TANG JIAWEI

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

Educations

Hong Kong University of Science and Technology **Sept. 2022 – Jul. 2025**
PhD in Electronic & Computer Engineering *GPA: 3.65*

Hong Kong University of Science and Technology **Sept. 2019 – Aug. 2021**
MPhil in Electronic & Computer Engineering *GPA: 3.77*

Hong Kong Polytechnic University **Sept. 2014 – Jun. 2019**
BEng(Hons) in Electronic & Information Engineering *GPA: 3.56*

Working Experiences

Noah's Ark Lab, Huawei **Jun. 2023 - Nov. 2023**
Research Intern *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).
- Recorded weekly paper sharing on AI, control, optimization and robotics.

Autonomous Driving Solution, Huawei **Oct. 2021 - Aug. 2022**
Algorithm Engineer *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 **Jun. 2018 - Aug. 2018**
Research Intern *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

Learning-based Geometric Optimal Tracking Control | *RL, Optimal Control, Python* **Dec. 2023 - Aug. 2024**

- Investigated Lie theory and formulated model-based optimal Lie-algebra tracking control for wheeled mobile robots.
- Designed Q-learning algorithm using Bellman's optimal principle for tracking control subject to model uncertainty.
- Completed one first-author paper and submitted it to the top-tier control and robotics journal.

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**, 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.

[2] **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.

[1] 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." Submitted to *IEEE Transactions on Automation Science and Engineering (TASE).*

Journal Papers

[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

- **22nd European Control Conference Oral Presentation**, Stockholm, Sweden — Jun. 2024
- **HKUST PhD Seminar Oral Presentation**, HKUST — Mar. 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
- 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