WEIHANG GUO

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RESEARCH OVERVIEW

My research builds planning algorithms and systems that let robots act capably and reliably in complex environments and tasks. My prior work touches on aligning human preferences with long-horizon robot tasks and coordinating multiple robots in shared workspaces. My current interest is integrating world models with memory-augmented robot policies to produce behavior that is reactive, safe, and generalizable. I am also a maintainer of the Open Motion Planning Library (OMPL), which has become foundational to motion planning research and deployment in both academia and industry.

RESEARCH AREAS

Robot Safety · Robot Memory · World Model · High-Performance Robotic Systems

EDUCATION

Rice University — Houston, TX
Ph.D. in Computer Science · Advised by Prof. Lydia E. Kavraki — *Aug. 2025 – Present*

Rice University — Houston, TX
M.S. in Computer Science · GPA: 3.91/4.0 — *Aug. 2023 – Dec. 2024*

Lehigh University — Bethlehem, PA
B.S. Mathematics and Computer Science · 4 year Dean's list · GPA: 3.85/4.0 — *Aug. 2019 – May 2023*

RESEARCH EXPERIENCE

Kavraki Lab · Rice University — Houston, TX
Supervised by Dr. Lydia Kavraki — *Jan. 2024 – Present*

- Develop reactive robot policies with safety guarantees.
- Build LLM- and VLM-based interfaces that translate human-specified constraints into long-horizon plans and accelerate task-and-motion planning.
- Maintain and extend the Open Motion Planning Library (OMPL), with a focus on real-time planning and GPU acceleration.

Prof. Rosa Zheng's Lab · Lehigh University — Bethlehem, PA
Supervised by Dr. Rosa Zheng — *Aug. 2021 – May 2023*

- Built an F1TENTH autonomous racing stack with pure-pursuit path tracking and real-time collision avoidance.
- Developed an underwater drone autonomy pipeline covering mapping (SLAM), object detection, and navigation.

PUBLICATIONS

Journal Articles

J1. **W. Guo**, Z. Kingston, K. Hang, and L.E. Kavraki, "Efficient Multi-Robot Motion Planning for Manifold-Constrained Manipulators by Randomized Scheduling and Informed Path Generation," *IEEE Robotics and Automation Letters (RA-L)*.

Conference Papers

C1. L. Bashaw*, Q. Meng*, E. Flores, **W. Guo**, L.E. Kavraki, "GANC-PRM: GPU-Accelerated PRM with Neural Costs," under review.

C2. **W. Guo**, T. Tyrovouzis, L.E. Kavraki, "Python Bindings for a Large C++ Robotics Library: The Case of OMPL," *2026 IEEE International Conference on Robotics and Automation (ICRA).*

C3. M. Yan, M. Mengdibayev, A. Floros, **W. Guo**, L.E. Kavraki, Z. Kingston, "Using VLM Reasoning to Constrain Task and Motion Planning," under review.

C4. **W. Guo**, Z. Kingston, L.E. Kavraki, "CaStL: Constraints as Specifications through LLM Translation for Long-Horizon Task and Motion Planning," *2025 IEEE International Conference on Robotics and Automation*

(ICRA).

C5. **W. Guo** and Y. R. Zheng, "Trade off Between the Probability of Detection and False Alarm Rate in Fish Tag Detection," *OCEANS 2022, Hampton Roads.*

Workshop Papers

W1. S. Coumar, **W. Guo**, Z. Kingston, "PyRoFFI: Accelerating Foreign Kinematics Kernels," *RoboARCH Workshop at 2026 IEEE International Conference on Robotics and Automation (ICRA).* Lightning Talk and Poster.

Invited Talks

Texas Regional Robotics Symposium (TEROS), Spotlight Talk	*Apr. 2025*

Honors and Awards

Jason Chahin Innovation Scholar, Rice University	*Feb. 2025*
Donald J. Hillman Memorial Award in AI, Lehigh University	*Apr. 2023*
Recognition for Outstanding Academic Achievement, Lehigh University	*Aug. 2022*
Blue Robotics Special Awards, Robosub 2022	*Aug. 2022*
2nd place at 10th F1TENTH Autonomous Grand Prix, ICRA 2022	*Jul. 2022*
Mountaintop Research Fellowship, Lehigh University	*May 2022*

Teaching Experience

Algorithmic Robotics (COMP 550), Teaching Assistant, Rice University	*Fall 2024*
Internet of Things (ECE 350), Teaching Assistant, Lehigh University	*Spring 2023*
Computer Vision (CSE 398/498), Teaching Assistant, Lehigh University	*Fall 2022*
Autonomous Driving and Robotic Racing (ENGR 010), Head Teaching Assistant, Lehigh University	*Fall 2022*

Reviewing

International Conference on Intelligent Robots and Systems (IROS)	*2026*
Robotics and Automation Letters (RA-L)	*2025, 2026*
International Conference on Robotics and Automation (ICRA)	*2025*
Workshop on Motion Planning and Control via Parallelization (Workshop @ RSS)	*2025*
Workshop on Robot Planning in the Era of Foundation Models (FM4RoboPlan @ RSS)	*2025*

Other Experience

Volunteered at Lehigh University Robot Versatility Workshop	*Jul. 2022*
Team Leader of PL400 (Lehigh Autonomous Racing Team)	*Apr. 2022*
Co-founder and Software Team Leader of Lehigh Underwater Robotics	*May 2021*

Coursework and Skills

Robotics: Robotic Manipulation, Autonomous Driving and Robotic Racing, IoT

AI/ML: Computer Vision, Reinforcement Learning, Generative Models, Accelerated Computing, NLP, Vision-Language-Action (VLA) Models, World Models

Computer Science: Data Structure, Computer Architecture, Software Engineering, Programming Language

Mathematics: Multivariable Calculus, Linear/Abstract Algebra, Real Analysis, Partial Differential Equations, Differential Geometry, Graph Theory, Game Theory, Theory of Probability

Skills: Python, C/C++, JAX, PyTorch, HuggingFace, ROS, MuJoCo, PyBullet, OMPL, cuRobo, PyRoKi