Jiaxin Li

Tel +86 159 70217523, Email: lijiaxin0204@gmail.com

Education

Beijing Jiaotong University, Beijing, China **2022 Sep – 2025 Jun (Expected)**

MS in Control Science and Engineering, GPA 91.58 / 100 (Ranked 2nd)

Academic focus / background: robot perception, motion planning, and control

Beijing Jiaotong University, Beijing, China **2018 Sep – 2022 Jun**

BS in Automation, GPA 3.78 / 4.0 (Ranked 2nd out of 55)

Research Experiences

Multi-UAV Trajectory Planning and Tracking Control – *Project Leader* **2023 Nov – Present**

- Developing an optimization problem model to address the cooperative recovery of multiple UAVs, where the number of UAVs exceeds the available landing spots, optimizing for minimum recovery time.
- Combining a greedy algorithm with a differential flatness-based trajectory planning approach to achieve efficient UAV assignment and trajectory planning, ensuring optimal resource allocation and coordination.
- Implemented a geometric control method for accurate trajectory tracking.
- ***Optimization, Optimal Control, Motion Planning, Geometric Control, Multi-robot Coordination***

Airport Runway Inspection Robot – *Project Leader* **2022 Sep – 2023 Nov**

- Developed a robot for autonomous airport runway inspections, incorporating RTK for outdoor positioning and a self-designed spiral complete coverage path planning algorithm to enhance path efficiency and coverage. This spiral algorithm improves upon traditional parallel line coverage by reducing overlap and achieves shorter path lengths compared to reinforcement learning-based methods.
- Integrated YOLOv5 for real-time detection of cracks on the surface of airport runways.
- A paper as the first author has been accepted by the *Journal of Field Robotics* (JCR: Q2).
- ***Coverage Path Planning, Object Detection, Robot Localization***

Dense Crowd Monitoring: Counting and Tracking – *Project Leader* **2022 Feb – 2022 Aug**

- Developed an algorithm to track pedestrians in dense urban environments, addressing challenges such as target occlusion and multi-target interference.
- Integrated spatial density information with optical flow-based motion estimation to enhance the stability of tracking in complex and dynamic scenarios.
- Implemented tracking optimization strategies inspired by the DeepSORT algorithm, enhancing the reliability of pedestrian tracking in crowded spaces.
- ***Multi-object Detection, Multi-object Tracking, Re-identification***

Train Simulation and Demonstration Platform – *Project Leader* **2021 Jul – 2021 Dec**

- Developed a semi-physical simulation system for train operation control using intelligent mobile robots and ROS. This approach addresses the safety and cost issues of real-world experiments, providing a reliable and cost-effective platform for validating train control theories and technologies.
- Designed and implemented a communication system for simulated trains and trackside devices, utilizing ESP8266 for device control and UDP protocol for network communication.
- Created a control center software interface using Qt, enabling real-time monitoring and interaction with the simulation platform.

- Awarded the Outstanding Undergraduate Design / Thesis at the University Level.
- ***Kalman Filter, Sensor Fusion, IoT, User Interface Design, Sensor Technology***

Intelligent Food Delivery Robot – ***Team leader of undergraduate students*** **2020 May – 2021 May**

- Led the design and development of an intelligent food delivery robot, integrating key components such as object detection, robotic arm control, and AGV navigation.
- Enhanced object detection accuracy and processing efficiency by implementing preprocessing techniques and optimized edge detection methods.
- Implemented robust positioning using the SLAM and ACML algorithm and applied A* and DWA algorithms for efficient path planning and dynamic obstacle avoidance.
- Awarded the National College Students' Innovation and Entrepreneurship Training Program Project.
- ***State Estimation, Path Planning, Obstacle Avoidance, Machine Vision***

Teaching Experiences

- Sensors and Detection Technology (2023) **–** *Teaching assistant* 2023 March – 2023 May
- Intelligent Systems and Unmanned Equipment (2024) **–** *Teaching assistant* 2024 March – 2024 May

Publications

- **Jiaxin Li**, Taogang Hou*, Xuan Pei, Hao Wang, Tianhui Liu, "A spiral coverage path planning algorithm for non-omnidirectional robots" submitted to *Journal of Field Robotics.* **(JCR: Q2, Accepted)**.
- Hao Wang, Taogang Hou*, Tianhui Liu, **Jiaxin Li**, Tianmiao Wang, "Encoded Marker Clusters for Auto-Labeling in Optical Motion Capture," submitted to *Transactions on Graphics.* **(JCR: Q1, Accepted)**.
- **Jiaxin Li**, Xuan Pei, Hongjie Liu, Shuai Su, Tao Tang, Taogang Hou*, "A Novel Train Operation Simulation System Based on Intelligent Mobile Robot and ROS Communication Network," *34th Chinese Control and Decision Conference (CCDC)*. IEEE, 2022: 97-102. (Oral Report)

Honors and Awards

- **Honors:** Three Good Student (2022), First-class Scholarship ×3, BJTU 2022 - 2024
- Second Prize at the National Level of the 13th 'Challenge Cup' China College Students Entrepreneurship Plan Competition, BJTU 2023 **(Percentage: 0.09%)**
- Bronze Award at the National Competition of the 8th China International 'Internet Plus' College Students Innovation and Entrepreneurship Competition, BJTU 2023 **(Percentage: 0.062%)**
- Second Prize in the 2023 'Challenge Cup' Extracurricular Academic and Technological Works Competition for Capital College Students, BJTU 2023 **(Percentage: <15%)**
- Outstanding Undergraduate Thesis, BJTU 2022 **(Percentage: <10%)**

Skills

- **Tools & Platforms**: LaTeX, ROS, Linux, Matlab / Simulink, Qt, Gazebo, Rviz, CasADi, SciPy, OpenCV
- **Programming & Algorithms**: C / C++, Python, familiar with ML, RL, DL

Extracurricular Activities

Graduate Student Union of Beijing Jiaotong University, Beijing, China **2022 Sep – 2023 Jun**

- Led students attendance at the China Scientific Instrument Standardization Forum.
- Organized pre-competition tutoring sessions for the China Graduate Electronics Design Competition.