Tianhao Wu

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Research interests: Formal methods, robotics, and machine learning, with a focus on developing verifiable safety guarantees for autonomous systems, particularly in self-driving cars and drones.

Education

University of Southern California (USC)
M.S. in Computer Science *Aug 2025 - May 2027*
GPA: NA/4
B.S. in Computer Engineering and Computer Science *Jan 2021 - Dec 2024*
B.S. in Applied and Computational Mathematics
GPA: 3.95/4

Research Experience

Research Assistant, Carnegie Mellon University, Pittsburgh, PA *Jan 2025 - May 2025*
Advisor: John Dolan @ Driverless Intelligent Vehicles Lab
- Designed a modular safe-control framework for autonomous driving, integrating VLM, LTL, and CBF to enable generalizable, adaptive, and formally verifiable safety guarantees
- Conducted preliminary CARLA simulations on safe-driving modules, assessing their functionality and robustness within the framework

Research Internship, SmartMore, Shenzhen, China *May 2024 - Aug 2024*
- Implemented a novel LLaVA model by introducing cross-attention layers for image-text fusion
- Gained proficiency in Hugging Face Transformers library and deployed models on a cluster

Research Assistant, USC, Los Angeles, CA *Aug 2022 - May 2023*
Advisor: Somil Bansal @ Safe and Intelligent Autonomy Lab
- Optimized DeepReach for high-dimensional systems by combining sine and ReLU activation layers
- Reduced violation rate by 5.1% in a 9D multi-vehicle collision avoidance case study

Research Assistant, University of California - Irvine, Irvine, CA *Jun 2022 - Aug 2022*
Advisor: Marco Levorato @ Intelligent and Autonomous Systems Lab
- Built an autonomous drone with static obstacle detection and avoidance capabilities
- Led end-to-end development, including dataset collection, model training, sensor integration, drone assembly, scripting, simulation, and field testing

Publications

Enhancing the Performance of DeepReach on High-Dimensional Systems through Optimizing Activation Functions [pdf]
Qian Wang*, **Tianhao Wu*.** *arXiv, 2023.*

Honors & Awards

MHI Undergraduate Scholar *2023 - 2024*
Selected as one of five scholars in the EE department for research excellence and academic potential
USC Academic Achievement Award *Fall 2023*
Viterbi CURVE Research Fellowship *2022 - 2023*
Awarded $2,500 for research commitment
Lenore B. Kreiger Endowed Scholarship for Math *2022 - 2023*
Awarded $4,500 for academic excellence and continued contributions to the Dornsife community
Dean's List (Viterbi & Dornsife) *2021 - 2024*

Teaching

Teaching Assistant, USC, Los Angeles, CA

- CSCI 102: Fundamentals of Computation (head TA) *Jan 2022 - May 2024*
- CSCI 360: Introduction to Artificial Intelligence *Jan 2023 - May 2023*
- EE 109: Introduction to Embedded Systems *Aug 2023 - Dec 2023*

Teaching Assistant, CS@SC Summer Coding Camp, online *Jun 2022 - Aug 2022*
- Instructed six classes of K-12 students in Python and Scratch (Jr.), totaling 120 hours of teaching
- Provided feedback on assignments and actively communicated students' progress to parents

Service

Co-organizer, MHI Undergraduate Research Hub, USC *Aug 2023 - May 2024*
- Hosted research talks and panels to foster undergraduate research engagement in ECE
- Connected students with faculty and graduate researchers to explore academic pathways

Volunteer, Mastery Learning Hour, online *Jan 2022 - May 2022*
- Provided free math tutoring to K-12 students for 4 hours per week

Personal Projects

- Built a first-person view drone from scratch [demo video]
- Built a hexapod robot controlled by Raspberry Pi [demo video]

Skills

Programming: Python, C/C++, MATLAB
Research: Transformers, CARLA, Reachability, Safe Control, Formal Methods, Linux, SSH, Latex
Languages: English, Mandarin, Spanish (Elementary)