Shuaikang Wang

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Education

Peking University Beijing, China

M.Eng. in Mechanical Engineering (Rank: 1/133) *Sep. 2023 – Jul. 2026*

Advisor: Prof. Meng Guo

Courses: Advanced Robotics, Reinforcement Learning, Distributed Optimization, Analytical Dynamics

Peking University Beijing, China

B.Eng. in Robotics Engineering (GPA: 3.6/4.0) *Sep. 2019 – Jul. 2023*

Advisor: Prof. Meng Guo

Courses: Machine Learning, Introduction to Intelligent Robots, Robot Perception and Control

The University of British Columbia Vancouver, Canada

Exchange Student in the Faculty of Applied Science (GPA: 4.0/4.0) *Aug. 2021 – Dec. 2021*

Courses: Introduction to Probability, Signals and Systems, Mechanics I, Applied Electronics

Research Interests

My research interests lie at the intersection of **decision-making**, **learning**, and **control** in robotic systems. I am particularly focused on improving the **efficiency**, **safety**, and **flexibility** of robots in **complex tasks**.

Publications

[6] Intention-aware Monitoring of Dynamic Targets with Bounded Uncertainty and Minimum Fleet
Shuaikang Wang, Jianyang Xue, Yiannis Kantaros and Meng Guo
Under Review

[5] LOMORO: Long-term Monitoring of Dynamic Targets with Minimum Robotic Fleet under Resource Constraints
Mingke Lu, Shuaikang Wang, and Meng Guo
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025. [PDF]

[4] Multi-UAV Deployment in Obstacle-cluttered Environments with LOS Connectivity
Yuda Chen, Shuaikang Wang, Jie Li, Meng Guo
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025. [PDF]

[3] Customize Harmonic Potential Fields via Hybrid Optimization over Homotopic Paths
Shuaikang Wang, Tiecheng Guo, and Meng Guo
IEEE Robotics and Automation Letters (RA-L), 2025. [PDF] [Project]
Selected for Presentation at ICRA2026

[2] Hybrid and Oriented Harmonic Potentials for Safe Task Execution in Unknown Environment
Shuaikang Wang and Meng Guo
Automatica, 2025. [PDF] [Project]

[1] Uncertainty-bounded Active Monitoring of Unknown Dynamic Targets in Road-networks with Minimum Fleet
Shuaikang Wang, Yiannis Kantaros and Meng Guo
IEEE International Conference on Robotics and Automation (ICRA), 2024. [PDF]
Best Paper Award on Multi-Robot Systems Finalist

Research Experience

Dexterous Grasping Synthesis via Contact-preserving Differentiable Optimization Mar. 2025 – Sep. 2025

Research Intern, National University of Singapore *Advisor: Prof. Xingyu Liu*

- Formulated a contact-preserving differentiable optimization pipeline that jointly refines the 6-DoF poses of all hand links and candidate contact points under joint-limit and non-penetration constraints.
- Derived closed-form analytic gradients for all kinematic and contact terms to ensure fast convergence.
- Implemented and benchmarked the method in *IsaacLab* across varied objects and dexterous-hand morphologies, then performed sim-to-real transfer via system identification and contact calibration.

Safe Robot Navigation in Complex Environments via Navigation Functions Jun. 2022 – Present

Research Assistant, Peking University *Advisor: Prof. Meng Guo*

- Proposed an online method to construct Navigation Functions by iteratively building diffeomorphic transformations as the environment updates, ensuring global convergence and safety from high-level task planning to low-level motion control.
- Designed a hybrid optimization scheme that jointly selects homotopy classes (discrete obstacle abstractions) and tunes continuous field parameters, yielding topology-aware, safety-preserving trajectories with certified convergence.
- Employed Flow Matching to learn diffeomorphic maps with physics-informed boundary constraints, enabling neural accelerated navigation while retaining global guarantees.

Intention-aware Monitoring of Dynamic Targets with Multi-Robot Teams Jun. 2023 – Present

Research Assistant, Peking University *Advisor: Prof. Meng Guo and Prof. Yiannis Kantaros*

- Formulated a distributed framework that couples LTL-based task specifications with Bayesian online intent inference and intent-aware Kalman prediction, enabling joint reasoning over task allocation and motion planning for moving targets.
- Designed a game-theoretic allocation scheme that attains local Nash equilibria and integrates event-triggered MPC for closed-loop execution, supporting real-time multi-robot coordination and persistent target monitoring.
- Developed a resource-constrained tasking method that minimizes team size under energy limits; validated through large-scale simulations and hardware experiments, demonstrating reduced robot usage while meeting monitoring requirements.

AWARDS & HONORS

National Scholarship (Highest Honor for Students in China), *Ministry of Education, China* Oct. 2025

Merit Student, *Peking University* Oct. 2025

Academic Innovation Award, *Peking University* Oct. 2025

Academic Rising Star, *College of Engineering, Peking University* May 2025

Best Paper Award on Multi-Robots Systems Finalist, *IEEE ICRA* May 2024

Dean's Scholarship, *College of Engineering, Peking University* Otc. 2023

(NAE) Grand Challenges Scholar Award, *National Academy of Engineering, United States* Jun. 2023

Outstanding Overseas Exchange Scholarship, *Peking University* Mar. 2022

Academic Excellence Award, *Peking University* Oct. 2020

ACADEMIC SERVICE

Reviewer: ICRA, IROS, RA-L, CDC

Teaching Assistant: Ordinary Differential Equation (ODE), *Peking University*, 2024

SKILLS

Programming: Python, C, C++, MATLAB, LaTeX

Frameworks: PyTorch, Anaconda, Git, ROS, IsaacLab, Mujoco, Pybullet, ManiSkill

Robots: Agile Limo, DJI Tello, Shadow Hand, Leap Hand, Unitree Go1