



SC EPSCoR

2024 STATE CONFERENCE



ADAPT in SC

TUESDAY, APRIL 9
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**Columbia Metropolitan Convention Center
Columbia, South Carolina**

ADAPT In SC is supported by the National Science Foundation Award #OIA-2242812

Welcome to the 2024 SC EPSCoR State Conference

With great appreciation from the SC EPSCoR State Committee

Daniel Noneaker, Chair, Associate Dean for Research,
College of Engineering, Computing and Applied
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Research Authority

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Research, Clemson University

and from the SC EPSCoR Team

Nadim M. Aziz, Director

April Heyward, Program Manager

Megan Souter, Financial Manager

Steve Ramirez, Communications Specialist

Special Thanks to the Conference Planning Committee

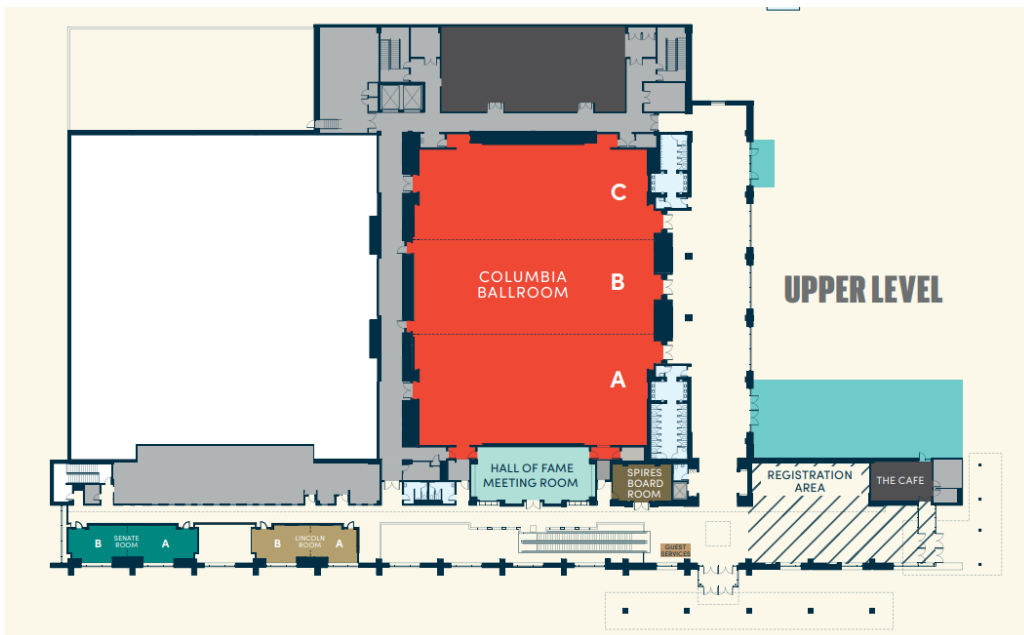
April Heyward, SC EPSCoR

Chris Korey, College of Charleston

Ivan Dungan, Francis Marion University

Jihad Obeid, Medical University of South Carolina

Jordon Gilmore, Clemson University



B – Poster Presentation
**C – Opening Session /
Concurrent Session /
Lunch / Closing Session**

Concurrent Session

Concurrent Session



Concurrent Session

Wifi Information

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Conference Program

7:30 AM	Conference Registration Poster Presentation Setup Exhibitor Setup Conference Breakfast Columbia Ballroom B Outside Columbia Ballroom B/C Outside Columbia Ballroom B/C
8:30 AM	Opening Session Columbia Ballroom C
- 10:00 AM	Daniel Noneaker, SC EPSCoR State Committee Chair Dr. Noneaker is the Associate Dean for Research and professor of Electrical and Computer Engineering in the College of Engineering, Computing and Applied Sciences at Clemson University. He was also the Chair of his Department. Dr. Noneaker is engaged in research on wireless communication for both military and commercial applications. Nadim Aziz, Director of SC EPSCoR, South Carolina Research Authority Dr. Aziz became the Director of SC EPSCoR in May 2023. He held the same position from 2016 to 2021 before he retired to become an independent consultant. Previously, he served as Professor and Chair of Civil Engineering, associate provost, and Interim Vice President for Academic Affairs and Provost at Clemson University. Tanju Karanfil, ADAPT in SC PD/PI Dr. Karanfil is the Senior Vice President for Research, Scholarship and Creative Endeavors and a Professor of Environmental Engineering and Earth Sciences at Clemson University. He is a registered professional engineer in SC, a Board-Certified Environmental Engineer by the American Academy of Environmental Engineers, a Fellow of the International Water Association, and a principal member of the Turkish Academy of Sciences.
	Guest Speaker Pinhas Ben-Tzvi, NSF Program Director, National Science Foundation Dr. Pinhas Ben-Tzvi is a Program Director in the Office of Integrative Activities' Established Program to Stimulate Competitive Research (EPSCoR) Section on an IPA assignment from Virginia Tech where he is a Professor of Mechanical Engineering and Electrical and Computer Engineering, and the founding Director of the Robotics and Mechatronics Lab. His expertise and interests span the areas of cyber-physical systems, artificial intelligence, machine learning, robotics and intelligent autonomous systems, healthcare technologies, human-machine interactions, multi-robot systems, systems dynamics and control, mechatronics design, and novel sensing and actuation. 
	Keynote Speaker Alka Roy, Founder, Responsible Innovation Project and RI Labs <i>Can We Make AI Responsibly? Responsibility and Ethics in AI & Innovation in Healthcare & Beyond</i> Alka Roy is a Bay Area innovator, technologist, author, keynote speaker, and independent advisor who guides and coaches industry leaders, entrepreneurs and policy makers to make awesome organizations, products, and tech. Alka is on the 100 Brilliant Women in AI & Ethics List and a recipient of the Rising Star, National Women of Color in Technology Outstanding Contribution Award and was invited to speak to the US AI Commission. Two questions preoccupy her: How are we designing our world? And how is that design, designing us?  As a product and technology leader, Alka has built and launched over 100+ Wireless, Cloud & AI products working with startups and Fortune 500 companies. She has evaluated and coached hundreds of AI and emerging tech startups as well as briefed and advised Universities, Policy Makers & Industry Leaders on Emerging Tech, Gen AI and Innovation.

<p>10:10 AM - 11:10 AM</p>	<p>Concurrent Session – ADAPT in SC - 1 Moderator – Bruce Gao, Clemson University</p> <ul style="list-style-type: none"> • <i>ADAPT in SC: Determination of Inflammation Progression in Diabetic Chronic Wounds via PLA:MWCNT Nanocomposite Biosensor and Image Analysis.</i> Md Salauddin Sk, Ruth Mwangomo, Logan Rush, and Jordon Gilmore (Clemson University) • <i>Sensory Augmentation to Improve Post-Stroke Standing Balance.</i> Jesse Dean (Medical University of South Carolina) • <i>Development of hPSC Isogenic Cardiac Organoids as an Implantable Device.</i> Sophia Silver (Clemson University), Charles Kerr (Medical University of South Carolina), Nathaniel Hyams (Clemson University), Sean Palecek (University of Wisconsin-Madison) and Ying Mei (Clemson University) 		<p>Columbia Ballroom C</p>
	<p>Concurrent Session - Materials Science - 1 Moderator – Bijoy Dey, Claflin University</p> <ul style="list-style-type: none"> • <i>Machine Learning Approach to Predict Photo-Induced Radical Generation in Triphenylamine bis-ureas.</i> G. Isuri P. Wijesekera, Christopher Sutton, and Linda S. Shimizu (University of South Carolina) • <i>Self-Assembly of Phenylethynylene bis-urea Macrocycles in Solution.</i> Fahidat A. Gbadamosi and Linda S. Shimizu (University of South Carolina) • <i>Exploring Cocrystals and Deep Eutectic Solvents Based on Halogen Bonding for Future Advancements in Drug Development.</i> Madhushi Bandara, Colin D. McMillen, and William T. Pennington (Clemson University) 		<p>Lincoln</p>
	<p>Concurrent Session - Infrastructure Cybersecurity - 1 Moderator – Leon Geter, Benedict College</p> <ul style="list-style-type: none"> • <i>Cybersecurity Threats in Autonomous Vehicle Technologies: Perceptions and Preparedness, A Case Study.</i> Methusela Sulle, Judith Mwakalonge (South Carolina State University), Gurcan Comert (Benedict College), and Saidi Siuhi (South Carolina State University) • <i>Transportation Cybersecurity Vulnerabilities, Threat Models, and Mitigation Strategies.</i> Ostonya Thomas, Jean Michel Tine, and Mashrur Chowdhury (Clemson University) • <i>Threats of Trojan Incursion in Transportation Hardware,</i> Sefatun-Noor Puspa, Jean Michel Tine, Reek Majumdar (Clemson University), Gurcan Comert (Benedict College), Mashrur Chowdhury and Yingjie Lao (Clemson University) 		<p>Hall of Fame</p>
	<p>Concurrent Session – AI Ethics and AI Applications Moderator – April Heyward, SC EPSCoR</p> <ul style="list-style-type: none"> • <i>AI Ethics and Acceptance: Progress Made Towards Strategic Objectives.</i> Shelia R. Cotten, Catherine Mobley, Xia Jing, (Clemson University), Jihad Obeid, G. Hamilton Baker, Grant Goodrich (Medical University of South Carolina), and Aishah Khan (Clemson University) • <i>Example Applications of AI in Healthcare.</i> Alireza Bagheri, Breanna Pederson, Sue Lessner and Homayoun Valafar, (University of South Carolina) • <i>Artificial Intelligence-Supported Connected Vehicles Technology for Traffic Incident Detection and Management.</i> Araf Rahman, Mashrur Chowdhury, and M Sabbir Salek (Clemson University) 		<p>Senate</p>
<p>11:20 AM - 11:50 AM</p>	<p align="center">Poster Session and Networking Break Columbia Ballroom B</p>		

Names of presenters are in bold.

12:00 PM - 12:40 PM	Networking Lunch	Columbia Ballroom C
12:55 PM - 1:55 PM	Concurrent Session – ADAPT in SC - 2 Moderator – Jesse Dean, Medical University of South Carolina  <ul style="list-style-type: none"> • <i>Addressing Challenges in Blood Multi-Omics Data Optimization and Analysis: A Call for AI Solutions.</i> Nannie Tan- Arsuwonggul, Diqi Yan, Jinnawat Jongkhumkrong, Thongpon Meethong, and Qian Wang (University of South Carolina) • <i>Biomedical Imaging Through Tissue with a Micro-LED Display.</i> Basanta Ghimire, Vigjna Abbaraju, Sriparna Bhattacharya, Herbert Belhow, Apparao Rao, and Jeffrey N. Anker (Clemson University) • <i>Measuring Chondrocyte Viability of Articular Cartilage with Two-Photo Microscopy and Deep Learning Image Analysis.</i> Hongming Fan, Pei Xu, Meenakshi Mulkajia, Zhi Gao (Clemson University), Harry Demos (Medical University of South Carolina), Hai Yao and Tong Ye (Clemson University) 	Hall of Fame
	Concurrent Session – Materials Science – 2 Moderator – Apparao Rao, Clemson University <ul style="list-style-type: none"> • <i>Enhancing Electrochemical Kinetics in Lithium-Ion Batteries with Hollow and Porous Si Anodes.</i> Nancy Chen, Morteza Sabet, Nawraj Sapkota, Mihir Parekh (Clemson University), Yi Ding (U.S. Army DEVCOM GVSC), Srikanth Pilla (University of Delaware), and Apparao M. Rao (Clemson University) • <i>Multiphysics Modeling of Hybrid Thermal Management Systems for Li-ion Battery Modules.</i> Shinto Francis, Sajib Mohonta, and Ramakrishna Podila (Clemson University) • <i>Development of a GITT Model for Si-embedded Carbon-cloud Electrode.</i> Peshal Karki, Mihir Parekh, Morteza Sabet (Clemson University), Yi Ding (U.S. Army DEVCOM GVSC), and Apparao M. Rao (Clemson University) 	Lincoln
	Concurrent Session – Emerging Research Areas - 1 Moderator – Ivan Dungan, Francis Marion University <ul style="list-style-type: none"> • <i>Injury Severity Risk Reduction Modeling Strategies for South Carolina Work Zone Crashes.</i> Abdullah Al Mamun (Clemson University), Gurcan Comert (Benedict College), Judith Mwakalonge (South Carolina State University), and Mashrur Chowdhury (Clemson University) • <i>An Adversarial Attack-Resilient Traffic Sign Classification System for Autonomous Vehicles Leveraging a Generative Adversarial Network.</i> M Sabbir Salek, Abdullah Al Mamun, and Mashrur Chowdhury (Clemson University) 	Senate Room
2:05 PM - 2:50 PM	Poster Session and Networking Break Columbia Ballroom B	

Names of presenters are in bold.

SC EPSCoR: Helping Increase South Carolina’s Research Capabilities



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<p>3:00 PM -</p> <p>4:00 PM</p>	<p>Concurrent Session – ADAPT in SC - 3</p> <p>Moderator –Qi Wang, University of South Carolina</p> <ul style="list-style-type: none"> • <i>ADAPT in SC: DNN infused Causal Bayesian Networks – A Beneficial Combination to Balance Explainability and Tractability.</i> Ivan Dungan (Francis Marion University) • <i>A Sustainable Way for Minimizing Environmental Impact of Large/Deep Neural Network Implementations.</i> G. Kumar Venayagamoorthy (Clemson University) • <i>ADAPT in SC: Personalized Eating Detection by Monitoring Wrist Motion Using Individually Trained Convolution Neural Networks.</i> Yu Xuan and Adam Hoover (Clemson University) 	 <p>Columbia Ballroom C</p>
	<p>Concurrent Session – Materials Science - 3</p> <p>Moderator – John Wheeler, Furman University</p> <ul style="list-style-type: none"> • <i>High-temperature Lithium-sulfur Batteries with Commercial Paper-derived Solid-state Electrolyte.</i> Nawraj Sapkota, Morteza Sabet, Mihir Parekh, Nancy Chen (Clemson University), Yi Ding (U.S. Army DEVCOM GVSC), Srikanth Pilla (University of Delaware), Apparao M. Rao (Clemson University) • <i>Concentrated Solution Theory for Nano-porous Electrodes and Separators.</i> Janak Basel, Mihir Parekh, Morteza Sabet (Clemson University), Yi Ding (U.S. Army DEVCOM GVSC), Leah Casabianca, and Apparao M. Rao (Clemson University) • <i>Fundamental Electrochemical Mechanisms in Sulfurized Polymer Cathod-based Li-S Batteries.</i> Sajib Kumar Mohonta, Nawraj Sapkota, Alan Rowland, Apurva Mitta, and Ramakrishna Podila (Clemson University) 	<p>Lincoln</p>
	<p>Concurrent Session – Infrastructure Cybersecurity - 2</p> <p>Moderator –Mashrur Chowdhury, Clemson University</p> <ul style="list-style-type: none"> • <i>Be Cyber Safe: Lock Your Digital Doors.</i> Leon Geter (Benedict College) • <i>Maritime Cybersecurity – Cybersecurity Solutions for the Maritime Transportation Ecosystem.</i> Rick Siebenaler (USC Beaufort) • <i>Leveraging Physical Side-Channel Information – from Attackers’ and Defenders’ Perspectives.</i> Zhenkai Zhang (Clemson University) 	<p>Hall of Fame</p>
	<p>Concurrent Session – Emerging Research Areas - 2</p> <p>Moderator – Christopher Korey, College of Charleston</p> <ul style="list-style-type: none"> • <i>Improving Irrigation Using an IoT System for Real-Time Soil Moisture Monitoring.</i> José Payero, Udayakumar Sekaran, Dana Turner, Anna Sarah Hill, Rebecca Davis, Jonathan Croft, Michael Marshall, and Nathan Smith (Clemson University) • <i>A Study of the atypical Heusler Alloy $Fe_2(V_{1-x}W_x)Al$.</i> Krystin Ferguson, Ming Yin, Godwin Mbamalu (Benedict College), Timir Datta (University of South Carolina), and Aliou Gadjiko (Benedict College) • <i>Mxene/Microgel Jammed Systems for High Performance 3D Printable Inks and Metamaterials.</i> Farivash Gholamirad, Monirosadat Sadati, and Nader Taheri-Qazvini (University of South Carolina) 	<p>Senate</p>
<p>4:10 PM -</p> <p>4:50 PM</p>	<p>Closing Session – Funding Opportunities and Student Awards</p> <p>Moderator – April Heyward, SC EPSCoR</p> <ul style="list-style-type: none"> • Holly LaVoie, Professor and SC INBRE Program Coordinator, University of South Carolina • April Heyward, Program Manager, SC EPSCoR, South Carolina Research Authority 	<p>Columbia Ballroom C</p>
<p>4:50 PM -</p> <p>5:00 PM</p>	<p>Presentation of Student Poster Awards</p> <p>Conference Adjourn</p>	

List of Posters

- *ADAPT in SC- Comparison of ML Algorithms to Classify Microscopic Biological Particles.* **Charlie Jindrich** and Leilei Shi (College of Charleston)
- *ADAPT in SC: Investigating Structural Dynamic Identification Using Time Series Topological Features.* **Nickola Simpson**, Gurcan Comert (Benedict College), Austin R.J. Downey, Jason D. Bakos (University of South Carolina) and Negash Begashaw (Benedict College)
- *ADAPT in SC: Utilizing Change Point Detection for Structural Dynamic Response Classification.* **Bariat Shuaib** (Benedict College), Gurcan Comert (Benedict College), Austin R.J. Downey (University of South Carolina), Jason D. Bakos (University of South Carolina), Negash Begashaw (Benedict College)
- *AI-Enabled Construction of Aligned Collagen using Two-Photon Techniques.* **Wesley Nichols**, Lucas Schmidt (Clemson University), Shrikant Pawar (Claflin University), and Bruce Z. Gao (Clemson University)
- *Animal Movement Patterns' Effect on Density Estimations Using Camera Traps.* **Devin Ruppe**, Rachel Grotheer, and Jennifer Bradham (Wofford College)
- *Automated Analysis of Cardiovascular System Using Deep Learning.* **Alireza Bagheri Rajeoni**, Breanna Pederson (University of South Carolina), Daniel G. Clair (Vanderbilt University Medical Center) Susan M. Lessner, and Homayoun Valafar (University of South Carolina)
- *Automating irrigation and nitrogen fertigation based on real- time data from a wireless sensor network.* **Javad Alavi**, José Payero, and Tom O. Owino (Clemson University)
- *Comparing Satellite-Derived SMAP Soil Moisture Data to In-Situ Measurements from a Network of Measuring Sites.* **José Payero**, and Joe Bible (Clemson University)
- *Comparison of Bayesian and Neural Networks in Predicting Customer Retention.* **Eli Hellmig**, and Ivan Dungan (Francis Marion University)
- *Conditional Density Estimation for CMV Crash Risk Analysis and Uncertainty Quantification in Work Zones.* Debbie Aisiana Indah, Judith Mwakalonge (South Carolina State University) **Gurcan Comert** (Benedict College) and Saidi Siuhi (South Carolina State University)
- *Creating a Comprehensive Dataset to Explore Retroreflectivity Degradation in Traffic Signs: Incorporating Environmental Factors.* **Denis Ruganuz**, Paul Olukoye, Methuselah Sulle, Judith Mwakalonge (South Carolina State University), Gurcan Comert (Benedict College) Saidi Siuhi (South Carolina State University)
- *Deep Learning-Based Classification of Gamma Photon Interaction in Room-Temperature Semiconductor Radiation Detectors.* **Sandeep K. Chaudhuri**, Qinyang Li, Krishna C. Mandal, and Jianjun Hu (University of South Carolina)
- *Densification and microstructure evolution of alumina samples processed via Direct Ink Writing.* **Deeksha Muralidar Kodangal**, and Rajendra K. Bordia (Clemson University)
- *Efficacy of Statistical, Long Short-Term Memory (LSTM), and Quantum LSTM in Cyberattack Detection for Connected Vehicles.* **Jean Michel Tine**, Sefatun-Noor Puspa (Clemson University), Gurcan Comert (Benedict College), Balaji Iyengar, Abuhdima Esmail and Mashrur Chowdhury (Clemson University),
- *El Niño Southern Oscillation (ENSO) Variability Changes 4,000 Years Ago,* **Kyle Bernier** (The Citadel), Lisa Zuraw (The Citadel), Judson W. Partin (University of Texas at Austin), Robert Domeyko (The University of Texas at Austin), Yuko Okumura (The University of Texas at Austin), Kaustubh Thirumalai (University of Arizona), Allison E. Lawman (Colorado College), Frederick W. Taylor (The University of Texas at Austin), Donyu Liu (The University of Texas at Austin), Hsun-Ming Hu (National Taiwan University/The University of Queensland), Eslime Garaebiti (Vanuatu Meteorology and Geohazards Department), Abel Kalo (Vanuatu Meteorology and Geohazards Department), Krishna Kotra (The University of the South Pacific), and Chuan-Chou Shen (National Taiwan University, Taipei)
- *Electrochemical reactions of alcohols with small-membered ring systems for bioconjugation applications,* **Shan Hu**, Öznur Ölmez Nalcioglu, Monchupa Kingsak, James D. Sitter, Michael Walla, Aaron K. Vannucci, Qian Wang (University of South Carolina)
- *Engineered porosity bone scaffolds bioceramics via directional freeze casting,* **Komalakrushna Hadagalli** (Clemson University), Bikramjit Basu (Indian Institute of Science) and Rajendra K. Bordia (Clemson University)
- *Evaluating Factors Influencing School Travel Mode Choice in the United States Using Explainable Artificial Intelligence,* **Hannah Musau**, Judith Mwakalonge, Gurcan Comert (Benedict College) and Saidi Siuh (South Carolina State University)
- *Examining Environmental Equity Gaps in EV Charging Deployment.* **Paul Omulokoli**, Judith Mwakalonge, Saidi Siuhi,(South Carolina State University) and Gurcan Comert (Benedict College)
- *From Curvature to Stability: Unraveling the Physics of Blue Phase Soft Crystals.* Sepideh Norouzi, Jeremy Money (University of South Carolina) Jose A. Martinez-Gonzalez (Universidad Autónoma de San Luis Potosi) and **Monirosadat Sadati** (University of South Carolina)

- *Halogen Bonding in Cocrystals of Organoiodines with Diphenyliodonium Chloride/Iodide Salts*, **Lahiruni Pelendage, Maryelle Nyeck, Colin D. McMillen, and William T. Pennington** (Clemson University)
- *High-Entropy Oxide Lithium Ion Battery Anodes*. **Ting Shen** (Clemson University), Rajendra K. Bordia (Clemson University), Xiaoxiao Jia and Guozhong Cao (University of Washington)
- *Hybrid Model Digital Twin-Enabled Wearable Device Telerehabilitation Platform*, **Oguzhan Oruc**, Andrew B. Williams, and Eva T. Singleton (The Citadel)
- *Hyperspectral Image Classification of Bacteria Using a Convolutional Neural Network*, **Bruce Vogelsberg**, Shantanu Kore, Reece Fratus, David Karig, and Bruce Z. Gao (Clemson University)
- *Machine learning enhanced design of RNA-based fluorescent biosensors for the detection of the neurotransmitter dopamine* Lane Chamberlain, Emma Westmoreland, Zachary Abernathy, Kristen Abernathy, and **Timea G. Fernandez** (Winthrop University)
- *Making Use of Quantitative Data in Bayesian Network Models by Clustering with K-Means*, **Jacob Reeder** (Francis Marion University)
- *Modeling County-Specific Chill Hours Based on Daily Maximum and Minimum Air Temperatures*, **José Payero** (Clemson University)
- *Multi-Sensor Integrated Simulation Environment for Methane Leak Detection Using Reinforcement Learning*, **Reek Majumder** (Clemson University), Nabeyou Tadessa, Tony Munnings, Anthony Stubbs, Charlton Rolle (Benedict College) Mashrur Chowdhury (Clemson University), Gurcan Comert, Adrian Gale (Benedict College), David Werth (Savannah River National Laboratory) and Godwin Mbamalu (Benedict College)
- *Multiphysics Simulation of Thermoelectric Material (Fe_{0.2}V_{0.8}W_{0.2}Al)*, **Krystin Ferguson**, Ming Yin, and Godwin Mbamalu (Benedict College)
- *PerovNet: A Generalizable Machine-Learned Interatomic Potential for Halide Perovskites*, **John T. Barber**, Nima Karimitari, Zachary J. L. Bare, Dipannoy Das Gupta, and Christopher Sutton (University of South Carolina)
- *Predicting Customer Status through Bayesian Networks with Imbalanced Data Handling*, **Bhakti Patel**, Francis Marion University
- *Representation Learning to Improve the Performance of Graph Neural Networks in Predicting Material Properties*, **Dipannoy Das Gupta**, Qi Zhang, and Christopher Sutton (University of South Carolina)
- *Risk-based Conflict Predictions for Large Trucks Merging in Work Zones*, **Abyad Enan** (Clemson University), Judith Mwakalonge (South Carolina State University), Gurcan Comert (Benedict College), and Mashrur Chowdhury (Clemson University)
- *Scenario-Based Learning: Pedagogy for Teaching Undergraduate Statistics*, **Morgin Jones Williams** (University Of South Carolina Beaufort)
- *Silicon oxycarbide/reduced graphene oxide composite anodes for lithium-ion batteries with enhanced electrochemical performance*, **Dillip K. Panda** (Clemson University), Nawraj Sapkota (Clemson University), Gangadhar Jella (Clemson University), Sujith R (Birla Institute of Technology and Science Pilani), Apparao M Rao (Clemson University), and Rajendra K. Bordia (Clemson University)
- *STAR Teachers of South Carolina: Early Observations and Lessons Learned from the Research Experience for Teachers in Biological Sciences (BIORETS) Program at Converse University*, **Neval Erturk** (Converse University)
- *Stress and Mental Workload Factors in Human - Robot Collaboration: Investigating Speed, Robot Density, and Robot Orientation Effects*, **Nisa Mareldiya Soltani**, Qian Zhang (College of Charleston), Jana Jovcheva (University of Edinburgh), Mia Wang and Joe Carson (College of Charleston)
- *Using Inertial Measurement Units to Estimate Center of Pressure in Stroke Patients During Balance Challenges*, **Isabelle Museck** and Jesse Dean (Medical University of South Carolina)

Thank you to our Exhibitors!

Bioengineering, Clemson University

Chemistry and Biochemistry, University of South Carolina

Clemson University Restoration Institute

College of Dental Medicine, Medical University of South Carolina

Integrated Information Technology, College of Engineering and Computing, University of South Carolina

MegaWatt Laser

Physics and Astronomy, Clemson University

STEAM Education, Interactive Learning Solutions LLC

Transportation Cybersecurity and Resiliency (TraCR) Center, Civil Engineering, Clemson University