UNIVERSITY OF HOUSTON

UTC 1987 2026

CYBER-CARE Annual Symposium 2024

Safeguarding Transportation Cybersecurity in the Digital Age

UNIVERSITY OF HOUSTON · EMBRY-RIDDLE Aeronautical University · RICE · TEXAS A&M UNIVERSITY CORPUS CHRISTI · University of CINCINNATI · UNIVERSITY of HAWAI'I MĀNOA

Welcome Message from

Yunpeng (Jack) Zhang, Director of the US DOT UTC CYBER-CARE

Dear Colleagues and Friends,

It's my sincere pleasure to welcome you to the 2024 CYBER-CARE Symposium! As Center Director of the CYBER-CARE, a Department of Transportation Tier 1 University Transportation Center (UTC) Center, I'm excited to have you here for this event, themed **"Safeguarding Transportation Cybersecurity in the Digital Age."**

Having spent a significant part of my career working in cybersecurity for critical infrastructures at leading institutions and now as an associate professor and researcher at the University of Houston, my mission has always been to ensure the safety of our nation's transportation and infrastructure systems. This symposium represents the culmination of that passion, and it brings together the brightest minds from academia, government, industry and NGO to confront the complexities of transportation cybersecurity in today's digital era.

As we gather over the next three days, I encourage you to fully engage in the insightful discussions, innovative presentations, and posters that our distinguished speakers and students have prepared. These sessions are designed not only to expand your knowledge but to inspire new perspectives and collaborations, fostering a shared vision of a safer and more resilient transportation future.

Cybersecurity is an ever-evolving field, and securing transportation systems requires a multidisciplinary approach. At CYBER-CARE, we are committed to tackling these issues by combining advanced research with practical, scalable solutions. With the support of the Department of Transportation and our research partners, our center has made significant strides in advancing cybersecurity technologies that can protect critical infrastructure against increasingly sophisticated threats.

A heartfelt thanks to the US DOT UTC, our speakers, volunteers, and you, our participants. Your presence underscores our shared mission in advancing the field of transportation cybersecurity. I look forward to the dynamic exchanges and innovative solutions that will emerge during this event.

Once again, welcome to the 2024 CYBER-CARE Symposium. Let's make this an event to remember!

Warm regards,
Yunpeng (Jack) Zhang, Ph.D.
Center Director, the US DOT UTC CYBER-CARE
University of Houston

Organizing Committee

Dr. Lu Gao, University of Houston

Dr. Jack Zhang, University of Houston

Dr. Zhu Han, University of Houston

Dr. Kailai Wang, University of Houston

Dr. Yongxin Liu, Embry-Riddle Aero. University

Dr. Arlei Silva, Rice University

Dr. Carlos Rubio Medrano, Texas A&M University

Dr. Richard Li, University of Cincinnati

Dr. Guohui Zhang, University of Hawaii

Keynote Presentations

Ryan Wright, Ph.D., M.B.A.
Professor and Senior Associate Dean for Faculty and Research at University of Virginia

Title: The Human Firewall: Preventing Cyber Threats in a Digitally Connected Transportation World

Abstract
As U.S. infrastructure becomes increasingly reliant on digital systems, it faces growing threats from both criminal organizations and state actors. These adversaries exploit human vulnerabilities through sophisticated social engineering tactics, often bypassing technical defenses. In this talk, we will explore the current state of cyberattacks, particularly focusing on the rise of ransomware and its devastating effects on critical infrastructure. Drawing from research conducted in the Human Firewall Project, we will examine why traditional cybersecurity training is often ineffective or even counterproductive. The session will also offer insights into how organizations can better protect themselves by adopting more human-centric and mindfulness-based approaches to security training. By reframing how we approach user behavior and organizational design, we can build stronger defenses against social engineering attacks.

Biography
Ryan Wright is the C. Coleman McGehee Professor of I.T. and the Senior Associate Dean of Faculty and Research at the McIntire School of Commerce. Professor Wright's research interests include cybersecurity, privacy, and the diffusion of innovations. He has over 80 publications in outlets such as *MIS Quarterly*; *Information Systems Research*; *Journal of the AIS*; and *Journal of MIS*. He has also garnered funding from the National Science Foundation, the state of Massachusetts, and the state of Virginia. His research has been featured in *Harvard Business Review; The Washington Post; Forbes; Seattle Post-Intelligencer; The Australian; USA Today; Fast Company*; *Psychology Today*; and many other outlets. He has presented his research for several practitioner groups, including TEDx, the Salesforce Foundation, and the Association for Finance and Technology.

Keynote Presentations

James Tsai, Ph.D., P.E.
Professor at Georgia Institute of Technology

Title: Autonomous Intelligence Using Low-cost Smartphone and AI Technologies for Safeguarding Transportation Safety and Cybersecurity

Abstract: Transportation safety concerns and mobility breakdowns can result from natural disasters, such as hurricanes, and man-made mistakes. In future connected communities with automated vehicles (CAVs), these events have the potential to cause system-wide mobility breakdowns, leading to serious cybersecurity threats. An intelligent safeguard system is urgently needed to address current transportation safety challenges and future cybersecurity risks. This talk discusses a developed transportation safety and cybersecurity system utilizing "Autonomous Intelligence" and low-cost smartphone AI technology. Additionally, traffic fatalities, particularly on curved roadways, are a high-priority concern for U.S. transportation agencies. The MUTCD (Manual on Uniform Traffic Control Devices) mandates warning signs and advisory speeds, but changing road conditions or missing signs can compromise safety. Agencies often respond only after accidents occur, highlighting the need for an intelligent system to monitor road conditions and signage in real-time, preventing fatalities and enhancing overall roadway safety.

This talk will present an innovative methodology and system that uses "Autonomous Intelligence" to make transportation agencies aware of roadway changes that cause dangerous situations on roadways (e.g., sign locations not meeting MUTCD requirements). The methodology and system use low-cost smartphones, AI, and interagency crowdsourcing technologies to enhance roadway safety (especially curve safety) and which have been developed through research projects sponsored by the NCHRP Innovation Deserving Exploratory Analysis (IDEA), the National Science Foundation, and State DOTs. The methodology and system leverage the widespread availability and affordability of smartphones to develop solutions that monitor and improve driver behavior, detect road signage and other traffic condition issues, and provide real-time feedback. Future research on using Autonomous Intelligence to provide transportation cybersecurity and roadway safety will be discussed.

Biography: Dr. Tsai, prior to joining Georgia Tech, worked as a senior research scientist at the GIS center for 10 years. Since 1997, he has led a team collaborating with GDOT engineers to develop and implement an Oracle GIS-based pavement preservation system managing 18,000 miles of highways. His research includes AI, sensor technologies, and autonomous systems for transportation, enhancing asset management and road safety. Notably, his work on sign inventory and pavement condition evaluation won the 2017 AASHTO High Value Research Award. He has led over $3.5M in research, with projects sponsored by USDOT and NAS, and holds a professional engineering license.

Conference Schedule

Most events (unless indicated) will be held at Student Center South, University of Houston. Each speaker in lectern sessions will have 15 minutes for the presentation including Q & A

Day 1 (Thursday) | October 17th, 2024	
5:00 PM – 7:00 PM (Heights Room-224)	**Registration & Reception**
Day 2 (Friday) | October 18th, 2024	
7:15 AM - 4:00 PM (2nd Floor Ticket Booth)	**Registration**
7:30 AM - 9:00 AM (Houston Room-220)	**Breakfast**
8:15 AM - 8:40 AM (Houston Room-220)	**Opening Ceremony** Welcome Remarks by **Leaderships**, [Host: **Dr. Lu Gao,** University of Houston] **Dr. Claudia M Neuhauser**, VPR, University of Houston **Dr. George Zouridakis**, IST Department Interim Chair, University of Houston **Dr. Jack Zhang**, University of Houston
8:40 AM - 9:20 AM (Houston Room-220)	**Keynote Presentation** [Moderator: **Dr. Jack Zhang**, University of Houston] • **Dr. Ryan Wright**, McIntire School of Commerce, University of Virginia Title: The Human Firewall: Preventing Cyber Threats in a Digitally Connected Transportation World
9:20 AM- 10:20 AM (Houston Room-220)	**Keynote panel discussion: Securing Transportation Cybersecurity in the Digital Age** [Moderator: **Dr. Yu Zhang**, University of South Florida] • **Dr. Hao Wang,** Rutgers University • **Dr. Mashrur Chowdhury ,** Clemson University (online) • **Dr. Yunlong Zhang**, Texas A&M University • **Dr. Zeb Bowden,** Virginia Tech Transportation Institute • **Dr. Wei Zhang,** the U.S Department of Transportation • **Dr. Zhu Han**, University of Houston
10:20 AM - 10:35 AM (Houston Room-220)	**Coffee Break**
10:35 AM – 12:00 PM (Houston Room-220)	**Lectern Session 1: Cybersecurity in Smart Cities and Transportation Systems** [Moderator**: Dr. Zia U Din**, University of Houston] • **Dr. Peggy Lindner,** University of Houston Train the Trainers: Next-Gen Data Science Leaders in Cybersecurity for Underrepresented Communities • **Dr. Kinam Kim,** University of Houston IoT-enabled Work Zone Proximity Safety System

	• **Dr. Yongxin Liu**, Embry-Riddle Aeronautical University Extending SUMO for Cyber Attack Simulation on Urban Transportation Systems: A Case Study of Daytona Beach • **Dr. Xinyue Ye**, Texas A&M University Urban Digital Twins: Enhancing Cybersecurity and Resilience in Transportation systems
12:00 PM - 1:30 PM (Houston Room-220)	**Lunch Break**
1:30 PM - 2:10 PM (Houston Room-220)	**Keynote Presentation** [Moderator: **Dr. Jack Zhang**, University of Houston] • **Dr. Yi-Chang James Tsai**, Georgia Institute of Technology Autonomous Intelligence Using Low-cost Smartphone and AI Technologies for Safeguarding Transportation Safety and Cybersecurity
2:10 PM - 3:30 PM (Third War Room-212)	**Panel Discussion: Managing University Transportation Centers: Best Practice, Lessons Learned, and Future Recommendations** [Moderator: **Dr. Jack Zhang**, University of Houston] • **Dr. Chandra R.Bhat**, University of Texas at Austin (online) • **Dr. Constantine Tarawneh,** University of Texas Rio Grande Valley (online) • **Dr. Guang Tian**, University of New Orleans • **Dr. Judy A. Perkins**, Prairie View A&M University • **Dr. Kaan Ozbay,** New York University (online) • **Dr. Karen Philbrick**, San José State University • **Dr. Kevin Heaslip II,** University of Tennessee, Knoxville • **Dr. Mansoureh Jeihani**, Morgan State University (online) • **Dr. Mashrur Chowdhury ,** Clemson University (online) • **Dr. Musharraf Zaman,** University of Oklahoma • **Dr. Qisheng Pan**, University of Texas at Arlington (online) • **Dr. Yinhai Wang**, University of Washington (online) • **Dr. Yu Zhang**, University of South Florida
2:10 PM –3:30 PM (Houston Room-220)	**Lectern Session 2: Resilience and IoT in Cybersecurity** [Moderator: **Dr. Yongxin Liu**, Embry-Riddle Aeronautical University] • **Dr. Carrie Sturts Dossick**, University of Washington Building Cybersecurity Resilience in Public Agencies • **Dr. Zheyong Bian**, University of Houston A Risk Analysis Framework for Non-Destructive Inspection Intervals for Rail Defects • **Dr. Zia U Din**, University of Houston Remote AR Inspections to Enhance Safety • **Dr. Hanyi Yang**, University of Hawaii at Manoa A Rivals Competition-Based Reinforcement Learning Method for Traffic Signal Control to Prevent Cybersecurity Attacks on Connected and Automated Vehicles
3:30 PM – 3:45 PM (Houston Room-220)	**Coffee Break**

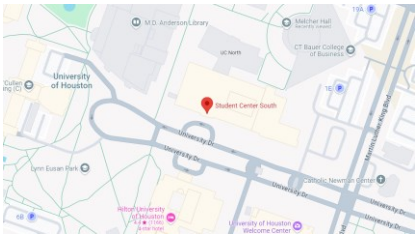
3:45 PM – 4:45 PM (Houston Room-220)	**Lectern Session 3: Vulnerabilities and AI in Transportation Systems** [**Moderator: Dr. Kailai Wang,** University of Houston] • **Dr. Fanxin Kong**, University of Notre Dame Vulnerability Analysis and Attack Response for Autonomous Vehicles • **Dr. Zhixia Li & Dr. Heng Wei**, University of Cincinnati Framework for Identifying Vulnerabilities and Enhancing Resilience of Cyber-Physical Operations in Connected Work Zones • **Dr. Abbas Sheykhfard,** Texas Southern University Crash Proneness among Freight Vehicle Drivers: Insights and Strategies
3:30 PM – 5:00 PM (Multipurpose Room- 237)	**Student Poster Competition**
5:05 PM - 5:30 PM (Houston Room-220)	**Awards Ceremony & Closing Remarks** Host: **Dr. Lu Gao** Closing Remarks**: Dr. Jack Zhang**
6:30 PM onwards	**Dinner at Eric's** The dinner will take place at 4450 University Dr, Houston, TX 77204, on the first floor of the Hilton University of Houston. Please note that while breakfast, lunch and snacks will be provided during the event, dinner will be at the attendee's own expense.
Day 3 (Saturday) | October 19th, 2024	
8:00 AM	Meet at University of Houston, Student center South
8:15 AM	Depart from University of Houston, drive to Rice University (15-20 minutes)
8:35 AM - 10:30 AM	Rice University Campus Tour and Exploration
10:30 AM - 10:45 AM	Wrap Up and Depart from Rice University
11:30 AM	11:30 AM – Arrive at NASA Johnson Space Center
12:30 PM - 1:15 PM	**Lunch**
2:15 PM - 3:45 PM	Explore Remaining Exhibits
3:45 PM	Depart from NASA Johnson Space Center
4:30 PM - 4:45 PM	Return to University of Houston

List of Student Posters

1. **"Optimizing Digital Twin Synchronization for Autonomous Systems with iterative RL-VLM"**, Abdolazim Rezaei, Texas A&M University Corpus Christi
2. **"Addressing System Security Concerns in Autonomous Vehicle Adoption: A Heterogeneous Analysis Using Generalized Random Forests"**, Behnam Sabzi, Industrial Engineering, University of Houston
3. **"Patterns of Safety Effect Caused by Cyberattacks (Falsified Red Light Countdown) at a Connected Intersection"**, Chen Chen, University of Cincinnati Department of Civil & Architectural Engineering & Construction
4. **"Domain-Adaptive Graph Anomaly Detection: GADT3 Framework for Cross-Domain Applications"**, Delaram Pirhayatifard, Rice University
5. **"A Comparative Analysis of Machine Learning-Based Intrusion Detection Systems for Intra-Networks"**, Mahsa Tavasoli, North Carolina A&T University
6. **"Securing Cyber-Physical Systems: Vulnerability Analysis, Adaptive Attack Detection, and Recovery Methods"**, Mengyu Liu, University of Notre Dame

7. **"Leveraging Mentorship Platforms for Workforce Development in Transportation Cybersecurity"**, Narayan Soni, University of Houston
8. **"Building Cybersecurity Resilience in Public Agencies"**, Ori Borjigin, University of Washington
9. **"Optimized Eco-Driving Strategy for Sustainable Intelligent Transportation System"**, Paul Clement Akpabio, Institute of Transportation Research
10. **"Evaluating the Impact of Pavement Conditions on Road Safety by Analyzing Crash Frequency and Severity"**, Prathyush Kumar Reddy Lebaku, University of Houston
11. **"Securing Construction Digital Models with AI-VERIFY: AI-Enabled Compliance Verification"**, Soumya Madireddy, University of Houston
12. **Implications of Speed Management-Related Safety Countermeasures on Air Quality"**, Ting Lei, Texas Southern University
13. **"Enhancing Cybersecurity in Advanced Traffic Management Systems by Detecting Evasion and False Data Injection Attacks"**, Venkata Naga Sai Ram Nomula, University of Houston
14. **"Modeling Dynamic Vehicle-Driver Complex Behaviors at Signalized Intersections Under Cyberattacks"**, Yifan Xu, University of Cincinnati
15. **"Enhancing CV Safety via a Trajectory-Forecasting-Based Cyberattack Warning System"**, Yingfan Gu, University of Cincinnati
16. **"Recognition Technique of Adversarial Robustness Enhancement for Transportation Cybersecurity in Remote Sensing Observation"**, Yuhao Wang, University of Houston
17. **"Secure, Usable and Practical Authentication for the Internet of Things"**, Kyu In Lee, University of Houston
18. **"A Risk Analysis Framework for Non-Destructive Inspection Intervals for Rail Defects"**, Yanjie Yi, University of Houston
19. **"Enhancing IoT Access Control with Risk-Adaptive Blockchain Configuration"**, Mahdi Manavi, University of Houston
20. "**A Multi-layered Detection Framework for Cyber-attacks on the Electric Vehicle Charging Process**", Changjian Zhang, University of Hawaii at Manoa
21. "**Studying Cascading Failures in Traffic Systems with Connected Autonomous Vehicles: A High-Resolution Agent-Based Modeling and Simulation Approach**", Rajkumar Konka, University of Houston
22. **"Comparative Analysis of Approaches to Software Vulnerability Detection on High-quality Datasets",** Aayush Gupta, University of Houston
23. **"Explainable AI for Comparative Analysis of Intrusion Detection Models",** Pap M. Corea, Embry-Riddle Aeronautical University

Venue



Student Center South, 2nd Floor

Day 1: Reception Venue- Heights room-224
Day 2: Main Conference- Houston Room-220
Day 2: Poster Session- Multipurpose Room-237

Nearest Hotels

Hilton University of Houston
Hampton Inn Houston Downtown
Days Inn & Suites by Wyndham Downtown
Westin Downtown
Doubletree Downtown

Parking and Venue Information for CYBER-CARE Symposium

Venue:

Student Center South - Google Maps Link

Parking Options:

- **Welcome Center Student Garage (6-minute walk to the venue)**
  Google Maps Link

Parking Rates:

- 15 minutes: Free
- 30 minutes: $1
- 1 hour: $5
- 2 hours: $8
- 3 hours: $10
- 4 hours: $15
- 24 hours: $20

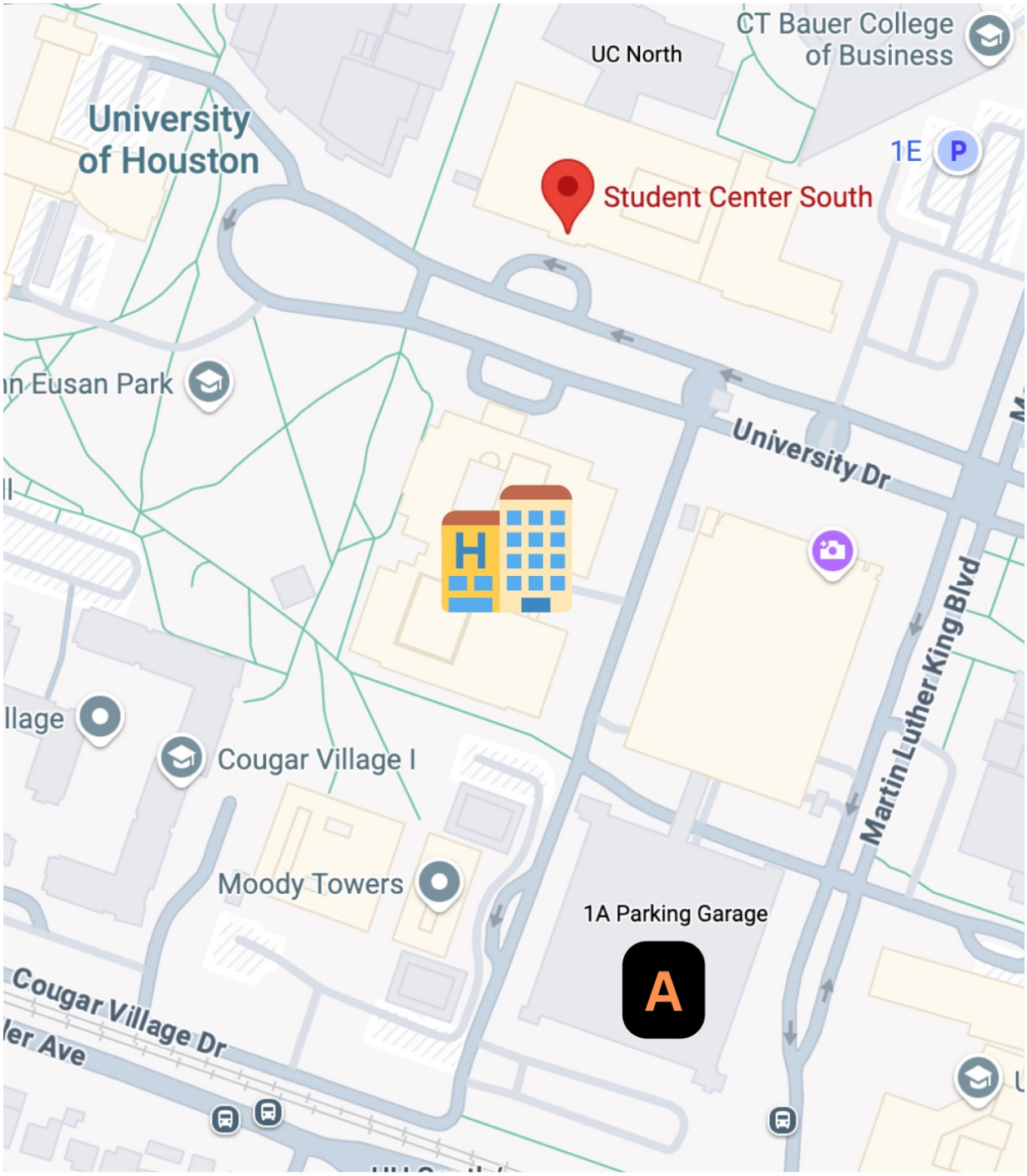
The Hilton Hotel is conveniently located directly in front of Student Center South:
Google Maps Link to Hilton Hotel

- **Hilton Hotel Parking Garage**
  - Day Pass: $20
  - Night Pass: $25
  - **Free Parking**: If you are dining at the Hilton Hotel, parking will be complimentary. Please ensure to validate your parking at the Hilton's reception desk.

Walking Directions:

- **From Hilton Hotel to Student Center South**:
  Google Maps Link

The Hilton Hotel is located in front of Student Center South, with a 2-3 minutes walk between the two.



Hilton, University of Houston: https://maps.app.goo.gl/oeCtBhs4YFQ8394r6

Welcome Center Garage: https://maps.app.goo.gl/6GJsTu8DujKFR1iK9

University Parking Garages: https://uh.edu/parking/_images/maps/all_garages_map.png