

TANG JIAWEI

+852-65531607 ✉ jtangas@connect.ust.hk 🌐 Garyandtang

Educations

Hong Kong University of Science and Technology

PhD in Electronic & Computer Engineering

Sept. 2022 – Jul. 2025

Supervisor: Prof. Ling Shi

Hong Kong University of Science and Technology

MPhil in Electronic & Computer Engineering

Sept. 2019 – Aug. 2021

Supervisor: Prof. Ling Shi

Hong Kong Polytechnic University

BEng(Hons) in Electronic & Information Engineering

Sept. 2014 – Jun. 2019

Prof. Kenneth Lam

Working Experiences

RoboticsX, Tencent

Research Intern

Nov. 2024 - Present

Shen Zhen, CN

- Designed and implemented a two-step deep RL framework for object capture using the robot arm and dexterous hand.
- Developing a reinforcement-learning-based impact-aware object-throwing framework for humanoid robots.

Noah's Ark Lab, Huawei

Research Intern

Jun. 2023 - Nov. 2023

Hong Kong, CN

- Designed balancing control algorithm for wheeled-legged robot with optimal control theory and reinforcement learning.
- Developed a Python simulation platform to facilitate rapid deployment in real robots.
- Published one first-author paper on geometric control in IEEE Robotics & Automation Letters (RAL).

Autonomous Driving Solution, Huawei

Algorithm Engineer

Oct. 2021 - Aug. 2022

Shanghai, CN

- Served as a C++ software engineer and contributed 3000 lines C++ code per month to Huawei's navigation engine.
- Maintained and developed new features for cloud-based navigation; Implemented data structure for cloud-based map.
- Recorded daily on-road test results from test engineers; Coordinated software engineers from different teams to debug.

Robotics Institute, Carnegie Mellon University

Research Intern

Jun. 2018 - Aug. 2018

Pittsburgh, US

- Developed an efficient extrinsic calibration toolbox for camera and 3D LiDAR with a user-friendly GUI.
- Presented the work in the CMU RISS poster section; Report available in pp.140-144 of [RISS Journal].

Research Works

Lie-algebra Control, Optimization and Learning | *Lie theory, Optimal Control, Python*

Dec. 2023 - Present

- Investigated Lie theory and the affine property of the group system and derived state-independent error dynamics.
- Designed Lie-algebra optimal control and data-driven algorithm for wheeled robots subject to model uncertainty.
- Derived the condition for Lie-algebra-based optimal control on stabilizability about a trajectory.

Trajectory Optimization for High-order Systems | *Optimization, Numerical Analysis*

Dec. 2022 - Sept. 2024

- Indicated the contradictory dynamics issues of existing numerical optimization methods for high-order systems.
- Designed modified direct transcription schemes and proved the superior theoretical performance of proposed methods.
- Completed two first-author papers and submitted them to the top-tier journal (*RAL*) and conference (*ECC*).

Advanced Motion Control for Mobile Robots | *Robotics, Planning, C++*

Sept. 2022 - Mar. 2023

- Led a five-person team to build a mobile robotic platform with perception, planning, and control systems from scratch.
- Designed the overall system and developed various control, planning, and state estimation algorithms.
- Conducted various simulations and physical experiments; Successfully demonstrated automatic navigation at HKUST.

Multi-robot Testbed | *Optimization, State Estimation, C++*

Jan. 2020 - Mar. 2021

- Cooperated with two MPhils to build a physical multi-robot testbed and a ROS-based simulation platform from scratch.
- Implemented various algorithms, including formation control, path planning with MPC, and extended Kalman filter.
- Completed and published one paper as the first author at *ASCC* and one as the third author at *ICPS*.

Extracurricular Activities

- HKUST Hall Tutor:** guides and supports UG students to foster a positive hall community. Aug. 2024 - Present
- Oversea Volunteer:** Continued contribution to the local village development in Phnom Penh, Cambodia. Jun. 2017
- Oversea Volunteer:** built a zero-carbon study center for local primal school in Phnom Penh, Cambodia. Jun. 2016
- Oversea Volunteer:** built solar panel charging stations for local villagers in Phnom Penh, Cambodia. Jun. 2015
- Volunteer:** built 3D-print zero-carbon building for local villagers in Ya'an Sichuan. Sept. 2017 - Jun. 2018
- International Student Ambassador:** promoted Chinese traditional culture in PolyU. Sept. 2016 - Jun. 2017

Publication

Submitted Papers

- [3] **Jiawei Tang**, Shilei Li, and Ling Shi, “Lie-algebra Adaptive Tracking Control for Rigid Body Dynamics.” Submitted.
- [2] **Jiawei Tang**, Yuxing Zhong, Nachuan Yang, Shuang Wu, Jiming Chen, and Ling Shi, “A Revisit on Direct Collocation: How to Simplify the Approximations Used in Numerical Optimal Control?” Submitted.
- [1] **Jiawei Tang**, Nachuan Yang, Shuang Wu, Shilei Li, Dawei Shi, and Ling Shi, “Lie-algebra Learning-based Tracking Control for Differential Wheeled Robots with Model Uncertainty.” Submitted.

Journal Papers

- [6] Pengyu Wang, **Jiawei Tang**, Hi Wang Lin, Fan Zhang, Chaoqun Wang, Jiankun Wang, Max Q.-H Meng, and Ling Shi, “MINER-RRT: A Hierarchical and Fast Trajectory Planning Framework in 3D Cluttered Environments.” *IEEE Transactions on Automation Science and Engineering (TASE)*.
- [5] Yuqiang Jin, Wen-An Zhang, **Jiawei Tang**, Hu Sun, Ling Shi, “A Nonlinear Filter for Pose Estimation Based on Fast Unscented Transform on Lie Groups.” *IEEE Robotics and Automation Letters (RAL)*, 2024.
- [4] Zikai Wang, Xiaoqi Zhao, Jiekai Zhang, Nachuan Yang, Penyu Wang, **Jiawei Tang**, Jiuzhou Zhang, Ling Shi, “APF-CPP: An Artificial Potential Field Based Multi-robot Online Coverage Path Planning Approach.” *IEEE Robotics and Automation Letters (RAL)*, 2024.
- [3] **Jiawei Tang**, Shuang Wu, Bo Lan, Yahui Dong, Yuqiang Jin, Guangjian Tian, Wen-An Zhang, Ling Shi, “GMPC: Geometric Model Predictive Control for Wheeled Mobile Robot Trajectory Tracking.” *IEEE Robotics and Automation Letters (RAL)*, 2024.
- [2] Yuxing Zhong, **Jiawei Tang**, Nachuan Yang, Dawei Shi, Ling Shi, “Event-triggered Sensor Scheduling for Remote State Estimation with Error-Detecting Code.” *IEEE Control Systems Letters (L-CSS)*, 2023.
- [1] Nachuan Yang, **Jiawei Tang**, Yik Ben Wong, Yuzhe Li, and Ling Shi, “Linear Quadratic Control of Positive Systems: A ProjectionBased Approach.” *IEEE Transactions on Automatic Control (TAC)*, 2022.

Conference Papers

- [4] **Jiawei Tang**, Yuxing Zhong, Pengyu Wang, Xingzhou Chen, Shuang Wu, Ling Shi, “Direct Shooting Method for Second-order Systems: An Improved Transcription Method.” *European Control Conference (ECC)*, 2024.
- [3] **Jiawei Tang**, Yik Ben Wong, Zhengyu Fu, Nachuan Yang, Sil Kwong Tse, Winnie Leung, Ling Shi, “Motion Planning for Mobile Robots with Noise: A Probabilistic MPC Approach.” *Asian Control Conference*, 2022.
- [2] Nachuan Yang, **Jiawei Tang**, Yuzhe Li, Ling Shi, “LQR Design for Discrete-Time Positive Systems: A First-Order Method”, *IEEE Conference on Decision and Control*, 2022.
- [1] Sil Kwong Tse, Yik Ben Wong, **Jiawei Tang**, Peihu Duan, Suk Wai Winnie Leung, Ling Shi, “Relative State Formation-based Warehouse Multi-robot Collaborative Parcel Moving”, *ICPS*, 2021.

Talks and Presentations

- | | |
|---|-----------|
| • International Conference on Intelligent Robots and Systems Oral Presentation , Abu Dhabi | Oct. 2024 |
| • 22nd European Control Conference Oral Presentation , Stockholm, Sweden | Jun. 2024 |
| • 13th Asian Control Conference Invited Talk , Jeju Island, Korea (Online) | May. 2022 |

Teaching

- | | |
|---|-------------|
| • ELEC1100 Introduction to Electro-Robot Design, HKUST | Spring 2024 |
| • ELEC5650 Introduction to Networked Sensing, Estimation and Control, HKUST | Spring 2023 |
| • ELEC1100 Introduction to Electro-Robot Design (Online Mode), HKUST | Spring 2020 |

Awards

- | | |
|--|-----------------|
| • UG Hall Student Tutorship, HKUST | 2024.7 |
| • University Grants Committee Research Travel Grant (10K HKD), HKUST | 2024.7 & 2025.1 |
| • Postgraduate Studentship (650K HKD), HKUST | 2022.9-2025.8 |
| • Postgraduate Studentship (430K HKD), HKUST | 2019.9-2021.8 |
| • UG Summer Research Abroad Sponsorship (50K HKD), PolyU | 2018.6 |
| • Mingxi Outstanding Youth Award (5K HKD) | 2017.11 |
| • Hall Residences with Outstanding Contribution (2 of 250) | 2017.7 |
| • Second Runner-up Award of Robotic Challenge 2016, PolyU | 2016.8 |
| • HKSAR Government Scholarship Fund - Reaching Out Award (10K HKD) | 2016.6 |
| • Best Sem GPA Award; Dean’s List Honor; International Student Ambassador Scheme Outreaching Award | |

Others

Programming: C++, Python, MATLAB

Language: Fluent in English, Mandarin and Cantonese