3rd Annual C²M² Fall Conference
Securing Transportation Cyber-Physical Systems

Center for Connected Multimodal Mobility (C²M²)
Madren Conference Center, October 18, 2019

CLEMSON UNIVERSITY

CLEMSON GLENN DEPARTMENT OF CIVIL ENGINEERING

Conference Sponsored by:

The Center for Connected Multimodal Mobility welcomes you to the 3rd Annual C^{2}M^2 Fall Conference

The Center for Connected Multimodal Mobility (C^{2}M^2) is excited to be hosting the 3rd Annual C^{2}M^2 Conference at Clemson University, Clemson, South Carolina. This gathering of students, faculty, staff, practitioners, and public officials from throughout South Carolina is vital for discussing ongoing activities conducted by C^{2}M^2. The conference also serves to connect the academic, public and private sectors in the hopes of fostering collaborative relationships. C^{2}M^2 is delighted by your participation, and we hope that you enjoy exploring the conference.

C^{2}M^2 consists of five leading higher education and research institutions in the state of South Carolina: Clemson University (CU), the lead institution; Benedict College (BC); The Citadel; South Carolina State University (SCSU); and the University of South Carolina (USC). Our vision is to become a globally recognized multimodal mobility innovation center for moving people and goods, specializing in connectivity, data analytics, cybersecurity, and automation.

The theme of this year's conference is "Securing Transportation Cyber-Physical Systems." Transportation systems are rapidly evolving due to the advancement of new connected and automated vehicle (CAV) technologies. However, the shift toward a CAV-centered cyber-physical system (CAV-CPS), with vehicle-to-everything (V2X) connectivity, will increase the size of the cyber-attack surface. Cyber-attacks to a CAV-CPS could have devastating consequences if the system is poorly secured. Our C^{2}M^2 researchers are working on the development of new methods and strategies that will enable a secure CAV-CPS where privacy, safety, and security countermeasures complement and strengthen each other.

On behalf of the C^{2}M^2 Board of Directors, I would like to thank all of our supporting organizations. We could not have put this conference together without their generosity. We would also like to thank the sponsors, moderators, speakers, faculty and student poster presentation participants, our advisory board members, and the many volunteers who helped organize and host this conference.

Mashrur "Ronnie" Chowdhury, Ph.D., P.E., F.ASCE
Eugene Douglas Mays Professor of Transportation
Director, USDOT Center for Connected Multimodal Mobility (C^{2}M^2)
Co-Director, Complex Systems, Analytics and Visualization Institute (CSAVI)
Clemson University, South Carolina

C^{2}M^2: www.cecas.clemson.edu/C2M2/
CSAVI: www.clemson.edu/centers-institutes/csavi/

Friday, October 18, 2019

7:00 am - 8:00 am

Registration and Continental Breakfast
Grand Ballroom, Madren Center

8:00 am - 8:15 am

Welcome & Opening Remarks
Dr. Jesus M. de la Garza
Professor & Department Chair
Glenn Department of Civil Engineering
Auditorium, Madren Center

8:15 am - 10:00 am

C^2M^2 Speakers
Auditorium, Madren Center

8:15 am - 9:00 am

Dr. Mashrur "Ronnie" Chowdhury
Eugene Douglas Mays Professor of Transportation
Director, Center for Connected Multimodal Mobility (C^2M^2)
"Security of Connected and Automated Vehicles in a Cyber-physical System Environment"

9:00 am - 9:15 am

Dr. Dimitra Michalaka
Associate Professor, The Citadel
Co-Director, Center for Connected Multimodal Mobility (C^2M^2)

9:15 am - 9:30 am

Dr. Nathan Huynh
Associate Professor, University of South Carolina
Co-Director, Center for Connected Multimodal Mobility (C^2M^2)

9:30 am - 9:45 am

Dr. Judith Mwakalonge
Assistant Professor, South Carolina State University
Co-Director, Center for Connected Multimodal Mobility (C^2M^2)

9:45 am - 10:00 am

Dr. Gurcan Comert
Associate Professor, Benedict College
Co-Director, Center for Connected Multimodal Mobility (C^2M^2)

10:00 am - 10:30 am

Morning Break - Poster Session
Grand Hallway, Madren Center

10:30 am - 11:30 am

Keynote Speaker
Dr. Bhavani Thuraisingham
Founders Chair Professor of Computer Science
Executive Director of the Cyber Security Research and Education Institute, University of Texas at Dallas
"SecAI: Integrating Cyber Security and Artificial Intelligence for Internet of Transportation and Infrastructure Applications"
Auditorium, Madren Center

Friday, October 18, 2019

11:30 am - 1:15 pm

Lunch and Student Poster Presentation
Grand Ballroom, Madren Center

1:30 pm - 2:30 pm

Featured Speaker
Jennifer Oswalt Rhoades, P.E.
Assistant State Traffic Management Engineer, SCDOT
"Intelligent Transportation Systems Infrastructure in South Carolina"
Auditorium, Madren Center

2:30 pm - 2:45 pm

Afternoon Break - Announcement of Winners of the Student Poster Session
Grand Hallway, Madren Center

3:00 pm - 4:30 pm

Connected and Automated Vehicle Technology Demonstration
Offsite Location - Shuttles will depart from Madren Conference Center's main entrance starting at 3:00 pm, returning by 4:45 pm, to the SC Botanical Garden, adjacent to the Bob Campbell Geology Museum.

4:30 pm

Conference Ends

Poster Presentations

1. **Application of Attribution Theory to Predict Drivers' Cognitive Behavior at Highway Intersection**
Samia Akter, South Carolina State University (SCSU); Md Mahmud Hasan Mamun, SCSU; Judith Mwakalonge, SCSU; Saidi Siuhi, SCSU; and Gurcan Comert, Benedict College

2. **Real-Time Traffic Assessment at the Railroad Grade Crossing**
Feng Guo, University of South Carolina (USC); Yu Qian, USC; Yi Wang, USC; and Dimitris Rizos, USC

3. **Adversarial Attacks on Deep Neural Network of Autonomous Vehicle**
Mhafuzul Islam, Clemson University (CU); and Mashrur Chowdhury, CU

4. **Damage Quantification for Bridge Inspections using Unmanned Aerial Systems**
Ajay Jadhav, Clemson University (CU); and Joseph Burgett, CU

5. **Simulation-Optimization Platooning Model for Fuel Savings of a Fleet of Commercial Autonomous Trucks**
Dahui Liu, Clemson University (CU); Burak Eksioglu, CU; Matthias Schmid, CU; Nathan Huynh, University of South Carolina; and Gurcan Comert, Benedict College

6. **Infrastructure and Policy Needs for Personal Electric Mobility Devices in a Connected Vehicle World**
Md Mahmud Hasan Mamun, South Carolina State University (SCSU); Judith Mwakalonge, SCSU; Saidi Siuhi, SCSU; and Jae-Dong Hong, SCSU

7. **Distracted Walking Countermeasures on Pedestrian Walking Behavior**
Isa Musa, South Carolina State University (SCSU); Md Mahmud Hasan Mamun, SCSU; Judith Mwakalonge, SCSU; Saidi Siuhi, SCSU; and Gurcan Comert, Benedict College

8. **Design and Analysis of Freight Networks with Capacitated Intermodal Facilities and Horizontal Carrier Collaboration**
Bhavya Padmanabhan, University of South Carolina (USC); Vishal Badyal, Clemson University (CU), Nathan Huynh, USC; and William Ferrell, CU

9. **Assessment of Autonomous Vehicles Sharing for Evacuation and Disaster Relief**
Thomas Shirley, Clemson University (CU); Pamela Murray-Tuite, CU; Nathan Huynh, University of South Carolina; and Gurcan Comert, Benedict College

10. **DSRC Security Verification**
Fei Sun, Clemson University (CU); and Richard R. Brooks, CU

11. **Construction of a Large Dataset for Daytime and Nighttime Vehicle Classification**
Michael Tadese, Benedict College (BC); Ediomo Elijah BC; Montogemery King, BC; Meriem Abdi, BC; Hiwot Tadesse, BC; Ephrem Kidane, BC; Yohanna Mejia, University of South Carolina (USC); Nathan Huynh, USC; Robert Mullen, USC; John Rose, USC; Balaji, Iyangar, BC; and Gurcan Comert, BC

12. **Assessing Potential of Bike Share Networks and Active Transportation to Improve Urban Mobility, Physical Activity, and Public Health Outcomes in South Carolina**
Anthony Troiani, The Citadel; Christian Seidler, The Citadel; Kweku Brown, The Citadel; William J. Davis, The Citadel; Morgan Hughey, College of Charleston; and Dimitra Michalaka, The Citadel

13. **A Surrogate Approach for Estimating Vehicle-related Emissions under Heterogeneous Traffic Patterns**
Yungteng Zhang, University of South Carolina (USC); Nathan Huynh, USC; Gurcan Comert, Benedict College; and Yuche Chen, USC

14. **Detection of False Data Injection Attack in Connected Vehicles via Cloud-based Sandboxing**
Chunheng Zhao, Clemson University (CU); Jasprit Gill, CU; Gurcan Comert, Benedict College; and Pierluigi Pisu, CU

15. **Safety Effectiveness Evaluation of Rural Roundabout Conversions at Predominantly Skewed Intersections in South Carolina**
Fengjiao Zou, Clemson University (CU); and Jennifer Ogle, CU

Biography of Dr. Bhavani Thuraisingham
Keynote Speaker

Dr. Bhavani Thuraisingham is the Founders Chair Professor of Computer Science and the Executive Director of the Cybersecurity Research and Education Institute at the University of Texas at Dallas. She is also a visiting Senior Research Fellow at Kings College, University of London and an elected Fellow of the ACM, IEEE, the AAAS, the NAI, and the BCS. Her research interests are on integrating cybersecurity and artificial intelligence/data science for the past 34 years (where it used to be computer security and data management).

She has received several awards including the IEEE CS 1997 Technical Achievement Award, ACM SIGSAC 2010 Outstanding Contributions Award, the IEEE Comsoc Communications and Information Security 2019 Technical Recognition Award, the IEEE CS Services Computing 2017 Research Innovation Award, the ACM CODASPY 2017 Lasting Research Award, the IEEE ISI 2010 Research Leadership Award, and the ACM SACMAT 10 Year Test of Time Awards for 2018 and 2019 (for papers published in 2008 and 2009).

She co-chaired the Women in Cyber Security Conference (WiCyS) in 2016 and delivered the featured address at the 2018 Women in Data Science (WiDS) at Stanford University and has chaired several conferences for ACM and IEEE.

Her 39 year career includes industry (Honeywell), federal research laboratory (MITRE), US government (NSF) and US Academia. Her work has resulted in 130+ journal articles, 300+ conference papers, 140+ keynote and featured addresses, six US patents, fifteen books as well as technology transfer of the research to commercial and operational systems. She received her Ph.D. from the University of Wales, Swansea, UK, and earned a higher doctorate (D. Eng) from the University of Bristol, UK.

Notes