

# TraCR ADVANCES

FALL 2023



## Director's Message

We are pleased to present the first newsletter from the National Center for Transportation Cybersecurity and Resiliency, or TraCR. TraCR is a U.S. Department of Transportation (USDOT) National University Transportation Center (UTC), which was established this year with Clemson University as its lead institution. TraCR's goal is to defend our nation's transportation systems from cyberattacks, including threats which are known today as well as those that will appear in the future. Our goal is to create defenses against cyberattacks and to develop resilient transportation infrastructure that can function and rebound when attacks do occur.

We will deliver updates on our ongoing activities through this quarterly newsletter. In this first issue, we have some exciting updates to share. These include notes from our associate directors, who are housed at the partner institutions in the TraCR consortium; information on talks delivered by several expert professionals as part of our "Scholar Webinar Series"; updates on future TraCR events; information about our first call for research proposals seeking ideas to strengthen the nation's cyberdefenses; and recognition of some of the achievements of our team members. These initiatives are putting TraCR on track to becoming a globally recognized innovation center in cybersecurity.

Under the guidance recently laid out by the USDOT, our focus this year will be on funding research that impacts current and future transportation cybersecurity practices. We have especially sought proposals for projects emphasizing technology transfers from our activities to transportation agencies, the transportation industry, and our communities. We are also excited about our future work with a wide-ranging group of industry partners who will collaborate with the academic researchers at our member institutions. Finally, we have been fortunate to host three eminent scholars through our Scholar Webinar Series, which provides researchers and students from our partner and other institutions access to cutting-edge transportation technology and policy research.

One of TraCR's special focuses is on offering courses, research opportunities, and mentoring programs at consortium institutions. TraCR's education and workforce development programs will help to train the next generation of cybersecurity experts. In sum, TraCR strives to make a lasting impact on current and future transportation systems to contribute to the safety and security of our nation.



**Dr. Mashrur "Ronnie" Chowdhury**

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# Meet the ASSOCIATE DIRECTORS



TraCR has a team of distinguished professors from our partner institutions who act as our associate directors. They are involved in all aspects of the center's research, education, training, and technology transfer activities. Our associate directors bring a wealth of resources, past track records of research excellence, and demonstrated leadership in the transportation cybersecurity and resiliency fields. This will help the center to foster breakthrough ideas, innovations, and transformative research solutions for transportation cybersecurity problems.



## **Dr. Hadi Amini – Florida International University**

I am very excited to collaborate with the outstanding TraCR researchers on novel solutions that strengthen our transportation infrastructure against cyber-physical attacks. We will do so in part by developing secure and privacy-preserving machine learning algorithms for connected and autonomous vehicles. Our transdisciplinary research portfolio in this arena will help to create more secure and resilient intelligent transportation systems.

## **Dr. Alvaro Cardenas – The University of California, Santa Cruz**

As AI agents become more pervasive in our transportation infrastructures, we need different areas of expertise to operate these systems safely and securely. Our interdisciplinary team of researchers in AI, formal methods, and security has the background to address the challenges of building secure and resilient intelligent transportation systems. Participating in TraCR is a great opportunity and a recognition of the talent and research at the University of California, Santa Cruz.



## **Dr. Gurcan Comert – Benedict College**

We are happy to be a partner institution in TraCR, and we look forward to working with transportation and cybersecurity experts in this center. Our collaborations will shape our students' learning and the programs at the college, ultimately leading to a well-prepared workforce for the nation's cybersecurity.

# Meet the ASSOCIATE DIRECTORS

## **Dr. Mansoureh Jeihani – Morgan State University**

Being on the cutting edge of connected vehicle technology, my colleagues and I at Morgan State are greatly encouraged by the high-quality research being pursued in the cybersecurity domain. The efforts underway at TraCR help guarantee that connected vehicles will be secure, enabling users to fully harness the potential of this new digital infrastructure.



## **Dr. Steve Jones – The University of Alabama at Tuscaloosa**

In addition to exploring such technical topics as quantum computing applications and the security of vehicle navigation systems, we at the University of Alabama and the Alabama Transportation Institute are excited to bring a policy perspective to TraCR's transportation cybersecurity research.



## **Dr. Judith Mwakalonge – South Carolina State University**

It is exciting to be a part of TraCR in order to address the cybersecurity vulnerabilities associated with transportation systems. The multi-disciplinary team is well-suited to operate at the frontier of transportation cybersecurity research.



## **Dr. Bhavani Thuraisingham – The University of Texas at Dallas**

We are honored and pleased to be part of such an exciting and intellectually challenging project. Over the years, we have developed strong cybersecurity and privacy expertise. We look forward to contributing to TraCR, and collaborating with, and learning from, our project partners. This is a great opportunity for all of us.



## **Dr. Satish Ukkusuri – Purdue University**

We look forward to developing an interdisciplinary agenda for solving the nation's transportation cybersecurity and resiliency issues. With the expertise of TraCR, we want to develop foundational tools and applications that will keep us ahead of the threats to transportation, help us to understand these threats' impacts, and improve our decision-making. We are looking forward to creating new workforce development and technology transfer programs with the amazing partnerships that we have in place.





# Research SPOTLIGHT

## A Regulatory Gap Analysis in Transportation Cybersecurity and Data Privacy

**Hockstad, T., Rahman, M., Jones, S., Chowdhury, M.**

Accepted for Presentation at the TRB Annual Meeting,  
January 2024, Washington, D.C.



Given the increasing number and severity of cyberattacks on critical infrastructure systems, cybercrime poses a potentially devastating threat to the transportation sector. In response to this problem, our research assessed U.S. transportation cybersecurity legal frameworks, regulations, and policies – and found significant shortcomings. Varying state regulations mean some states are behind, and gaps in federal and state policies are resulting in inadequate focus on major issues such as third-party vendor liability, cybersecurity tools, and supply chain risk management. Despite some laws addressing workforce development, ransomware, and cybersecurity-related privacy issues, the low rate of passage of such bills by Congress and the state legislatures, compared with the total number of bills proposed, signals an urgent issue. Our analysis identifies specific points of breakdown leading to communication gaps, and provides two recommendations to remedy existing vulnerabilities. First, we recommend the establishment of a national entity, led by the American Association of State Highway and Transportation Officials (AASHTO), which would develop comprehensive national policies and standards for transportation cybersecurity and privacy. Second, we advise implementing a nationwide, mandatory testing and certification process for the cybersecurity of multimodal transportation systems, including hardware and software security. These actions are essential in order to prioritize cybersecurity in the ever-evolving landscape of computerized transportation systems, and to address the growing threats from entities ranging from individual hackers, to criminal gangs, to hostile states.

# Upcoming EVENTS & Recorded WEBINARS

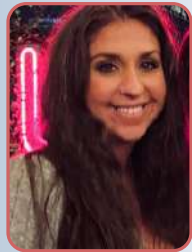
## Transportation Research Board 2024 Annual Meeting



The Transportation Research Board (TRB) is a leading organization in transportation research and provides valuable resources and expertise to transportation professionals and policymakers worldwide. TRB's Annual Meeting attracts thousands of transportation professionals from around the world. The program covers all transportation modes, with sessions and workshops addressing topics of interest to policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions.

**Find more information and register here!**

## Recorded WEBINARS



### A REGULATORY GAP ANALYSIS IN TRANSPORTATION CYBERSECURITY

**Trayce Hockstad, J.D.**

Legal Research Associate

University of Alabama Transportation Policy Research Center



### DEEP LEARNING FOR SCIENCE AND ENGINEERING

**Feng Luo, Ph.D.**

Marvin J. Pinson, Jr. '46 Distinguished Professor  
Clemson University



### SIMPLE ANALYTICAL MODELS FOR ESTIMATING THE QUEUE LENGTHS FROM PROBE VEHICLES AT TRAFFIC SIGNALS II: A COMBINATORIAL APPROACH FOR NONPARAMETRIC MODELS

**Gurcan Comert, Ph.D.**

Associate Professor, Benedict College

As part of our workforce development/training activities, TraCR hosts monthly webinars from transportation experts. We initiated our series with an inaugural webinar from Ms. Trayce Hockstad from the University of Alabama at Tuscaloosa, who discussed our collaborative work.

**Watch the recordings here and keep an eye out for future ones!**

# ACHIEVEMENTS



Dr. Hadi Amini was awarded the **2023 Florida International University Faculty Excellence in Teaching Award**. This honor recognizes Dr. Amini's exceptional performance as an educator, including his passion for bringing research into the classroom. Dr. Amini has contributed significantly to developing new courses at Florida International University's Knight Foundation School of Computing and Information Sciences. These include courses on Optimization for Computing and Applied Linear Structures, along with a new course currently in development for the data science program.

Dr. Bhavani Thuraisingham was recognized with the **2023 Taylor L. Booth Education Award from the IEEE Computer Society**. The award includes a medal and a \$5,000 honorarium. The award recognizes Dr. Thuraisingham's "outstanding leadership in cyber security education and data science education as well as mentorship of members of systemically marginalized groups." The award is given in honor of Dr. Taylor Booth, who was a professor of computer science and engineering at the University of Connecticut and was director of the university's Computer Applications and Research Center.



Dr. Ronnie Chowdhury was awarded the **2023 IEEE Big Data Security Leadership Award** at the 9th IEEE International Conference on Big Data Security on Cloud (IEEE BigDataSecurity 2023). The award recognizes Dr. Chowdhury "for his exceptional leadership in heading the USDOT University Transportation Centers - Center for Connected Multimodal Mobility and the National Center for Transportation Cybersecurity and Resiliency - and for his formidable vision for integrating Cyber Physical Systems with Big Data and Machine Learning for Transportation Systems Security."

## Student Recognition

Jiawei Xue, a Ph.D. candidate in the research group of TraCR Associate Director Dr. Satish V. Ukkusuri, won the **Eldon Yoder Award** at Purdue University. This award is presented to an outstanding graduate student in transportation engineering. His research focuses on transportation engineering, urban science, and machine learning. Congratulations Jiawei!







**Dr. Chowdhury with the students of the  
Hickory Tavern Middle School**

## **Hickory Tavern Middle School Visit**

In collaboration with the Center for Connected Multimodal Mobility (C2M2), TraCR hosted a technology demonstration for a group of Hickory Tavern Middle School students on September 6th, 2023. The day started with a presentation from Dr. Ronnie Chowdhury, the director of both TraCR and C2M2. Students were introduced to transportation cyber-physical-social systems (TCPSS) and self-driving cars. The students learned about:

- (1) hybrid classical-quantum deep learning models to detect adversarial attacks that affect the performance of the traffic sign detection module of autonomous vehicles,
- (2) virtual traffic signal control with cloud-based quantum computers, and
- (3) distributed machine learning models for environmental emission detection with unmanned aerial vehicles. Students also gained autonomous vehicle user experience through virtual reality.

# CONTACTS

## That's It for Now!

Stay tuned for our next newsletter in the winter of 2024.  
In the meantime, please follow us on our social media pages, including  
Twitter, LinkedIn, and YouTube.



### **Mashrur "Ronnie" Chowdhury, Ph.D., P.E., F. ASCE**

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