Mingke Lu

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Education

Peking University **Beijing, China**
B.S. in Theoretical and Applied Mechanics *Sep 2022 – Jul 2026*
B.E. in Robotics Engineering *Sep 2022 – Jul 2026*

- GPA: 3.85/4.00 (3/ 41)

Research Experience

project: **Proactive Multimodal Interaction for Human-in-the-Loop Task and Motion Planning** *Sep 2025 – Present*

Supervisor: **Prof. David Hsu, School of Computing, National University of Singapore**

- Aims to develop a multimodal human-robot interaction framework that integrates language and gestures. Unlike passive instruction following, the robot can proactively propose candidate actions or points for human feedback, using Task and Motion Planning (TAMP) as the backbone to enable collaborative, constraint-aware decision-making.

project: **LOMORO: Long-term Monitoring of Dynamic Targets with Minimum Robotic Fleet under Resource Constraints** *Jun 2024 – Mar 2025*

Supervisor: **Prof. Meng Guo, College of Engineering, Peking University**

- Formulated the long-term monitoring of dynamic targets on road networks as a constrained optimization problem, incorporating UAV battery limits and autonomous recharging decisions to ensure sustainable deployment.
- Developed a novel Maximum-Allowed Martin's (MAM) algorithm using an incremental label-setting procedure to jointly optimize target selection, visiting sequence, and charging strategy with real-time efficiency.
- The work is **accepted** by IROS 2025.

project: **Path-Tracking Hybrid A* For Autonomous Agricultural Vehicles** *Oct 2023 – Oct 2024*

Supervisor: **Prof. Chang Liu, ARL Lab, College of Engineering, Peking University**

- Formulated the cross-furrow path smoothing problem as a real-time motion planning task with curvature, nonholonomic, and full-body collision-avoidance constraints.
- Developed the Path-Tracking Hybrid A* algorithm with customized cost/heuristic functions and pruning-based acceleration, and further designed a hierarchical MPC framework where a linearized MPC warm-starts the nonlinear solver, enabling real-time, accurate trajectory tracking under full-body and dynamic constraints.

Publications

LOMORO: Long-term Monitoring of Dynamic Targets with Minimum Robotic Fleet under Resource Constraints *Accepted*

Mingke Lu, Shuaikang Wang, Meng Guo,

Accepted by IROS 2025.

Path-Tracking Hybrid A* and Hierarachical MPC For Autonomous Agricultural Vehicles *Under submission*

Mingke Lu, Han Gao, Qianli Lei, Haijie Dai, Chang Liu

arXiv preprint arXiv:2411.14086

Skills

Language: TOEFL: 106, GRE: 330+3.5
Programming: C++, Python, MATLAB, ROS