

Juncheng Li

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EDUCATION

Nanyang Technological University

Ph.D. in Electrical & Electronic Engineering, NTU

GPA: 5.0/5.0; NTU Research Scholarship

Singapore

Jul. 2017 - Now

Supervisor: [Prof. Lihua Xie](#)

Tsinghua University

Bachelor in Mechanical Engineering, THU

GPA: 87.97/100

Beijing, China

Aug. 2013 - Jun. 2017

RESEARCH

Motion Planning and Control for Automated Guided Vehicles

- Developed a hierarchical trajectory planning and control framework for real-time autonomous navigation of AGVs in warehouse environments without landmarks.
- It can provide accurate tracking performance and handle large uncertainties of the robot dynamics.

Multi-Robot Motion Coordination

- Proposed an efficient motion planning method to generate safe, dynamically feasible, and near-optimal trajectories for multiple non-holonomic robots in a shared workspace.
- The computation time is considerably reduced with a small impact on the optimality of the plans.

Map-less Navigation via Deep Reinforcement Learning

- Developed a DRL-based autonomous navigation method that directly maps raw sensor data and goal information to control commands.
- Proposed a behavior-fusion framework to reduce the learning complexity and enable risk-aware navigation of robots in unknown environments.

SELECTED PUBLICATIONS

Journal Papers

1. **Juncheng Li**, Maopeng Ran, and Lihua Xie, “Efficient Trajectory Planning for Multiple Non-Holonomic Mobile Robots via Prioritized Trajectory Optimization”, in *IEEE Robotics and Automation Letters (RA-L)*, 2021. [[Paper](#)] [[Code](#)] [[Video](#)]
2. **Juncheng Li***, Maopeng Ran*, and Lihua Xie, “Design and Experimental Evaluation of a Hierarchical Controller for an Autonomous Ground Vehicle with Large Uncertainties”, in *IEEE Transactions on Control Systems Technology*, 2021. [[Paper](#)] [[Video](#)] (* equal contribution)
3. **Juncheng Li**, Maopeng Ran, and Lihua Xie, “A Behavior-Based Mobile Robot Navigation Method with Deep Reinforcement Learning”, in *Unmanned Systems*, 2021. [[Paper](#)] [[Video](#)]
4. Maopeng Ran, **Juncheng Li** and Lihua Xie, “Reinforcement-Learning-Based Disturbance Rejection Control for Uncertain Nonlinear Systems”, in *IEEE Transactions on Cybernetics*, 2021. [[Paper](#)]
5. Maopeng Ran, **Juncheng Li** and Lihua Xie, “A New Extended State Observer for Uncertain Nonlinear Systems”, in *Automatica*, 2021. [[Paper](#)]

Conference Papers

6. **Juncheng Li**, Maopeng Ran, and Lihua Xie, “MPC-Based Unified Trajectory Planning and Tracking Control Approach for Automated Guided Vehicles”, in *IEEE International Conference on Control and Automation (ICCA)*, 2019. [\[Paper\]](#) [\[Video\]](#)
7. Han Wang, **Juncheng Li**, Maopeng Ran, and Lihua Xie “Fast Loop Closure Detection via Binary Content”, in *IEEE International Conference on Control and Automation (ICCA)*, 2019. [\[Paper\]](#) [\[Video\]](#)
8. Maopeng Ran, **Juncheng Li**, and Lihua Xie, “Active Disturbance Rejection Time-Varying Formation Tracking for Unmanned Aerial Vehicles”, in *IEEE International Conference on Control, Automation, Robotics and Vision (ICARCV)*, 2020. [\[Paper\]](#)

PROJECT EXPERIENCE

Development of Dynamic Reconfigurable Material Handling System

2017-Now

Delta-NTU Corporate Laboratory for Cyber Physical Systems

- The project aims to develop a universal navigation solution that is adaptable to all types of industry AGVs in manufacturing.
- The technologies used in this project include simultaneous localization and mapping (SLAM), path and trajectory planning, collision avoidance, robust and accurate tracking control, auto-charging and docking, etc. [\[Demo1\]](#) [\[Demo2\]](#)
- It provides a cost-efficient solution to upgrade conventional AGVs into smart ones.

SKILLS & PROFICIENCY

Research	Mobile Robot Motion Planning Robust Nonlinear Control Deep Reinforcement Learning (DRL)
Engineering	Robotics Operating System (ROS) Automated Guided Vehicle (AGV) Simultaneous localization and mapping (SLAM) Programming Ability in C/C++ and Python