Zhuoyuan "Jacob" WANG

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Research Interests

My interests focus on developing safe and efficient control and AI solutions with long-term guarantees and real-time efficiency in high-dimensional and interactive systems, ranging from theory to applications.

Education

Carnegie Mellon University Feb 2021 – May 2026

Ph.D., Electrical and Computer Engineering.

Tsinghua University Sep 2016 – Jun 2020

B.E., Automation.

Professional Experience

Mitsubishi Electric Research Laboratories May 2025 – Aug 2025

Research Intern, Computational Sensing Group.

Selected Publications

Wang, Z., Chern, A., & Nakahira, Y. "Generalizable physics-informed learning for stochastic safety-critical systems." Under Review for IEEE Transaction on Automatic Control (TAC). Short version in Learning for Dynamics and Control Conference (L4DC), 2023.

Wang, Z., Jing, H., Kurniawan, C., Chern, A., & Nakahira, Y. "Myopically verifiable probabilistic certificates for safe control and learning." Under Review for IEEE Transaction on Automatic Control (TAC). Short version in IEEE American Control Conference (ACC), 2022.

Wang, Z., Romagnoli, R., Azizzadenesheli, K., & Nakahira, Y. "Neural spline operators for risk quantification in stochastic systems." In IEEE Conference on Decision and Control (CDC), 2025.

Wang, Z., Keller, R., Deng, X., Hoshino, K., Tanaka, T., & Nakahira, Y. "Physics-informed representation and learning: Control and risk quantification." In AAAI Conference on Artificial Intelligence, 2024.

Full Publications

Journal Publications

Wang, Z., Chern, A., & Nakahira, Y. "Generalizable physics-informed learning for stochastic safety-critical systems." Under Review for IEEE Transaction on Automatic Control (TAC).

Wang, Z., Jing, H., Kurniawan, C., Chern, A., & Nakahira, Y. "Myopically verifiable probabilistic certificates for safe control and learning." Under Review for IEEE Transaction on Automatic Control (TAC).

Hoshino, K., **Wang, Z.**, & Nakahira, Y. "Scalable long-term safety certificate for large-scale systems." In IEEE Control Systems Letters, 2023.

Shi, W., Huang, G., Song, S., **Wang, Z.**, Lin, T., & Wu, C. "Self-supervised discovering of interpretable features for reinforcement learning." In IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2020.

Conference Proceedings

Wang, Z., Romagnoli, R., Azizzadenesheli, K., & Nakahira, Y. "Neural spline operators for risk quantification in stochastic systems." In IEEE Conference on Decision and Control (CDC), 2025.

Wang, Z., Romagnoli, R., Ratchford, J., & Nakahira, Y. "Physics-informed deep B-spline networks for dynamical systems." Under Review.

Wang, Z., Keller, R., Deng, X., Hoshino, K., Tanaka, T., & Nakahira, Y. "Physics-informed representation and learning: Control and risk quantification." In AAAI Conference on Artificial Intelligence, 2024.

Pandya, R.*, **Wang, Z.***, Nakahira, Y., & Liu, C. "Towards proactive safe human-robot collaborations via data-efficient conditional behavior prediction." In IEEE International Conference on Robotics and Automation (ICRA), 2024.

Wang, Z., & Nakahira, Y. "A generalizable physics-informed learning framework for risk probability estimation." In Learning for Dynamics and Control Conference (L4DC), 2023.

Gangadhar, S.*, **Wang, Z.***, Poku, K., Yamada, N., Honda, K., Nakahira, Y., Okuda, H., & Suzuki, T. "An occlusion- and interaction-aware safe control strategy for autonomous vehicles." In IFAC World Congress, 2023.

Wang, Z.*, Jing, H.*, Kurniawan, C., Chern, A., & Nakahira, Y. "Myopically verifiable probabilistic certificate for long-term safety." In IEEE American Control Conference (ACC), 2022.

Gangadhar, S.*, **Wang, Z.***, Jing, H., & Nakahira, Y. "Adaptive safe control for driving in uncertain environments." In IEEE Intelligent Vehicles Symposium (IV), 2022.

* indicates equal contribution.

Funding Proposal Development

"New Sampling Paradigms for Safety-constrained, High-dimensional, and Partially Observable Path Integral Control." NSF DCSD, 2025.

"Probabilistic Safety Certificates for Data-Driven Perception and Control for Multi-agent Systems." NSF CPS, 2022.

Honors and Awards

Michel and Kathy Doreau Graduate Fellowship at Carnegie Mellon University 2022

Mathematical Contest in Modeling (MCM) Honorable Mention 2019

Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM) First Prize 2018

Tsinghua University Scholarship - Excellent Academic Performance 2018

Talks and Presentations

"Deep B-Spline Representations in Physics-Informed Neural Networks and Operators" 2025
Mitsubishi Electric Research Laboratories, Cambridge, MA

"Myopically Verifiable Probabilistic Certificate for Long-term Safety" 2022
American Control Conference (ACC), Atlanta, GA

"Long-term Safety for Autonomous Systems" 2022
MIT REALM Lab, Cambridge, MA

Teaching & Service

Faculty Search Council (CMU ECE) 2024, 2025

Teaching Assistant (CMU 18-475 S24, CMU 18-370 F23) 2023, 2024

Conference Reviewer: CDC 2023–2025, ACC 2024–2025, NECSYS 2025, AAAI 2024–2026, ICLR 2025, NeurIPS 2025, RSS 2023

Journal Reviewer: TAC, RICO, CONES

Mentorship

Reece Keller — Ph.D., CMU Neuroscience 2023

Xiyu Deng — Ph.D., CMU Electrical and Computer Engineering 2023

Siddharth Gangadhar — M.S., CMU Electrical and Computer Engineering 2021 - 2023

Kofi Puku — M.S., CMU Electrical and Computer Engineering 2022 - 2023

Tongyao Jia — M.S., CMU Electrical and Computer Engineering 2024 -

Lin Zhan — M.S., CMU Electrical and Computer Engineering 2024 - 2025

Neeraj Ramesh — Undergrad, CMU Electrical and Computer Engineering 2023 - 2024

Mentored students include 4 individuals from underrepresented groups in STEM.

Last updated: September 27, 2025