Jiaxin Li

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Education

Beijing Jiaotong University, Beijing, China **2022 Sep – 2025 Jun (Expected)**
MS in Control Science and Engineering, GPA 92.27 / 100
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 Experience

Multi-UAV Trajectory Planning and Tracking Control – *Principal Investigator* **2023 Oct – Present**

- Developing a mathematical 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 multi-objective optimization to achieve efficient UAV assignment and trajectory planning, ensuring optimal resource allocation and coordination.
- Implemented a geometric control method for accurate trajectory tracking.

Airport Runway Inspection Robot – *Principal investigator* **2022 Sep – 2023 Jul**

- 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 offers greater stability compared to reinforcement learning-based methods.
- Integrated the YOLOv5 algorithm for real-time detection of surface cracks on airport runways.
- Published a paper as the first author in the *Journal of field Robotics* (JCR: Q2), currently under revision.

Dense Crowd Monitoring: Counting and Tracking – *Principal investigator* **2022 Feb – 2022 Aug**

- Developed an algorithm to track pedestrians in dense urban environments, addressing challenges like target occlusion and multi-target interference.
- Enhanced tracking robustness by integrating spatial density information with motion estimation, leading to improved accuracy in complex scenarios.
- Implemented tracking optimization strategies inspired by the DeepSORT algorithm, enhancing the reliability of pedestrian tracking in crowded spaces.

Train Simulation and Demonstration Platform – *Principal investigator* **2021 Jul – 2021 Nov**

- 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.

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 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.

Teaching Experience

- 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* (under revision).
- 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.

Additional Info and Awards

- Skilled in ROS, Linux, Matlab, Python, C / C++, Qt, Latex
- First-class Scholarship ×3, BJTU 2022 - 2024
- Second Prize in the North China Division of the 18th China Graduate Electronics Design Competition, BJTU 2023
- Bronze Award at the National Competition of the 8th China International 'Internet Plus' College Students Innovation and Entrepreneurship Competition, BJTU 2023
- Second Prize at the National Level of the 13th 'Challenge Cup' China College Students Entrepreneurship Plan Competition, BJTU 2023
- Second Prize in the 2023 'Challenge Cup' Extracurricular Academic and Technological Works Competition for Capital College Students, BJTU 2023
- Outstanding Undergraduate Thesis, BJTU 2022

Extracurricular Activities

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

Executive Member of the Scientific Research and Innovation Department

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