Long Xu | 徐隆

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Education

Zhejiang University (ZJU), Hangzhou, Zhejiang, China **2022 – Present**

Ph.D. student in Electronic Information, College of Control Science and Engineering.

- Advisor: Prof. Fei Gao

Zhejiang University (ZJU), Hangzhou, Zhejiang, China **2018 – 2022**

B.Eng. in Automation, College of Control Science and Engineering.

Honors and Awards

- **1st** prize at ICRA 2022 RoboMaster AI Challenge (rank $\mathbf{2}^{nd}/35$) 2022
- Zhejiang Government Scholarship (top **3%**) 2020
- First Academic Scholarship of Zhejiang University (top **3%**) 2019

Experiences & Projects

ZJU-FAST Lab **05/2021 – 08/2023**

RoboMaster 2022 University AI Challenge (RMUA2022)

- Designed motion planning module. [Vedio]
- Realized **dynamic obstacle avoidance**, **dual-robot collaboration** and **rapid local re-planning**.
- Accelerate the process of trajectory optimization by using **CUDA** and GPU.

Research on motion planning of mobile robots on unstructured road (Graduation Project)

- Designed a geometry-based local **terrain assessment** algorithm.
- Using **B-spline** curve parameterized trajectories, implemented a local planner that considers **curvature constraint** and **terrain roughness**. [Vedio]

Design and manufacture of Ackermann chassis mobile robot (Research Assistant)

- Refitted the climbing remote control toy car into a **robot**. [Vedio]
- Implemented basis speed controller with STM32 and PID controller.
- Reproduced and implemented **Stanley trajectory tracking controller** with C++ and ROS.
- Reproduced and implemented the motion planning algorithm proposed in the work "Driving on Point Clouds"

Research Publications

(†Equal Contribution)

[1] **L. Xu**†, Z. Hou†, F. Gao, "Learning Trajectory Generation on Uneven Terrain with Differentiable Trajectory Optimization and Manifold". On-going. To be submitted to RSS.

[2] **L. Xu**†, C. Wong†, F. Gao, "Primitive-based Truncated Diffusion for Efficient Trajectory Generation of Mobile Manipulators". Submitted to ICLR 2026.

[3] **L. Xu**†, C. Wong†, M. Zhang, J. Lin, F. Gao, "Trajectory Optimization for Differential Drive Mobile Manipulators via Topological Paths Search and Arc Length-Yaw Parameterization". Under review. Submitted to ICRA 2026 [Paper][Code]

[4] **L. Xu**, K. Chai, B. An, J. Gan, Q. Wang, Y. Zhou, X. Li, J. Lin, Z. Han, C. Xu, Y. Cao, F. Gao, "Tracailer: An Efficient Trajectory Planner for Tractor-Trailer Vehicles in Unstructured Environments". *IEEE Transactions on Automation Science and Engineering*, 2025.
[Paper][Vedio][Code]

[5] Z. Han†, **L. Xu**†, L. Pei, F. Gao, "Dynamically Feasible Trajectory Generation with Optimization-Embedded Networks for Autonomous Flight", *IEEE Robotics and Automation Letters*, 2025.
[Paper][Web]

[6] X. Li†, **L. Xu**†, X. Huang†, D. Xue, Z. Zhang, Z. Han, C. Xu, Y. Cao, F. Gao, "SEB-Naver: A SE(2)-based Local Navigation Framework for Car-like Robots on Uneven Terrain", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025.
[Paper][Vedio][Code]

[7] Z. W, Y. Li, **L. Xu**, H. Shi, Z. Ma, Z. Chu, C. Li, F. Gao, K. Yang, K. Wang, "SF-TIM: A Simple Framework for Enhancing Quadrupedal Robot Jumping Agility by Combining Terrain Imagination and Measurement", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025.
[Paper][Web]

[8] S. Tan†, Z. Hou†, Z. Zhang†, **L. Xu**, M. Zhang, Z. He, C. Xu, F. Gao, Y. Cao, "Real-time Spatial-temporal Traversability Assessment via Feature-based Sparse Gaussian Process", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025.
[Paper][Code]

[9] K. Chai†, **L. Xu**†, Q. Wang, C. Xu, P. Yin, F. Gao, "LF-3PM: a LiDAR-based Framework for Perception-aware Planning with Perturbation-induced Metric", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024.
[Paper][Vedio][Code]

[10] Z. Han†, Y. Wu†, T. Li, L. Zhang, L. Pei, **L. Xu**, C. Li, C. Ma, C. Xu, S. Shen, F. Gao, "An Efficient Spatial-Temporal Trajectory Planner for Autonomous Vehicles in Unstructured Environments", *IEEE Transactions on Intelligent Transportation Systems*, 2023.
[Paper][Vedio][Code]

[11] **L. Xu**, K. Chai, Z. Han, H. Liu, C. Xu, Y. Cao, F. Gao, "An Efficient Trajectory Planner for Car-like Robots on Uneven Terrain", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.
[Paper][Vedio][Code]

[12] C. Ma, Z. Han, T. Zhang, J. Wang, **L. Xu**, C. Li, C. Xu, F. Gao, "Decentralized Planning for Car-Like Robotic Swarm in Cluttered Environments", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.
[Paper][Vedio][Code]

[13] J. Wang†, **L. Xu**†, H. Fu, Z. Meng, C. Xu, Y. Cao, X. Lyu, F. Gao, "Towards Efficient Trajectory Generation for Ground Robots beyond 2D Environment", *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.
[Paper][Vedio][Code]

SKILLS

- **Language**: Mandarin, native speaker; English, IELTS/7.0
- **Programming**: C++/C, Python, MATLAB, Java, CUDA
- **Software Development**: UE, ROS, Pytorch, IsaacGym, Docker
- **Hardware Development**: IoT chips (STM32, Arduino), SolidWorks

ADDITIONAL ACTIVITIES

- Minister of Youth Volunteer Department of Youth League Committee, ZJU 2019
- Chief sax of Marching Band of Zhejiang University 2019