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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	Worcester, MA, USA
Nanjing University of Aeronautics and Astronautics	2018
• B.E., Automation Engineering	Nanjing, Jiangsu, China

Research Interests

Learning-enabled System; Cyber-physical Systems (CPS); Safe Control; Robotics; CPS Security

Published Conference Papers

1. H. Zhang, Z. Qin, S. Gao, and A. Clark, "SEEV: Synthesis with Efficient Exact Verification for ReLU Neural Barrier Functions." *Advances in Neural Information Processing Systems* 37 (2024), To Appear.
2. L. Niu, H. Zhang, D. Sahabandu, B. Ramasubramanian, A. Clark and R. Poovendran. "Who is Responsible? Explaining Safety Violations in Multi-Agent Cyber-Physical Systems" 2024 IEEE International Conference on Assured Autonomy (ICAA), 2024.
3. H. Dai, C. Jiang, H. Zhang, and A. Clark. "Verification and Synthesis of Compatible Control Lyapunov and Control Barrier Functions." 2024 63rd IEEE Conference on Decision and Control (CDC), 2024.
4. M. Tayal, H. Zhang, P. Jagtap, A. Clark, and S. Kolathaya, "Learning a Formally Verified Control Barrier Function in Stochastic Environment." 2024 63rd IEEE Conference on Decision and Control (CDC), 2024.
5. 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.
6. 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): 5685-5705.
7. 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.
8. 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.**

9. 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.
10. 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.
11. 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.
12. 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. Conditionally Accepted.

Awards and Fellowship

- 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)
- Shao-Fang and Tsu-Chin Lee Endowed Fellowship (2022)

Mentoring Experience

- Mentoring in Washington University Research Experience for Undergraduates (REU)
 - i. 2024 Mario Rodriguez-Montoya, Dzenan Zecevic
 - ii. 2023 Nicolas Hernandez, Keyron Linarez
- Mentoring Graduate Directed Research (Mark Charnot, Seifeldin I. Elkhashab) in 2023.
- Mentoring in the Worcester Polytechnic Institute Major Qualifying Project (MQP)
 - i. 2022 Noelle Johnson
 - ii. 2019 Minh Le and Christopher Letherbarrow

Service

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

Software Tools

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

Hardware Platform

- Raspberry Pi, Arduino, F1Tenth Car, Quadrotors