Hongchao Zhang, PhD Candidate
Dept. of Electrical and System Engineering
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Education

Washington University in St. Louis — 2025 (Expected)
- Ph.D., Electrical Engineering — St. Louis, MO, USA
- Advisor: Prof. Andrew Clark

Worcester Polytechnic Institute — 2020
- M.S., Electrical & Computer Engineering — St. Louis, MO, USA
- Advisor: Prof. Andrew Clark

Nanjing University of Aeronautics and Astronautics — 2018
- B.E., Automation Engineering — Nanjing, Jiangsu, China

Research Interests

Learning-enabled CPS; Control Theory; Robotics; Security

Published Conference Papers

1. H. Dai, C. Jiang, H. Zhang, and A. Clark. "Verification and Synthesis of Compatible Control Lyapunov and Control Barrier Functions." 2024 63nd IEEE Conference on Decision and Control (CDC), 2024. To Appear.
2. M. Tayal, H. Zhang, P. Jagtap, A. Clark, and S. Kolathaya, "Learning a Formally Verified Control Barrier Function in Stochastic Environment. " 2024 63nd IEEE Conference on Decision and Control (CDC), 2024. To Appear.
3. H. Zhang, L. Niu, A. Clark, and R. Poovendran, "Fault tolerant neural control barrier functions for robotic systems under sensor faults and attacks. " In 2024 IEEE International Conference on Robotics and Automation (ICRA). IEEE, 2024. To Appear.
4. H. Zhang, J. Wu, Y. Vorobeychik, and A. Clark, "Exact Verification of ReLU Neural Control Barrier Functions. " Advances in Neural Information Processing Systems 36 (2023).
5. H. Zhang, Z. Li, H. Dai and A. Clark, "Efficient Sum of Squares-Based Verification and Construction of Control Barrier Functions by Sampling on Algebraic Varieties." 2023 62nd IEEE Conference on Decision and Control (CDC), 2023, pp. 5384-5391, doi: 10.1109/CDC49753.2023.10384199.
6. H. Zhang, Z. Li, S. Cheng, and A. Clark, “Cooperative Perception for Safe Control of Autonomous Vehicles under LiDAR Spoofing Attacks.” Symposium on Vehicle Security and Privacy (VehicleSec), 2023. **General Motors Autodriving Security Award**.
7. H. Zhang, S. Cheng, L. Niu and A. Clark, "Barrier Certificate based Safe Control for LiDAR-based Systems under Sensor Faults and Attacks." 2022 IEEE 61st Conference on Decision and Control (CDC), pp. 2256-2263, doi: 10.1109/CDC51059.2022.9992432.

8. L. Niu, H. Zhang and A. Clark, "Safety-Critical Control Synthesis for Unknown Sampled-Data Systems via Control Barrier Functions." 60th IEEE Conference on Decision and Control (CDC), 2021, pp. 6806-6813, doi: 10.1109/CDC45484.2021.9683019.
9. H. Zhang, Z. Li and A. Clark, "Model-based Reinforcement Learning with Provable Safety Guarantees via Control Barrier Functions." IEEE International Conference on Robotics and Automation (ICRA), 2021, pp. 792-798, doi: 10.1109/ICRA48506.2021.9561253.
10. A. Clark, Z. Li and H. Zhang, "Control Barrier Functions for Safe CPS Under Sensor Faults and Attacks." 59th IEEE Conference on Decision and Control (CDC), 2020, pp. 796-803, doi: 10.1109/CDC42340.2020.9303766.

Journal Papers

1. H. Zhang, Z. Li, and A. Clark, "Safe Control for Nonlinear Systems under Faults and Attacks via Control Barrier Functions." IEEE Transactions on Automatic Control, 2024. To Appear.

Awards and Fellowship

- Shao-Fang and Tsu-Chin Lee Endowed Fellowship (2022)
- 2023 General Motors AutoDriving Security Award at the inaugural ISOC Symposium on Vehicle Security and Privacy at the Network and Distributed System Security Symposium (NDSS)

Teaching Experience

- Teaching Assistant for the course ESE2180 Linear Algebra and Component Analysis at Washington University in St. Louis in 2024.
- Mentoring in Washington University Research Experience for Undergraduates (REU) in 2023 and 2024.
- Mentoring in the Worcester Polytechnic Institute Major Qualifying Project (MQP) in 2019 and 2021.

Working Experience

- 2022-Present Research Assistant, Washington University in St. Louis, St. Louis, MO, USA
- 2019-2022 Graduate Research Assistant, Worcester Polytechnic Institute, Worcester, MA, USA

Service

- Reviewer of IEEE TAC, IEEE T-IFS, IEEE L-CSS, IEEE CDC
- WUSTL ESE PhD Advisory Board
- Public Demonstration at WPI TouchTomorrow 2019, 2022

Patents

- Hongchao Zhang, Patent- A following housekeeper robot (Patent No.: 201710406907.1)
- Hongchao Zhang, Patent- Laptop Heat Exchange Cupholder (Patent No.: ZL 2014 2 0806400.7)

Tools

- Python, PyTorch, Matlab, ROS, C/C++