Chengkai Wu

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Education

Harbin Institute of Technology, Shenzhen 2022/09 -- 2025/01 (Expected)
M.Eng in Control Engineering Shenzhen, China

Xidian University 2018/09 -- 2022/06
B.Eng in Electronic Information Engineering Xi'an, China
- GPA: 3.8/4.0, Rank: 1%

Publications

- Real-time Whole-body Motion Planning for Mobile Manipulators Using Environment-adaptive Search and Spatial-temporal Optimization. **Chengkai Wu***, Ruilin Wang*, Mianzhi Song, Fei Gao, Jie Mei, Boyu Zhou†. *2024 IEEE International Conference on Robotics and Automation* (**ICRA 2024**).
- Interaction-Aware Autonomous Exploration with an Eye-in-hand Mobile Manipulator. Mianzhi Song, **Chengkai Wu**, Xinyi Chen, Yichen Zhang, Jinni Zhou, Shaojie Shen, Jie Mei, Boyu Zhou†. (In submission).

Research Experience

Smart Autonomous Robotics Group - Sun Yat-sen University 2022/12 -- Present
Visiting Student, advised by Prof. Boyu Zhou Zhuhai, China
- Designed an environment-adaptive path searching method for mobile manipulators, achieving a higher quality path with reduced computation time compared to *RRT*-Connect*.
- Developed a spatial-temporal optimization method to generate smooth, agile, safe, and dynamically feasible trajectories for mobile manipulators, outperforming CHOMP by a factor of approximately 10 in computation time efficiency.
- Established a physical platform for mobile manipulators, achieving real-time whole-body trajectory planning within 500ms in indoor scenes containing various obstacles using onboard computer.
- Designed a novel representation, called hidden frontier, along with a viewpoint sampling method that together provide suitable perspectives for complete detection of interactable objects, resulting in higher coverage rate.
- Proposed a method named Constrained Whole-body Configuration Database, accelerating the acquisition of feasible configurations by about 20 times compared to baseline method given a desired viewpoint.
- Published one paper to ICRA 2024 and submitted one paper to IROS 2024.

DJI RoboMaster University AI Challenge Competition - Team MAS 2022/09 -- 2022/11
Team Leader, advised by Prof. Jie Mei Shenzhen, China
- Developed code for drone trajectory planning and SE(3) controller to enable the drone to cross target circles at average speeds exceeding 8m/s in simulation.
- Designed and built a physical platform for drones, deployed algorithms, and successfully crossed ten circles within 39 seconds in real-world competition.

Field Autonomous System & Computing Lab - Zhejiang University 2021/07 -- 2021/09
Research Assistant, advised by Prof. Yanjun Cao Huzhou, China
- Developed algorithms for drone decision-making and path planning, and deployed code onto a physical drone platform.
- Designed a user interface for drone operation using ROS Qt.

Open-Source Projects

Smart Autonomous Robotics Group 2023/01 - Present
- **Contributor of** REMANI-Planner **(★18)**. A motion planning method capable of generating high-quality, safe, agile and feasible trajectories for mobile manipulators in real time.

Honors and Awards

National Second Prize - RoboMaster 2022-2023 University AI Challenge Competition Nov. 2022
Provincial First Prize - Contemporary Undergraduate Mathematical Contest in Modeling Dec. 2020
First-class Scholarship Oct. 2023
First-Class Senior Scholarship Dec. 2020

Technical Skills

- **Programming Languages:** C/C++(ROS), Python, MATLAB
- **Tools:** Gazebo, Isaac Sim, Unity, Git, LaTeX, LBFGS, ACADOS

Last Updated on March 27, 2024