Siqi Liang

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Research Interests

Embodied Navigation · **Robot Learning** · **Motion Planning**

Education

The University of Hong Kong (HKU), Hong Kong, China — Jul. 2024 – Present
Ph.D. Student, Department of Mechanical Engineering, MaRS Lab.
Advisor: Prof. Fu Zhang.

Harbin Institute of Technology (HIT), Shenzhen, China — Sept. 2019 – Jun. 2023
B.E. in Mechatronics, Robotics, and Automation Engineering. Major GPA: 87.61/100.

Industry Experience

Strutt, Shenzhen, China — Sept. 2023 – Jun. 2024
Software Engineer — Perception & Mapping — *Early Team Member*

- Designed and built the mobile robot's mapping system from the ground up, including occupancy and terrain mapping for navigation and motion planning in cluttered, complex environments. The system remains in use today.

Selected Publications

* *denotes equal contribution. Bullet points summarize my contributions to each work.*

Compass 1: Towards Open-World and Persistent Embodied Navigation from Monocular RGB Videos
Technical Report, 2026 — *Co-first Author & Main Developer*
H. Zhang*, **Siqi Liang***, Y. Guo, S. Zhang, Y. Wang, H. Du, H. Mai, H. Li, J. Yang, J. Zeng, Y. Hu, C. Chen, G. Jiang, Z. Zhuo, L. Zhao, Z. Li, Y. Qiao, Z. Yang, F. Zhang, H. Li.

- Built and trained a navigation model that combines instruction understanding, future-video prediction, and robot trajectory generation. Developed its motion-prediction component and joint-training workflow, and evaluated design choices through training experiments and ablations.
- Designed how the model selects visual memories and learns from six navigation question-answering tasks, supporting task-progress tracking, consistent exploration, and return to previously observed targets. Refined the supervision through analysis of real-world failures.
- Developed a processing and quality-control workflow for 2,500+ hours of video, producing motion labels and navigation question-answer pairs automatically. Specified annotation requirements and trained external annotators.
- Built and optimized a cloud inference service for real-time navigation across robot platforms. Personally integrated and tested quadrupedal and humanoid robots, while supporting partner-led deployments on wheeled robots and UAVs.

Sparse Video Generation Propels Real-World Beyond-the-View Vision-Language Navigation
NeurIPS 2026 *Co-first Author & Main Developer*
H. Zhang*, **Siqi Liang***, L. Chen, Y. Li, Y. Xu, Y. Zhong, F. Zhang, H. Li.

- Adapted a pretrained video-generation model for navigation and developed an inverse dynamics model to translate predicted future observations into robot trajectories. Implemented, trained, and evaluated both components of the video-action pipeline.
- Established the annotation and quality-control workflow for 140 hours of real-world video, including automatic motion-label generation, taking the project from initial simulation experiments to training on real-world data.
- Reduced video-generation denoising from 50 to 4 steps by implementing model distillation. Built the quadruped's remote-inference and execution stack from the ground up, providing the infrastructure later extended for Compass 1.

Online Whole-Body Motion Planning for Quadrotor Using Multi-Resolution Search
ICRA 2023 – Outstanding Navigation Paper Award Finalist *Co-first Author & Main Developer*
Y. Ren*, **Siqi Liang***, F. Zhu, G. Lu, F. Zhang.

- Implemented the complete multi-resolution planning pipeline, combining SE(3) search in narrow passages, $\mathbb{R}^3$ search in open space, and MINCO-based trajectory optimization. Resolved search corner cases under incomplete point-cloud observations to enable stable real-world operation.
- Designed a narrow-gap flight-corridor generation strategy that provides sufficient overlap between adjacent corridors, addressing trajectory-optimization infeasibility caused by conventional corridor construction.

Other Co-authored Publications

Real-time Whole-Body Motion Planning for Mobile Manipulators Carrying Arbitrarily Shaped Payloads via Kinematically-Coupled SVSDF Under review at IEEE RA-L
Y. Li, L. Yin, T. Zhang, R. Xue, H. Zhu, N. Chen, **S. Liang**, Y. Liu, F. Zhang.

DALIO: Degeneracy-Aware, Efficient LiDAR-Inertial Odometry With Adaptive Multiresolution Mapping T-mech 2026
H. Zhu, F. Zhu, Y. Fang, J. Han, Y. Ren, **S. Liang**, L. Yin, J. Mei, F. Zhang.

Efficient Swept Volume-Based Trajectory Generation for Arbitrary-Shaped Ground Robot Navigation IROS 2025
Y. Li*, L. Yin*, Y. Cai, J. Liu, F. Zhu, M. Ma, **S. Liang**, H. Li, F. Zhang.

ROG-Map: An Efficient Robocentric Occupancy Grid Map for Large-Scene and High-Resolution LiDAR-based Motion Planning IROS 2024
Y. Ren, Y. Cai, F. Zhu, **S. Liang**, F. Zhang.

Bubble Explorer: Fast UAV Exploration in Large-Scale and Cluttered 3D-Environments Using Occlusion-Free Spheres IROS 2023
B. Tang, Y. Ren, F. Zhu, R. He, **S. Liang**, F. Kong, F. Zhang.

Swarm-LIO: Decentralized LiDAR-inertial Swarm Odometry ICRA 2023
F. Zhu, Y. Ren, F. Kong, H. Wu, **S. Liang**, N. Chen, W. Xu, F. Zhang.

Honors and Awards

- **IROS 2025 Aerial Autonomy Challenge** – Best Innovation Award; also achieved the shortest actual flight time on the full course with a reinforcement-learning-based control stack. (2025)