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Education and Employment

- August/2021–August/2023 **Postdoctoral Research Assistant**, *Civil Engineering*, Purdue University, West Lafayette, IN, USA.
Mentor: Dr. Yiheng Feng
- August/2016–August/2021 **Doctor of Philosophy**, *Computer Information and Technology*, Purdue University, West Lafayette, IN, USA.
Advisor: Dr. John A. Springer
Thesis: Adaptive safety and cyber security for connected and automated vehicle system
- May/2016–August/2016 **Unemployed.**
- August/2013–May/2016 **Master of Science**, *Mechanical Engineering Technology*, Purdue University, West Lafayette, IN, USA.
Advisor: Dr. Henry H. Zhang
- June/2013–August/2013 **Unemployed.**
- September/2009–June/2013 **Bachelor of Engineering**, *Electrical Engineering and Automation*, Huazhong University of Science and Technology, Wuhan, Hubei, China.
- June/2009–September/2009 **Unemployed.**
- September/2006–June/2009 **Highschool Diploma**, *Wuhan Foreign Languages School*, Wuhan, Hubei, China.

Publications

(Authors underline are students under my supervision and collaboration)

PAPERS UNDER REVIEW

- [1] Yuankai He, **Hanlin Chen** and Weisong Shi. Blue ICE - An Integrative Customizable Simulated Environment for Autonomous Driving *The Transportation Research Board (TRB) 102nd Annual Meeting (TRB)*, 2024. (under review)
- [2] **Hanlin Chen**, Vamsi K. Bandaru, Yilin Wang, Mario A. Romero, Andrew Tarko and Yiheng Feng. A Cooperative Perception System for Aiding CAVs Navigation and Improving Safety *The Transportation Research Board (TRB) 102nd Annual Meeting (TRB)*, 2024. (under review)
- [3] **Hanlin Chen**, Simin Chen, Wenyu Li, Wei Yang and Yiheng Feng. Impact Analysis of Inference Time Attack of Perception Sensors on Autonomous Vehicles. *The Transportation Research Board (TRB) 102nd Annual Meeting (TRB)*, 2024. (under review)

- [4] **Hanlin Chen**, Xiaolin Xu, Jeffrey Sun, Qilin Chen and Yiheng Feng. I know you changed your lane without seeing you: a lane change time estimation based on following vehicle's trajectory only. *The Transportation Research Board (TRB) 102nd Annual Meeting (TRB)*, 2024. (under review)
- [5] Ahmed Abdo, **Hanlin Chen**, Xuanpeng Zhao, Guoyuan Wu and Yiheng Feng. Cyber-security on Connected and Automated Transportation Systems: A Survey. *Journal OF IEEE Transactions on Intelligent Vehicles (IEEE-TIV)*, 2023. (second round review)

REFERRED JOURNAL PUBLICATIONS

- [6] Shuocheng Guo, **Hanlin Chen**, Mizanur Rahman and Xinwu Qian. DCA: Delayed Charging Attack on the Electric Shared Mobility System. *IEEE Transactions on Intelligent Transportation Systems (IEEE-TITS)*, 2023-8
- [7] Ziyang Tang, Xiang Liu, **Hanlin Chen**, John Jupy, Baijian Yang. Deep Learning Based Wildfire Event Object Detection from 4K Aerial Images Acquired by UAS *AI(AI)*, 2020.

PEER-REVIEWED CONFERENCE PAPERS

- [8] Simin Chen, **Hanlin Chen**, Mirazul Haque, Cong Liu and Wei Yang. The Dark Side of Dynamic Routing Neural Networks: Towards Efficiency Backdoor Injection *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023.
- [9] **Hanlin Chen**, Brian Liu, Xumiao Zhang, Feng Qian, Z. Morley Mao and Yiheng Feng. A Cooperative Perception Environment for Traffic Operations and Control *The Transportation Research Board (TRB) 102nd Annual Meeting (TRB)*, 2023.
- [10] **Hanlin Chen**, Renyuan Luo, Yiheng Feng. Improving Connected and Autonomous Vehicle Mapping and Navigation in Work Zones Using Crowdsourcing Vehicle Trajectories *The Transportation Research Board (TRB) 102nd Annual Meeting (TRB)*, 2023.
- [11] **Hanlin Chen**, John Springer. A Risk Analysis Framework for Vehicular Networks *The Third International Conference on Connected and Autonomous Driving (MetroCAD 2020)*, 2020. (Poster Paper)
- [12] **Hanlin Chen**, Baijian Yang. CAN Performance Evaluation of CAN Encryption *2019 The First IEEE International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications (TPS)*, 2019.
- [13] **Hanlin Chen**, Wangling Yu. Controller Design for Mechatronic Rotary Inverted Pendulum (Part 1 and Part 2) *2018 ASEE Mid-Atlantic Section Spring Conference (ASEE)*, 2018.
- [14] Niveah Abraham, A. A. Bolaji, **Hanlin Chen**, Melissa Dark, Al Holt, John Springer. Internet of Things Mobility Forensics *The 18th CERIAS Annual Information Security Symposium*, 2017.

Projects

Collaborative projects

May 2023 - Present **Lane change estimation with following vehicle data only**, Postdoctoral Research Assistant at CART Lab, Purdue University, with ISS Lab at Purdue AAE.

Collaborators: Xiaolin Xu and Professor Dengfeng Sun

- Develop an augmented reality system for testing on collision avoidance algorithms
- Develop decision level merging for cooperative perception system
- Build virtual test proving ground for project testing

- September 2022 - Present **Inference time attack and its impact on smart transportation system**, *Postdoctoral Research Assistant at CART Lab, Purdue University*, with ISS Lab at University of Texas Dallas.
Collaborators: Simin Chen and Professor Wei Yang
 Formulated the inference time attack problem into the context of autonomous vehicle control
 Implement the inference time attack in a co-simulation platform for end-to-end impact analysis
 Have one research paper published in CVPR 2023, more research work in progress.
- December 2022 - Present **A Digital Twin Simulation Toolkit for C-V2X-Enabled Collaborative Autonomous Driving**, *Postdoctoral Research Assistant at CART Lab, Purdue University*, with CAR Lab at University of Delaware.
Collaborators: William He and Professor Weisong Shi
 Help developing a digital twin simulation for collaborative autonomous driving automation
 Wrote the background vehicle control module using SUMO simulator, which provides more accurate vehicle maneuvers
 Integrating the digital twin system with C-V2X communication system to better assess the impact of communication delay
- July 2022 - Present **Cybersecurity on Electric Shared Mobility System**, *Postdoctoral Research Assistant at CART Lab at Purdue University*, with Mobility-X Lab at University of Alabama.
Collaborators: Shuocheng Guo and Professor Xinwu Qian
 Use proper charging station and EV model to formulate the threat into a more realistic attack
 Adjusted the threat model for network level attack
 One research paper submitted to IEEE TITS
 Projects inside Purdue University
- August 2022 - September 2023 **Development of A Cooperative Perception System**, *Postdoctoral Research Assistant at CART Lab, Purdue University*, West Lafayette, Indiana.
 Develop a augmented reality system for testing on collision avoidance algorithms
 Develop decision level merging for cooperative perception system
 Build virtual test proving ground for project testing
- August 2021 - Present **NSF-CPS: Medium: Transforming Connected and Automated Transportation with Smart Networking, Cooperative Sensing, and Edge Computing**, *Postdoctoral Research Assistant at CART Lab, Purdue University*, West Lafayette, Indiana.
 Implement a co-simulation platform for microscopic level traffic simulation and vehicle level simulation
 Created an adaptive traffic signal control system utilizing cooperative perception with raw data level data sharing
 One TRB paper accepted as project outcome, more research work in progress
- March 2019 - December 2019 **Object and Fire Detection using Deep Learning and UAV for Disaster Rescuing**, *Graduate Research Assistant at DAO2 Lab, Purdue University*, West Lafayette, Indiana.
 Developed object and fire-recognition model based on deep learning from UAV data
 One research paper published as project outcome
- July 2019 **SAE CyberAuto Challenge**, *Participant*, SAE International, Warren, Michigan.
 Conducted investigation on a modern automobile, figured out potential threats and risks within the in-vehicular and inter-vehicular system using reverse engineering and penetration testing.

June 2018 - August 2018	Development of a Apollo based autonomous driving platform with V2X communication , <i>Visting student at MCity Lab, University of Michigan, Ann Arbor, Michigan.</i> Mentor: Professor Huei Peng Successfully Integrated Apollo open-AI system on a Kia Soul EV Added V2X communication function in Apollo system that worked on the target vehicle Obtained a vehicle dynamic model for the testing vehicle Kia Soul EV based on the vehicle dynamics testing data
January 2017 - December 2018	Forecast Project: Increase graduate student success using big data , <i>Graduate Research Assistant at Office of Information Management and Analysis, Purdue University, West Lafayette, Indiana.</i> Perform data analysis for big data on graduate student Developed numerical models that predict students' academic performance based on the selected factors UI testing for Purdue's new database user interface
August 2017 - June 2017	InSURE: Risk Analysis on Vehicular Network , <i>Graduate student at The Center for Education and Research in Information Assurance and Security(CERIAS), Purdue University, West Lafayette, Indiana.</i> Proposed a risk-analysis taxonomy based on current experimental results that fits the existing Autonomous Vehicle environment with vehicular communication.
August 2016 - December 2016	InSURE: Internet of Things Mobility Forensics , <i>Graduate Student at CERIAS, Purdue University, West Lafayette, Indiana.</i> Defined the gap between the traditional computer cyberforensics and cyberforensics for IoT devices Find out some limitation for IoT mobility forensics and performed several forensic analysis on a smart doorbell to prove our theoretical analysis result.
August 2013 - June 2014	EcoCar2, Purdue University , <i>Graduate Student, West Lafayette, Indiana.</i> Develop and rebuild the infotainment system for the vehicle of Purdue EcoCar2 project while making it collaborating with the existing in-vehicular network

Teaching and service

Mentor

Fall 2022 PMP program Metor, Purdue Disability Resource Center

Teaching Assistant

Summer 2019 Design for Security Foundations of Secure Design

Spring 2014 MET 302, CAD In The Enterprise

Fall 2014 MET 143, Materials And Processes

Grader

Spring 2021 ECE301 Signals and Systems

Professional Experience

Associate Editor	Multimedia Tools and Applications, Springer
Program Committee	International Conference on Algorithms and Architectures for Parallel Processing(ICA3PP), 2023
Reviewer	IEEE International Automated Vehicle Validation Conference(IAVVC), 2023
Reviewer	IEEE Transactions on Intelligent Transportation Systems
Reviewer	IEEE Transactions on Intelligent Vehicles
Reviewer	Accident Analysis Prevention
Reviewer	IEEE Transaction on Internet of Things
Reviewer	Mechanical Systems and Signal Processing

Student Reviewer	IEEE Transaction on Computer
Student Reviewer	BMVC
Participant	2018 SAE CyberAuto Challenge

Invited Talks

Spring 2023	An Introduction to Connected and Automated Vehicle with demonstration. Guest Lecture at CE 597 - Smart Construction. Purdue University, West Lafayette, IN, 2023
Fall 2022	An introduction to Cooperative Driving Automation from a vehicle perspective. Guest Lecture at CE 565 - Traffic Operations and Control. Purdue University, West Lafayette, IN, 2022
Fall 2022	An Introduction to Connected and Automated Vehicle with demonstration. Guest seminar session at Purdue ITE seminar. Purdue University, West Lafayette, IN, 2022
Fall 2022	Cooperative perception for traffic operation and control with vehicle application. Guest seminar session at Purdue Polytechnic Institute. Purdue University, West Lafayette, IN, 2022
Spring 2022	Mapping in temporary changed drive-able area with crowd-source trajectory data. Guest seminar session at Purdue Polytechnic Institute. Purdue University, West Lafayette, IN, 2022
Fall 2019	CAN Performance Evaluation of CAN Encryption. The First IEEE International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications (IEEE-TPS), Los Angeles, CA, 2019
Fall 2019	CAN Performance Evaluation of CAN Encryption. Guest lecture at CSI 4480 - Information Security Practice. Oakland University, Rochester, MI, 2019.
Fall 2018	Implementation of an open-source platform for CAV system: a comprehensive report. Guest lecture at CSI 4480 - Information Security Practice. Oakland University, Rochester, MI, 2018.

Demos

2023	Development of A Cooperative Perception System. Impact evaluation of decision level merging for cooperative perception, information shared from infrastructure Baseline link here: Link to be added CAV driving only, no TScan: Link to be added CAV driving only, with TScan: https://youtu.be/8WB1pk_8e8g
2023	Inference time attack on autonomous vehicle in end2end simulation. Inference time attack on perception module for autonomous vehicle, impact evaluation in end to end system Baseline link here: https://youtu.be/-UJOcZR_IHw Attack link here: https://youtu.be/TICj_hna_XM
2023	High fidelity driving simulator with background vehicle. A driving simulator using CARLA for perception data generation, SUMO for background vehicle control, and ROS for ego vehicle control link here: https://youtu.be/JzlB_81JHHA
2023	Augmented Reality with CART CAV and Visualization. An augmented reality system for safer CAV testing with CART CAV and visualization link here: https://youtu.be/IAp-tFonHZI

- 2022 **Trajectory following with pure pursuit implementation on CAV platform.**
 Trajectory following with real-time perception result, both implemented on CART Lab's CAV and demo in Purdue's parking lot
 link here: <https://www.youtube.com/shorts/44eg8jUbyqI>
- 2022 **Real-time perception implementation on CAV platform.**
 Visualization for real-time perception on CART Lab's CAV with both 2d and 3d data.
 Result can be used for decision level merging
 link here: <https://youtu.be/0ont9S0ySz0>
- 2021 **CARMA co-simulation platform with online raw data level merging.**
 A demo video for raw data level merging on cooperative perception between infrastructure and CAVs
 link here: <https://youtu.be/NJ2Ue3Fg6og>

Media Coverage

- 2023 **The USDOT Research and Tchnology story about our Cooperative Driving Automation research.**
 LinkedIn: https://www.linkedin.com/posts/usdot-research-technology_fhwas-cooperative-driving-automation-cda-activity-7041815509478035456-snuk?utm_source=share&utm_medium=member_desktop
 Twitter: https://twitter.com/ITS_USDOT/status/1636049834032365569
 Facebook: <https://www.facebook.com/photo/fbid=600391862112904&set=a.234011082084319>
- 2022 **CE's Feng leads testing of new autonomous car.**
 Purdue College of Engineering News: <https://engineering.purdue.edu/Engr/AboutUs/News/Spotlights/2022/2022-0722-ce-feng>
- 2022 **CIT researchers develop new “deep learning” methods to fight wildfires with drones.**
 Purdue Polytechnic News Room: <https://polytechnic.purdue.edu/newsroom/cit-researchers-develop-new-deep-learning-methods-fight-wildfires-drones>
- 2014 **Purdue wins 'EcoCAR 2' accolades in creating hybrid-electric vehicle.**
 Purdue News Room: <https://www.purdue.edu/newsroom/releases/2014/Q2/purdue-wins-ecocar-2-accolades-in-creating-hybrid-electric-vehicle.html>
 AVTC: <https://avtcseries.org/about-avtc/past-competitions/ecocar-2/>