Leadership Academy experience involves the development of an ePortfolio and identification of artifacts through CRS that best represent a leadership competency area, including teamwork, problem-solving, interpersonal skills, and integrity.
- Apprenticeship programs are gaining popularity across the country. Similarly, the field of cybersecurity is emerging as one of the critical areas for any given organization in the digital workplace. Therefore, the P-CAP Leadership Academy plays an important role in advancing leadership education through exploring the effectiveness of a workforce development model through CSR and ePortfolio building.

Cybersecurity jobs are expected to have a gap of 3.5 million unfilled positions globally by the end of 2021. Recognizing the increasingly significant role of the cybersecurity sector in protecting both citizen’s and the nation’s security, this substantial workforce shortage could have damaging ramifications to individuals, organizations, government sector, and corporations. However, rapid skilling of professionals to build a cybersecurity workforce for the nation requires a multipronged effort, especially around identifying the knowledge, skills, and abilities (KSAs) critical for jobs in cybersecurity. The Career and Aptitude Assessment for Cybersecurity aims to provide individuals interested in careers in cyber-related fields with a tool for self-assessment about their personality traits, career interests, perceptions on career success and career satisfaction, and knowledge, skills, and abilities related to cybersecurity.

- Cybersecurity jobs are expected to have a 350% growth rate between 2013 and 2021, with an estimate of 3.5 million unfilled cybersecurity jobs globally by the end of 2021 (Morgan, 2019).
- Rapid skilling of professionals to build a cybersecurity workforce for the nation requires a multipronged effort, especially around identifying the knowledge, skills, and abilities (KSAs) critical for jobs in cybersecurity.
- Career and Aptitude Assessment for Cybersecurity aims to provide individuals interested in careers in cyber-related fields with a tool for self-assessment about their personality traits, career interests, perceptions on career success and career satisfaction, and knowledge, skills, and abilities related to cybersecurity.
- The KSAs components of the inventory are directly linked to the NICE Cybersecurity Workforce Framework (NICE Framework).
Management: Quality Management

**THURSDAY, NOV 4**
4:30 P.M. - 4:55 P.M. **UNIVERSAL D3**

**DETERMINING PROCESS CAPABILITY AND SIGMA LEVEL IN A HEALTHCARE CLINIC: SIX SIGMA PROJECT**

Dr. Mahmoud Al-Odeh, Bemidji State University

The healthcare environment is complex and continuously evolving, and there is an increasing need for efficient processes, patient-centric solutions, and reliable service. Healthcare decision-makers must implement efficient processes that effectively respond to the current needs and improve the quality of healthcare services. Process capability analysis, a Six Sigma analysis phase method, is one of the quality tools used to build efficient processes. Process Capability analysis can be conducted by calculating various process capability indicators such as Cp and Cpk. Calculating these capability indices provides opportunities for organizations to assess the current performance of their processes and develop an action plan to improve quality and productivity. This presentation will summarize six sigma project implementation in a healthcare environment and show process capabilities calculations and charts during this project.

- Using Statistical Quality Control (SQC) to measure, analyze, and monitor a healthcare medical center process.
- Providing high service quality performance within responsive time
- Using Minitab to create Boxplots, probability plots, X bar, and R control charts to monitor the process
- Calculating Cp and Cpk, and sigma level for the process
- Implementing an improvement plan to meet the ever-changing needs in the healthcare facility

Management: Operations Management

**THURSDAY, NOV 4**
5:00 P.M. - 5:25 P.M. **UNIVERSAL D3**

**ANALYSIS OF FACTORS AFFECTING COMPETITIVENESS OF US AUTOMOTIVE INDUSTRY**

Dr. Nilesh Joshi, Morehead State University

The US Automotive Industry is one of the most important industries in the United States, and is currently going through a massive transformation. Thus, it is imperative to study the factors affecting the industry to ensure its global competitiveness during this critical transformation phase.

The objective of this study is to explore factors affecting the competitiveness of the US automotive industry. The industry is currently going through a massive transformation with four disruptive technology trends emerging at the same time: electric vehicles, autonomous driving, connectivity, and Transportation as a Service (TaaS). Historical data is collected from a selected list of automotive companies for the purpose of this analysis. Both quantitative and qualitative factors are considered in the study. Examples of quantitative factors include growth, profitability, capital structure, etc. Examples of qualitative factors include management quality, company culture, etc.

- Historical developments in the US automotive industry and emerging trends.
- Quantitative and Qualitative factors affecting the competitiveness of the industry.
- Data collection and interpretation from a carefully selected list of automotive companies.
- Regression analysis to explore correlations among factors.
- Presentation and analysis of results.

Management: Quality Management

**FRIDAY, NOV 5**
10:00 A.M. - 10:25 A.M. **UNIVERSAL E1**

**IMPLEMENTING LEAN SIX SIGMA PRINCIPLES IN THE AUTOMOTIVE COLLISION REPAIR INDUSTRY: A MULTIPLE CASE STUDY**

Dr. Matthew Houseworth, University of Central Missouri
Dr. Cindy Crowder, Indiana State University

This proposed research presentation provides automotive collision centers and small-to-medium-sized enterprises (SMEs) with critical knowledge and understanding of how to successfully navigate and progress through a systematic model for Lean Six Sigma adoption, training, and development to achieve a sustained Lean culture.

Our proposed research presentation provides the automotive collision industry (a service industry) empirical evidence of the effects of Lean-for-Collision Training and Development Initiatives facilitated by a targeted sample of three automotive collision repair centers. Through formal interview and artifact review, the findings showcased in this study are in terms of automotive collision industry metrics; a balance in cost, quality, and service delivery, specifically vehicle cycle-time, vehicle touch-time, employee turnover, and the Return-on-Investment (ROI) of their Lean initiatives. In addition, this research provides automotive collision centers with critical knowledge and understanding of how to successfully navigate and progress through the Framework for Six Sigma Implementation in SMEs to achieve and develop a Lean culture in order to ultimately sustain the results of Lean Six Sigma implementation.
Our proposed research presentation addresses the following:

- the little to no academic literature discussing the successful implementation of Lean Six Sigma in the automotive collision industry and other small-to-medium-sized enterprises (SMEs).
- the lack of standardization in the automotive collision repair process.
- filling the research gap not only associated with the implementation of Lean Six Sigma in SMEs but also its use in standardizing the automotive collision repair process in the automotive collision repair industry.
- providing recommendations and best practices for Lean Six Sigma Implementation in SMEs, specifically in automotive collision repair centers using the Six Sigma Framework for SMEs Model (Kumar et al, 2011).
- providing recommendations for future research.

Management: Other
FRIDAY, NOV 5
10:30 A.M. -10:55 A.M. UNIVERSAL D2
STUDENT PERCEPTION OF THE IMPACT OF COVID-19 ON FUTURE EMPLOYMENT
Dr. Scott Abney, East Carolina University

Since 2020, Covid-19 has impacted everyone on Earth in one shape or another. This presentation will reflect on how college students perceive their future employment outlook as well as how they perceive their degree has prepared them for a Post-Covid world.

Since 2020, Covid-19 has impacted everyone on the planet. This can be seen in the global economy in areas such as supply chain, healthcare, manufacturing, and many others. In the Spring of 2020 college students enrolled were surveyed on topics related to Covid-19. In total, 47 students chose to participate in the survey. Though the survey collected basic demographic information such as: college class, program enrolled in, and gender, the survey was also used to gain insight on student perception on how they believe Covid-19 will impact their future career. Such areas included on whether students had focused more on possible career options since Covid-19, whether they believe Covid-19 will have a negative impact on their career, how comfortable they feel in their degree choice, and finally whether they are more likely to consider graduate school since Covid-19 first hit. Students were also able to have input on anything else they felt may be relevant regarding their career choice and Covid-19 impact. The purpose of this study was for faculty within the academic program to have a better understanding on how students may be dealing with Covid-19 related to academics, as well as possibly finding opportunities on how better to serve students presently and in the future as Covid-19 is expected to still have impact on 2021 as well as 2022.

- Overview of the college program
- How Covid-19 has impacted our area of interest
- Overview of the survey
- Survey demographic information
- Why the interest of whether students had previous industry or internship experience
- Survey results related to student perception of Covid-19 impact on their chosen field and future plans
- What the faculty learned from the survey results and how it may impact our current layout
- Reflect on what can be done going forward
As the US manufacturing sector is transformed by the fourth industrial revolution, automation will increasingly impact manufacturing processes. As a result, the risk to jobs in the manufacturing field has the potential to increase. This increase in risk will affect counties differently based on their manufacturing workforce distribution. Therefore, an examination of the risk-adjusted employment distribution is needed to more clearly evaluate the risk each county across the US will encounter regarding automation in manufacturing.

This presentation will include a background of automation and the fourth industrial revolution, methods used to collect and analyze the data necessary to create the adjusted risk values per county, and the impacts of automation in manufacturing on a county-by-county level. Additionally, recommendations for workers in high-risk areas are included to help respond to these potential risks.

- Quantification of every US county’s workforce per prevailing manufacturing sector.
- Potential impacts of every US county’s manufacturing jobs due to increasing automation.

There is a need for Manufacturing and Mechanical Engineering Technology graduates to have options for graduate certificates and MS degrees. There are several universities that offer graduate programs in mechanical, civil, and electrical engineering. Often times a manufacturing focus can be an option within a degree in mechanical, but the entrance criteria may require a mechanical engineering bachelor degree or completion of equivalent course prerequisites.

This presentation will outline the process for establishing a new graduate certificate and Master’s in Manufacturing Engineering developed primarily for industry professionals and graduates from Manufacturing and Mechanical Engineering Technology degree programs. Connections to the SME Four Pillars of Manufacturing Knowledge in the curriculum design will be described. The implementation of the certificate and MS degree is planned for the 2021/22 academic year. Initial enrollment data will be reported.

- Market research for Engineering Technology graduates pursuing graduate degrees and certificates
- 30 credit MS degree in Manufacturing Engineering content and development
- 9 credit online certificate in Manufacturing Engineering content and development
- Marketing methods and alumni outreach for the Manufacturing Engineering graduate offerings
ORAL PRESENTATIONS
MICRO/NANOTECHNOLOGY

2021 ANNUAL CONFERENCE

MANUFACTURING: OTHER

THURSDAY, NOV 4
2:30PM - 2:55PM UNIVERSAL E1

HAPTIC RENDERING IN A VIRTUAL MANUFACTURING ENVIRONMENT FOR PROCEDURAL KNOWLEDGE ACQUISITION

Mr. Alex Diffor, Illinois State University
Dr. Yi-hsiang Chang, Illinois State University
Mr. Jordan Osborne, Illinois State University
Mr. Jake Weihe, Illinois State University

Can properly designed haptic feedback help individuals acquire procedural knowledge in a virtual manufacturing environment?

We will discuss how haptic rendering in a virtual environment may enable individuals to acquire procedural knowledge in the manufacturing setting. The proposed haptic rendering scheme and the design of the virtual learning system will be presented, along with experimental results and findings.

- The need to design haptic feedback in a virtual learning environment for acquiring procedural knowledge
- The conceptual framework of hand movements and corresponding haptic rendering scheme
- The implementation of the proposed scheme in a manual assembly task
- The system design, experimental results, and findings

MICRO/NANOTECHNOLOGY

MICRO/NANOTECHNOLOGY: NANOMATERIAL SAFETY

THURSDAY, NOV 4
9:00AM - 9:25AM UNIVERSAL D2

COMPUTATIONAL SIMULATION OF THE LUNG DOSES OF AIR-BORNE FINE AND ULTRAFINE PARTICLES INHALED BY HUMANS AT INDUSTRIAL WORKPLACES

Dr. Mohammed Ali, The University of Texas at Tyler

Epidemiological studies reported that workplace exposure to fine (size <2.5 μm) and ultrafine particles (UFPs) (size <100 nm) as a risk factor for increased susceptibility to acute broncho-pulmonary infections. In general, the UFPs cause a greater inflammatory response and enhanced oxidant capacity than large particles and their respiratory tract deposition is significantly higher. Before conducting any in-vivo studies, it necessary to conduct computational simulation studies which can mimic inhalation of these air-borne fine UFPs by humans at workplace.

This study will computationally predict how inhaled micro and nano particles are transported, disseminated and deposited in the human respiratory airway regions. Polydisperse fine and ultrafine particles are in the range between 1 nm and 2500 nm in diameter. Multiple Path Particle Dosimetry (MPPD), a probabilistic computational simulation software will be used to mimic reported in-vivo experimental conditions.

- Computationally simulated quantification of fine and ultrafine PMs doses is necessary to correlate with in-vivo evaluation of pulmonary distress in occupational workers as they impose increased risk of developing lung-function reduction and pro-inflammatory cytokines secretion.
- In this work, the physical, mechanical, and electrical properties of PMs of carbon black and nanoparticles from wire-cut electrical discharge machining (WEDM), with mass median aerodynamic diameter in the range of 1 to 2500 nm were used as input parameters in MPPD
- Additionally, it mimicked occupational workers oro-nasal - combinational of nose and mouth breathing exposure.
- The deposition results were compared with several in vivo experimental data reported in literature; and satisfactory agreements were found. For example, total lung dose of carbon black PMs of 100 nm size is the highest
(28%) while 450 nm size is the lowest (14%). Then, the deposition again increases with particle size and reaches 21% for 1000 nm (1.0 μm). In case of WEDM nanoparticles, 98% of all 1.0 nm inhaled particles deposits or retain the lung. Thereafter, deposition dose decreases with the particle size and it reaches upto 28% for 100 nm size, a similar pattern that has shown by carbon black PMs.

Micro/Nanotechnology: Product Applications (Sensors, Biomedical, Photovoltaics, Flow Membranes, Etc.)

THURSDAY, NOV 4
9:30AM - 9:55AM

STUDY OF BIOFOULING USING FEMTOSECOND LASER INDUCED BREAKDOWN SPECTROSCOPY

Dr. Swapnil Patole, Mississippi State University

Marine biofouling accounts for around 60 Billion USD in loss every year according to US Naval sources. This study will help in understanding the elemental composition of biofilm and serve as a means of early identification of marine fouling bacteria and algae species.

Marine biofouling accounts for around 60 Billion USD in loss every year according to US Naval sources. Biofouling refers to the undesirable growth and adhesion of marine organisms such as barnacles and algae. These marine organisms attach to a ship hull and glue themselves to the surface and create a calciferous bottom plate, building up walls around their soft body. Apart from protection, the shells also create surface turbulence. For a ship of any size that will increase the fuel costs dramatically, lower the speed, increase costs regarding maintenance and thereby reduce efficiency, both in financial as well as safety terms.

The study of biofouling composition is critical to developing anti fouling technologies. In this study a method of Laser Induced Breakdown Spectroscopy (LIBS) is introduced to determine the elemental composition of biofouling by analyzing the spectral emission from the sample. The laser used is a 1 MHz femtosecond laser from Clark MXR. Samples of biofilm are collected by suspending Stainless Steel grade 316 plates at a depth of 1m in Pascagoula Bay for 5,10,15 and 20 days. This study will help in understanding the elemental composition of biofilm and serve as a means of early identification of marine fouling bacteria and algae species.

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Micro/Nanotechnology: Microtechnology

THURSDAY, NOV 4
5:00PM - 5:25PM

UNDERGRADUATE RESEARCH EXPERIENCE IN MICRO NANO TECHNOLOGY

Dr. Matthias Pleil, University of New Mexico

This is a review of the Micro Nano Technology opportunity offered to students and faculty at the University of New Mexico’s MTTC Cleanroom.

This presentation will provide an overview of the Support Center for Microsystems Education’s URE program which combines online short courses, hands-on cleanroom research, conference presentation and submission to the Journal of Micro Nano Technology Education (JMT-Ed), opportunities for the students.

- Overview of the URE program
- Student outcomes
- Future opportunities for Faculty and Students
Safety: Analysis
THURSDAY, NOV 4
9:00AM - 9:25AM
UNIVERSAL C3

PERCEPTION OF LOW PROBABILITY, HIGH CONSEQUENCE (LPHC) PRODUCT FAILURE EVENTS IN SMALL-TO MID-SIZED (SMM) MANUFACTURERS IN THE MIDWEST
Ms. Kirshanthi Ganessa Moorthy, Iowa State University
Dr. Nir Keren, Iowa State University

Create awareness among small to mid sized manufacturers regarding low-probability, high consequence product failure events.

Low-Probability High-Consequence (LPHC) events are accidents that happen unexpectedly but inflict catastrophic outcomes when they do happen. Catastrophic outcomes include loss of lives, severe injuries, and damage to the environment. There is a lack of metrics for measuring low probability, high consequence (LPHC). In relation to that, this project would focus on establishing a certain statistical approach to identifying and addressing product safety risks among manufacturers, particularly small to mid-sized manufacturers (SMMs) in the Midwest region. SMMs have difficulty perceiving the realities of low-probability/high-consequence events. One area where this phenomenon is especially pronounced is in the product safety liability area. The gaps are potentially in (1) SMMs ability to identify/conceptualize product safety risks, (2) wherein the design can be controlled and how (e.g., through Process and Design FMECA), and (3) measures they should take so design controls are carried through the manufacturing lifecycle.

Safety: Innovative Safety Intervention in the Classroom or Workplace
THURSDAY, NOV 4
10:30AM - 10:55AM
UNIVERSAL C1

ONLINE SAFETY TRAINING PORTAL TO ENHANCE STUDENT AWARENESS OF ACADEMIC LABORATORY SAFETY IN ENGINEERING TECHNOLOGY
Prof. Ali Aljaroudi, Sam Houston State University
Prof. Faruk Yildiz, Sam Houston State University

Professional safety training portal is needed to identify academic laboratory hazards, increase students’ awareness of laboratory safety and manage at-risk behaviors.

This paper is presenting an online safety training portal created to enhance safety awareness and manage at-risk behaviors in academic laboratory among students of engineering technology.

- Safety Training Portal
- Engineering Technology
- Academic Laboratory
The sentiment of the people affected during and after an emergency situation determines the success of the emergency response and recovery process.

Sentiment analysis aims to identify public opinions and attitudes in certain contexts. People now use social networks to share their opinions on events and the data can offer immense opportunities to study and analyze people's opinions and sentiments. The goal of this work is to identify and analyze disaster-related social media posts that may provide useful information from a disaster/emergency management perspective.

- Sentiment analysis and its application in disaster management
- Disaster and Emergency Management
- Sentiment analysis through machine learning

Agriculturally-related industries are among the most hazardous work environments with a high rate of occupational incidents. Therefore, identifying incident risk profiles and dynamics are significant for planning focused safety measures to reduce the rate and severity of incidents and save workers' lives.

Workers’ compensation claims are analyzed using latent class clustering statistical approach to identify various safety risk profiles among agribusiness workers. The analytical approach of the study allows for further investigating injury profiles, workers’ demographics and financial burden of the incidents.

- A record of 18,000 occupational incidents are analyzed.
- Injury profiles are determined based on the number of clusters.
- Workers’ demographics in each cluster are compared.
- Financial burden of incidents is analyzed and compared based on the injury clusters.

Safety concerns and responses associated with the COVID-19 pandemic, resulted in a 47% decline in the total operating revenue of domestic airlines from $248 billion in 2019, to $130 billion in 2020. For safety reasons associated with COVID-19, flying capacity on all US airlines dropped to 5% during 2020. Collectively, US airlines registered a net loss of $24.6 billion in 2020, a 256% decrease from a combined net profit of $15.71 billion, a year earlier in 2019 (Thomaselli, 2021). The need to examine these safety related losses in commercial aviation and effective strategies to save commercial aviation is significant for several reasons, including preparation for expected future episodes of contagion and pandemics in a world integrated by commercial aviation services.

On Sunday, 2nd May 2021, Delta Airlines became the “last commercial airline to end blocking off middle seats” … “which was put in place as a safety measure against COVID-19” (Pfalz, 2021). On Sunday, 16th May 2021, the US Transportation Security Administration (TSA) reported screening 1.85 million passengers, which was the highest number of airline passengers since March 2020, when safety and health concerns about the novel coronavirus decimated demand for commercial aviation in the United States and around the world. A year earlier on the same day of 16th May 2020, only 253,000 persons were screened by the TSA at airports (Shepardson, 2021). Several major airlines, including American and United Airlines, expect to restore routes and regain 80% to 90% of 2019 service levels before COVID-19 decimated commercial aviation in 2020. It is worth noting that since March 2020, the US “has barred nearly all non-US citizens who have recently been in much of Europe from the United States” and “nearly all of Europe still bans most US travelers from visiting, while Britain allows American visits but requires a 10-day quarantine upon arrival and two COVID-19 tests” (Shepardson, 2021). The use of face coverings, improved filtration of cabin air, crew and passenger vaccination, as well as emerging safety measures such as contactless health screening at airports, have all facilitated and supported the gradual growth in the number of airline passengers and the restoration of commercial aviation to about 70% of its pre-pandemic level. This presentation examines workplace safety through the lens of the impact of COVID-19 on commercial aviation, and explores effective safety strategies to restore airline service and commercial aviation, as America and the rest of the world fights to emerge from the COVID-19 contagion and pandemic.
• Safety related concerns stemming from the COVID-19 contagion and pandemic have decimated commercial aviation.
• For safety reasons associated with COVID-19, flying capacity on all United States airlines dropped to 5% during 2020.
• US airlines registered a net loss of $24.6 billion in 2020, a 256% decrease from a combined net profit of $15.71 billion in 2019.
• Banned air travel, restricted air travel, quarantine of air travelers, improved filtration of cabin air, face coverings by airline crew, airport workers, and airline passengers as well as the vaccination of crew and passengers have constituted measures for dealing with COVID-19 in commercial aviation.

• the overall finding can help practitioners think about potential hazards and health effects when working in the field

Safety: Worker Safety in Diverse Fields
FRIDAY, NOV 5
11:00AM - 11:25AM UNIVERSAL C3

OCCUPATIONAL RISK FACTORS AND PROSTATE CANCER IN FIREFIGHTERS: A SYSTEMATIC REVIEW

Dr. Farman Moayed, Indiana State University
Mr. Roland Falana, Indiana State University

This systematic review tries to identify the major risk factors for prostate cancer among firefighters which can have significant implications in protective or preventive methods used in the field.

This presentation uses EAI (epidemiological appraisal instrument) to conduct a systematic review on 13 different studies across the world trying to explain the exposures and risk factors that firefighters are exposed to and the prostate cancer. EAI evaluates the quality of research articles in different areas which are study description, subject/record selection, observation quality, data analysis, and generalization of results. Overall 13 articles were included in this review. they were published between 2010 and 2020 and evaluated twice. A kappa coefficient was calculated for intra-rater reliability. The overall results were inconclusive but there were certain factors (variables0 were identifies that can lead to cancer.

• firefighter are exposed to so many different chemicals and hazards and it can increase their risk for variety of diseases such as prostate cancers.
• fireighters’ exposure vary from one station to another and over time.
• there are difficulties that a specific exposure can be isolated and evaluated
• the prostate cancer alone has never been studied among firefighters.
• the findings of this systematic review was able to identify certain factors/variables that can correlate with cancer and suggests a few measure to evaluate the exposures in real time.

This articles intergrates evidence from different research about exposure to Glyphosate and NHL to make an evidence-based conclusion

This presentations tries to answer a research question that if there is any association between exposure to glyphosate among farmers and non-hudgkins Lymphoma and what the risk factors are. this presentation uses EAI (Epidemiological Appraisal Instrument) to conduct a systematic review on research articles related to this topic. It includes 6 articles from 2000 to 2019 and evaluates each one of them based on the quality of their work in different areas which are study description, subject/record selection, observation quality, data analysis, and generalization of results. At the end it will make a conclusion about its research question which is the correlation is inconclusive but there are certain factors that can play an important role in this issue.
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• this systematic review tries to look at the exposure and outcomes for better and consistent evaluation
• the overall finding can help practitioners think about potential hazards and health effects when working in the field

Safety: Worker Safety in Diverse Fields
FRIDAY, NOV 5
11:00 A.M. - 11:25 A.M. UNIVERSAL C3

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EMERGENCE OF MINORITY ADVOCATE CAREER ROLE DEVELOPMENT IN UNDERGRADUATE ARCHITECTURE, ENGINEERING, AND CONSTRUCTION (AEC) WOMEN OF COLOR

Dr. Andrea Ofori-Boadu, North Carolina Agricultural and Technical State University
Ms. Aisha Benton, North Carolina Agricultural and Technical State University
Ms. Rabiatu Bonku, North Carolina Agricultural and Technical State University

Insights into the lived experiences, concerns, and future career aspirations of undergraduate architecture, engineering, and construction (AEC) women of color will inform advances in AEC educational and professional environments. Such advances will enhance AEC professional identity development and career transitions in women of color towards a more racial and gender diverse AEC workforce, while contributing to reductions in AEC workforce shortages.

Workforce shortages and the lack of racial and gender diversity is prevalent in the architecture, engineering, and construction (AEC) industry. Significant barriers exist for undergraduate women of color (WOC) as they often experience the ‘double bind’ of racial and gender marginalization when navigating the science, technology, engineering, and mathematics (STEM) culture.

Major Points:
- Introduction
- Problem Statement
- Objectives
- Research Methods
- Results
- Conclusion

BUILDING A FUTURE FOR WOMEN IN CONSTRUCTION

Dr. Jennifer Warrner, Ball State University
Ms. Sarah Strong, Ball State University

Although it’s been found that there is an increase in women in the construction industry, they are still considered a distinct minority in the field. In attempt to guide future females thinking of pursuing a degree in construction management, more research should be focused on what led females to pursue a degree in construction management and how they prepared themselves to be successful in their careers. Learning through the experience of how other women overcame barriers in their careers and attained success can influence more women to consider a career in the construction industry.

There is a lack of women represented in the construction management industry. This presentation highlights results from a research study of female students pursuing a baccalaureate degree in construction management. The purpose of this study was to determine what led females to pursue a degree in construction management and how they prepared to be successful in their careers. The research results provide information regarding the participants’ work experiences in construction, their experiences as a female in the construction industry, their career preparation expectations, and their goals. Findings and best practices from this research could help females studying construction and other male-dominated academic disciplines at other institutions.

Major Points:
- Importance of female representation in the construction industry
- What led females to pursue a degree in construction management
- How women prepared themselves to attain success in their careers
- Barriers encountered by females in male-dominant industries and how to overcome them
**POSTER PRESENTATIONS**

**ADMINISTRATION**

**PREPARING FOR YOUR FIRST ATMAE VISIT: SELF-STUDY TO TEAM VISIT--TIPS AND TRICKS FOR SURVIVING!**

Primary Presenter: Mrs. Cindi Albrightson, Southwestern Oklahoma State University

**NEED:** While ATMAE is great about presenting the Self-Study workshop, writing your first self-study can be overwhelming. This poster strives to give tips and tricks from someone who recently completed their first self-study and accreditation visit.

**OVERVIEW:** This presentation will focus on how to set your timeline for writing, what information you think you need vs what information you will need; preparing for the visit; what to expect during the visit; and the closing conference.

Major Points:
- Preparing Your Writing Timeline
- Writing the Self-Study
- Preparing for the Team Visit
- The Visit
- Closing Conference

**DISTANCE LEARNING/TEACHING INNOVATIONS**

**DISTANCE LEARNING/TEACHING INNOVATIONS: TRAINING & SUPPORT FOR DISTANCE INSTRUCTORS**

Primary Presenter: Mrs. Kay Bishop, Appalachian State University

**NEED:** Instructors can actively engage students in remote settings beyond video conferencing. Screen time alone can lead to disengagement and burnout. I would like to share how I used various new media resources to track attendance, encourage student participation, and, ultimately, win back my classroom.

**OVERVIEW:** When the pandemic hit during the Spring 2020 semester, Appalachian State University, like many schools and universities transitioned to fully remote learning. While it was unplanned, I learned how to improve student engagement in the online classroom and implemented new strategies and practices into my graphic arts classroom curriculum during the Fall 2020 and Spring 2021 semesters. I found that students need to actively participate in remote settings beyond joining video conferencing via Zoom or Google Meets. Staring at a screen alone actually leads to disengagement and burnout. I would like to share how I used various new media resources to track attendance, encourage student participation, and, ultimately, win back my classroom.

I taught four different courses from Spring 2020–Spring 2021: Digital Media Composition I, Web Development for Graphic Communication, Digital Imaging, and Introduction to Graphic Communications. Since I had completed my Masters in Educational Media, New Media Literacies & Global Perspectives in May 2020, I was eager to utilize new media tools and technologies into both completely online and hybrid classrooms. By Fall 2020, most of my classes were synchronous hybrid classrooms except for one fully online asynchronous course.

Major Points:
- Work-in-progress reviews via sketch and digital layout submissions
- Peer reviews in the form of Google slides, FlipGrid
- Group work through Reading Circles, Breakout Rooms, projects
- Online discussion forums
- Instagram poster campaign
- Storyboard and Site plan techniques via Google Jamboard and Adobe XD
- Student presentations in the form of Adobe PDF publishing, Blogspot, Google Sites, Adobe Spark, and CMS websites
- E-portfolio websites (Adobe Dreamweaver)
- Live instructor and TA demonstrations with virtual office hours, independent lab
- Pre-recorded, instructor-generated, YouTube tutorial videos
- Guest speakers, including alumni, experts, and clients in synchronous Zoom settings
Distance Learning/Teaching Innovations

**TRAINING STUDENTS FOR IMMEDIATE ENTRY TO WORK FORCE**

Primary Presenter: Mr. Shrishail Jagtap, University of Central Missouri  
Co-Author: Dr. Curtis Bradford, University of Central Missouri

If the current students and faculty believe that a mentorship program will be helpful to better prepare students for careers in construction

**NEED:** The importance of mentorship program is to help new student in the construction management program learn from their senior peer who have gained academic and professional experience. To allow for a support system which can overcome the knowledge difference between an experience and inexperienced students.

**OVERVIEW:** The research study is about implementing a mentorship program at the University of Central Missouri for the Construction Management program. The goal of this study is to improve student involvement in the construction management program and help them get assistance from senior students of the program. The mentorship program will be an excellent support system that will be available to all the students in the CM program on all levels. This program will take the advantage of the industry experience gained by the senior student and pass it to the junior students of the construction management program. The senior students will be able to practice soft skills such as schedule management, interpersonal communication, leadership, and teamwork as these skills have always been vital in the construction industry. The student pool in the construction management program at the University of Central Missouri has a good mix of experienced and academic students. As mentors in the mentorship program students who have moved up into their program have gained experience through internships and academics studies. The upperclassmen who learn and gain experience in their internship by learning industry-standard processes and operations will prove beneficial as they become mentors for their fellow students. The mentorship program will aim to take advantage of these resources and help pair experienced students with newer enrolled students to guide them through the program. In the mentorship program for a student to become a mentor, a student must have completed at least one year in the construction management program.

**Major Points:**
- Senior students’ mentor will help new student in the construction management program.
- Opportunity to for students to participate and develop soft skill vital to construction industry.
- Sharing industry experience.
- Gain confidence of working in a team and organizing tasks.

Distance Learning/Teaching Innovations: Other

**CONNECTEDNESS IN ONLINE CLASSES: COMPARING THREADED DISCUSSIONS VS SYNCHRONOUS CHATS**

Primary Presenter: Ms. MariEtta Byerline, University of Central Missouri  
Co-Presenters:  
Mr. Sesha Dwarampudi, University of Central Missouri  
Ms. Victoria Mbah, University of Central Missouri

**NEED:** Students value connectedness in their online courses. This research was conducted in order to determine whether threaded discussion boards or synchronous chats provide a better sense of connectedness in student participants.

**OVERVIEW:** Survey results will be presented examining student perception of connectedness in online courses. Two online graduate courses are compared, one using threaded discussion boards and one using synchronous chats. Peer to peer connection and student to teacher connection is compared.

**Major Points:**
- perceptions of peer to peer connectedness are compared in courses threaded discussion boards vs synchronous chats
- perceptions of student to teacher connectedness are compared in courses threaded discussion boards vs synchronous chats

Electricity, Electronics, Computer Technology & Energy Issues

**INSULATED SOLAR ELECTRIC COOKING**

Primary Presenter: Mr. Martin Osei, Eastern Illinois University

**NEED:** Sun is an abundant resource that can be harnessed to address SDG 7 providing affordable, reliable, sustainable, and modern energy. Households in third world countries primarily cook food by burning firewood, charcoal, and coal for which the World Health Organization (WHO) reports that 4 million people globally die from cooking with these fuels. There is a need to utilize this resource to address clean cooking to substitute use of open fire and its health implications.

**OVERVIEW:** The Insulated Solar Electric Cooking (ISEC) is made from a cheap heating element (attached to a cookpot)
connected to a solar panel which cooks food slowly when thermally insulated, however, the addition of thermal storage material that stores heat for later use makes it possible to cook when the sun is not shining. The ISEC uses Direct DC Solar (DDS) to power the heater over several solar intensities while providing access to electricity. The subsequent electricity expense (less than most grid electricity) is competitive with the cost of biomass cooking for many areas. Benefits include inexpensive access to electricity, a decrease in deforestation, and reduced indoor air pollution. With the continued decline in the cost of solar panels, Direct DC Solar will become ever more compelling for bringing electricity and clean cooking technology to the global poor. Several working prototypes have been fabricated and in use in collaborating countries to study the technology adoption processes.

Major Points:

- Directly connecting an electric heater to a solar panel is an inexpensive way to extract electrical power for cooking.
- Phase change thermal storage provides greater power, reliability, and versatility; and makes the change required for widespread adoption.
- Phase change thermal storage could be a solution to solar energy’s intermittency problems.
- Erythritol is an inexpensive thermal storage medium with high specific heat, high latent heat of fusion, and a melting point appropriate for domestic and industrial thermal storage utility.
- We present cooking as an example use of a phase change material, but also explored the practical challenges of thermal conductivity.

Electricity, Electronics, Computer Technology & Energy Issues

**ECO POTS (ENVIRONMENT CONNECT OPERATION)**

Primary Presenter:  
Mr. Shoaib Shaik, Eastern Illinois University  
Co-Presenter:  
Dr. Toqeer Israr, Eastern Illinois University

**NEED:** Human psychology health and Ecology Awareness program which is major area future is dependent and current technology area is the best part to educate and increase dependency on the plant and growth of it

**OVERVIEW:** An important barrier in the human behavior is emotional/pressure that has effect in the productive environment. The concept of eco pot is to display the emotion of the plant directly in the daily life, in either way of utilizing a small desk plant or large house plant, which is directly proportion to the requirement of the plant with very low cost and no maintenance structure and acts as booster to the human productivity. According to the study of University of Exeter the plants will improve more than 26% boost in cognition, and 30% fewer sickness related absences. What is more, respondents also reported a 6% rise in their sleep quality. We have many advancements in the plant for the medical and agriculture product but no concept to display requirements of the plant, these pots help to get an emotional and responsible structure with plant, The pots are going to be with interactive display with soil, moist and other required sensors that will operate as mean of analytics what are plant requirement and show their emotion in a digital interactive format to form a behavioral bond. These independently increase many qualities like Leadership, Responsible and many more human structures in further case of development these can act same as service dog which will have more benefits to the society and environment. The main aim of the project is to increase the integration between the humas and plants which indulge has impact from childhood further enhance the plant revolution with an initial start.

Major Points:

- The major area is the part development of plant area to understand the requirement and as service to the human development
- This act as major part in the psychology development of human in reducing the stress in the work environment

**DESIGN AN ANDROID APP TO FIND THE OPTIMAL WAY IN TIME AND DISTANCE BETWEEN LOCATIONS IN 11 STATES FOR NPO.**

Primary Presenter:  
Isra Abo Iqsaysa, Eastern Illinois University  
Co-Presenter:  
Dr. Toqeer Israr, Eastern Illinois University

**NEED:** Simplify the task of finding the best way for users, reducing time and effort, calculate the minimum distance and time between sites and develop contingency plans.

**OVERVIEW:** In this project, an Android application will be designed to serve the non-profit organization. The app is designed to find the best routes between different stations in several 11 states. The application will be designed using Android Studio IDE.

Major Points:

- Design an application on the Android system.
- Find the distance and time preference.
- Simplify data handling for users.
- Develop contingency plans.

Electricity, Electronics, Computer Technology & Networking Cyber Security
Electricity, Electronics, Computer Technology & Energy Issues: Cyber Security

**Identifying Fake Digital Images in Social Media and Stopping Its Spread**

**Primary Presenter:**
Dr. Biju Bajracharya, East Tennessee State University

**Need:** In the digital era, communication between people is becoming faster than ever before with the wide usage and adoption of social media. People from all walks of life and different entities of different interest groups are attracted to social media platforms. Among those attractions, some of them are attracted with the business intent, marketing intent, intent with the political motive, etc. While some others’ intent is malicious whose purpose is polarizing the society, harassing people, digital extorsion by creating fear among the users. Such kinds of interest groups of malicious and criminal intents, use digital images over social media with fabricated stories. Digital images can be easily manipulated and distorted from the original events, or the legitimate images can be presented with fabricated stories causing the social media users’ reactions that may cause fatal consequences leading to the loss of life and assets. These kinds of events are possible because it is not easy for people to distinguish such manipulated images or fabricated stories. Thus, to protect and stop the widespread inappropriate use of digital images, it requires a way to detect fake images and stories.

**Overview:** The objective of this presentation is to discuss digital image usage over social media platforms, the impact of usages of digital images on social media, inappropriate uses of images, fake image detection methods, and protection methods of spreading such digital images. Digital images are widely used on social media platforms with an intention to share life events and personal news. Social media are no longer limited to sharing life events and news, but it is also used to convey different information’s with a marketing intent, political intent, etc. Among those intents, some of the intents can be malicious, criminal, and mischievous that can cause many fatal widespread consequences. Digital images can be easily manipulated in such a way that it does not leave any obvious traces on the image. These fake images can be rapidly shared among social media users with misleading and distorted information. There is also a chance of using a legitimate digital image with the fabricated stories or using both fake images and fabricated stories. This is one of the major concerns of the trust of the authenticity of the digital images. There are many methods of verification of the authenticity of the image and storylines. Therefore, it is very critical to accurately identify the fake images from the original images and protecting the legitimate images from misleading and fabricated stories. Various methods that can protect from misuse of legitimate images and detecting the fake images will be explored in this presentation.

**Major Points:**
- Discussion of the legitimate and the illegitimate digital image usage in the social media platforms.
- Discussion of the consequences of the illegitimate or the inappropriate digital image in the social media platforms.
- Discussion of various ways of identifying fake digital image on social media and ways to stopping its spread.
- Describe how the digital images are protected from digital image manipulations.

**Electricity, Electronics, Computer Technology & Energy Issues: Energy Conservation**

**A Sustainable Future with Sense Monitoring**

**Primary Presenter:**
Mr. Josh McCombe, Eastern Illinois University

**Co-Presenter:**
Dr. Toqeer Israr, Eastern Illinois University

**Need:** With the ability to gather detailed energy consumption data from all of your wired electrical devices and appliances, it is possible to better manage your annual energy usage.

**Overview:** The purpose of this presentation would be to elaborate on the process of installing and connecting to the Sense monitor via the Sense web and mobile apps, and gathering and analyzing energy consumption of a home, with a device by device breakdown.

**Major Points:**
- How to use the Sense monitor (hardware and software)
- Details about how the Sense app detects and labels devices and appliances
- An overview of the graphs and data presented by the Sense app
- The benefits of installing a Sense monitor in your home or business
Electricity, Electronics, Computer Technology & Energy Issues: Software Technology

**CALCULATING DISTANCE AND TIME BETWEEN LOCATIONS FOR EMERGENCY RELIEF EFFORTS**

Primary Presenter: Dr. Toqeer Israr, Eastern Illinois University

**NEED:** In the case of emergency, resources need to be reployed from one Salvation Army location to another Salvation Army location. Knowing the distance/time between these locations is an essential component to this relocation efforts

**OVERVIEW:** In this work, we are trying to calculate the distance and the time it would take for a person to travel between the 282 locations across 11 States. This work is being accomplished using Excel VBA and Google Map Api

**Major Points:**
- for emergency response, we need distance and time between each one of the 282 locations across 11 States of the Salvation army
- we need to be able to figure out how to calculate this distance and time using an automated system instead of manually researching this one by one

Electricity, Electronics, Computer Technology & Energy Issues

**SUPERVIOY CONTROL AND DATA ACQUISITION (SCADA) FOR A FACILITY-WIDE NETWORK ARCHITECTURE TO AUGMENT MANUFACTURING EXECUTION SYSTEMS (MES)**

Primary Presenter: Ms. Katherine Pelcin, Millersville University of Pennsylvania

Co-Presenters: Dr. John Haughery, Millersville University of Pennsylvania

**NEED:** As Human Machine Interfaces (HMIs) are increasingly integrated with manufacturing workstation PLCs, the impact of Supervisory Control and Data Acquisition (SCADA) technologies only grows. Not only do these technologies provide increased process flexibility, they also enable Manufacturing Execution Systems (MES). However, many manufacturing facilities do not currently have existing SCADA technologies to support MES and the transformation of Industry 4.0.

**OVERVIEW:** The goal of this project was to develop and deploy a facility-wide SCADA network. Project results realized an in-lab LAN and SCADA network to enable exploration and develop of MES and Industry 4.0 technologies.
Manufacturing

ASSESSING THE STATE OF INDUSTRY 4.0 ADvanced manufacturing education AND TRAINING NEEDS

Primary Presenter: Mr. Oyetunji Olaniba, Iowa State University
Co-Presenters: Dr. Saxon Ryan, Iowa State University
Co-Presenter: Dr. Gretchen Mosher, Iowa State University
Co-Presenter: Dr. John Haughery, Millersville University of Pennsylvania

NEED: The fourth industrial revolution, Industry 4.0 has been described as a major shift in how manufacturing systems operate, with potential improvements in efficiency and response time, with reduced lead time and improved cost efficiencies. The interconnectivity and instantaneous nature of Industry 4.0 allows manufacturers to assess, understand, control, and predict their systems in real-time. Yet, for these systems to be optimized, there is a need to improve the understanding of where manufacturers are in their implementation of Industry 4.0 and where additional assistance is needed.

OVERVIEW: This research identified the needs of manufacturers in the Industry 4.0 advanced manufacturing realm. This presentation describes the proposed gap analysis process to identify what is currently available to manufacturers for Industry 4.0 training and resources, what manufacturers need for Industry 4.0 training and resources, and how the gap between what is currently available and what is needed can be bridged. To identify available Industry 4.0 training and resources as well as the needs, a survey was developed and sent to manufacturers in multiple manufacturing fields. The survey was used to gather data on manufacturing employee perception of the industry 4.0 training and education needs. In this presentation, the audience will learn about the current state of Industry 4.0 training and education, responses from manufacturer’s surveys describing their needs will be shared, and the implications for educational institutions advancing Industry 4.0 will be discussed.

Major Points:
- Some companies may need assistance in implementing aspects of Industry 4.0.
- Understanding the training and education trends, will help educators identify strategic areas to assist manufacturers in the Industry 4.0 integration process.
- Recommendations and implications for advancing Industry 4.0 training and education.

Manufacturing

MPMC MODEL TO EVALUATE THE REUSABILITY FOR PRODUCT RECOVERY

Primary Presenter: Dr. Kouroush Jenab, Morehead State University

NEED: Environmentally conscious manufacturing design and processes

OVERVIEW: Environmentally conscious manufacturing deals with principles of product design and reusability for sustainability (environment, economy, and society) by considering the four life-cycle stages: Design, Manufacturing, and Postuse. Postuse includes recovery, recycle, reduce, redesign, remanufacture, and reuse activities. In reusability concept, the products can be categorized as a well established or a fast innovation ones. The well-established products are returned to producers due to the failures in which reliability is major factor in making decision for remanufacturing, refurbishing, and recycling. Also, it is noteworthy that the well-established product changes do not happen so often. Therefore, the reuse strategy of the well-established products seems to be an economic option which lays the foundation for multi life-cycle evaluation of the products.

Major Points:
- considering the four life-cycle stages: Design, Manufacturing, and Postuse.
- discuss recovery, recycle, reduce, redesign, remanufacture, and reuse activities.
- explore the reusability concept.
- categorize a well established or a fast innovation products
- present MPMC model.
**TOWARD A TEXAS NANOTECHNOLOGY HUB-AND-SPOKE DEGREE NETWORK**

Co-Presenters: Joseph Wright
Dominick Fazarro

**NEED:** Nanotechnology is a quickly growing field. Various regional nanotechnology programs have developed over the past twenty years. In a better effort to produce nanotechnology professionals at the technician, engineer, and scientist level, providing access to nanotechnology education is essential. The costs of establishing or maintaining such a hands-on program are steep, but can be mitigated by hosting the technical lab courses at a single institution and having partner institution students visit and earn credit. While there is some level of nanotechnology education in Texas, there is not a program with such capabilities.

**OVERVIEW:** A presentation concerning the implementation and development of a nanotechnology degree or capstone semester program is provided. The administrative qualities and costs of such a program are examined, with existing and attainable resources considered. The benefit to the Texas and National workforce is considered against these costs.

**ABSTRACT PROPOSAL:** Nanotechnology and nanoscience programs have developed over the past twenty years to better produce a workforce skilled in the design, fabrication, and application of nanotechnology in a variety of fields. Dedicating nanotechnology practical lab space and reservation time can be prohibitively expensive, with modern tools exceeding hundreds of thousands of dollars. Some states implement a hub-and-spoke system, where students at participating universities stay and study at a research institution willing to host this lab-intensive program for a single term. In this presentation, we develop the typical characteristics of these networks and lay groundwork for how a similar program can exist in Texas in the near future.
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