

Haitao Liu

✉ htl@buaa.edu.cn |  [LHT-Liu](https://github.com/LHT-Liu) |  [lht-liu.github.io](https://github.com/lht-liu) |  [Blog](#) |  [Bilibili](#) | Chinese

Education

Beihang University

Doctor of Mechanical Engineering

September 2021 – February 2026 (Expected)

Beijing, China

- Research Interests: Robot Control, Imitation Learning and Reinforcement Learning.

North China University of Technology

M.Eng. degree in Mechanical Engineering

September 2018 – June 2021

Beijing, China

- GPA 3.77/4. Dynamics of Electromechanical Systems: 100 / 100 (full marks).

Liaocheng University

B.Eng. degree in Mechanical Design & Manufacturing and Automation

September 2014 – June 2018

Shandong, China

- GPA 3.74/4. 97+ Courses: Higher Mathematics(I,II), C Language Program Design and others.

Publications

Journal Articles

- **TMECH 2025** PR-IMP²-STOMP: PRObabilistically-Informed Motion Primitives for IMPedance control with STOMP Motion Planning in contact-rich manipulation tasks (submitted). *Yong Tao, Haitao Liu, Weiqi Fu, Xiaotong Wang, Sipu Ruan.*
- **JCISE 2025** Dynamic Tip-Over Avoidance Method for Mobile Manipulators Based on the Extended Zero-Moment Point Algorithm for Human-Robot Collaboration. *Yong Tao, Haitao Liu, Yian Song, Changyi Deng, Baicun Wang, Pai Zheng.*
- **Robotica 2024** Robot hybrid inverse dynamics model compensation method based on the BLL residual prediction algorithm. *Yong Tao, Shuo Chen, Haitao Liu, Jiahao Wan, Hongxing Wei, Tianmiao Wang.*
- **Electronics 2023** An Off-Line Error Compensation Method for Absolute Positioning Accuracy of Industrial Robots Based on Differential Evolution and Deep Belief Networks. *Yong Tao, Haitao Liu, Shuo Chen, Jiangbo Lan, Qi Qi, Wenlei Xiao.*
- **JME 2022** Research Progress and Industrialization Development Trend of Chinese Service Robot. *Yong Tao, Haitao Liu, Tianmiao Wang, Dongming Han, Gang Zhao.*

Refereed Conference Papers

- **IROS 2025** Peg-in-hole assembly method based on visual reinforcement learning and tactile pose estimation (Accepted). *Yong Tao, Shuo Chen, Haitao Liu, He Gao, Yu Tao, Yixian Chen, Hongxing Wei.*
- **WRC SARA 2022** Optimal Grasping Pose Selection Method for Dual-arm Robot Based on Improved Genetic Algorithm. *Yong Tao, Jiahao Wan, Haitao Liu, He Gao, Yufang Wen.*

Research & Project Experiences

Robot imitation learning and guided motion planning (2025) (Research)

- Presented a novel skill learning method combining the probabilistically-informed motion primitives (PRIMP) method and variable impedance control, denoted as PR-IMP². The method can learn and generalize to different Lie groups such as $SE(3)$ (trajectory) and $SPD(3)$ (stiffness) simultaneously.
- Developed a new motion planner, Impedance-STOMP, as an extension of the existing STOMP algorithm, to enable the robot to avoid novel obstacles not encountered during demonstrations.
- The proposed method can be applied to contact-rich scenarios that rely on human skills, such as robotic massage therapy and apple picking tasks.

Dynamic Tip-Over Avoidance Method for Wheeled Mobile Manipulators (2024) (Research)

- Development of a 3D ZMP algorithm designed for mobile manipulators.
- Integration of the proposed algorithm with dynamic weight matrix adjustment, facilitating real-time motion distribution to improve stability and adaptability.
- Proposal of a dynamic tip-over avoidance strategy that considers complex environmental constraints, ensures safe and efficient operation in various scenarios.

NSFC General Program — Research on Cooperative Control Algorithm of Mobile Dual-Arm Manipulation Robot for Human-Robot Cooperative Assembly (2024-2027) (Project)

- Experienced in drafting proposals, project defenses, and annual reviews for NSFC projects, with a solid understanding of the full application and execution process.
- Propose a Lie group-based modeling framework for mobile dual-arm manipulation robots, in which a centroidal kinematic model and a decoupled dynamic model are developed. To enable compliant interaction with the environment, a variable impedance control scheme is integrated at the whole-body level.

National Key R&D Program — Integrated Platform for Industrial Robot Process Applications (2022-2025) (Project)

- Participated in proposal writing, defense, and project reviews, gained hands-on experience in project execution and team coordination, gained expertise in national-level project management.
- Led the sub-topic “Intelligent Learning and Optimization for Typical Processes” with major milestones completed and project completion expected in October.

High-Quality Development Special Program by the Ministry of Industry and Information (Project)

★ Mobile Manipulator Project, 2022.

- Participated in the preparation of the project proposal, which was successfully awarded; involved in the development of control algorithms for the integrated system of a mobile manipulator.

High-Quality Development Special Program by the Ministry of Industry and Information (Project)

★ Multi-channel Minimally Invasive Vascular Interventional Surgical Robot Project, 2023.

- Participated in the preparation of the project proposal, which was successfully awarded; contributed to the research on key technologies such as force control and compliant control for robots.

Industry-Collaborative Project (Project and Research)

★ Development of a Compliant Robotic System with Joint Torque Sensors (Phase I) (2018-2020)

- Principal Investigator and Key Contributor. Developed the control system for a collaborative robot equipped with joint torque sensors using TwinCAT3 software and the EtherCAT fieldbus.

Industry-Collaborative Project (Project and Research)

★ Research on Full-Space Impedance Control with Multi-Joint Force/Torque Perception (Phase II) (2020-2022)

- Major Participant. Investigated time-varying impedance control methods for robotic arms, enabling safe and stable operation with dual force–position feedback. Achieved compliant human–robot interaction and force-sensitive task execution.

Internship Experience

AUBO (Beijing) Robotics Technology Co., Ltd

March 2021 –September 2021

Robotics Algorithm Engineer

Beijing, China

- Developed robotic control algorithms for AUBO collaborative robots using Qt framework on Ubuntu.
- Designed and implemented unit tests using the unittest framework to ensure algorithm robustness and reliability.

Beijing Aerospace Measurement & Control Technology Co., Ltd.

May 2020 –November 2020

R&D center staff

Beijing, China

- A control system for collaborative robots was developed based on TwinCAT3.
- An impedance control strategy was implemented to enable compliant operations, including constant-force polishing.

Honors and Awards

Outstanding Graduate Student

May 2025

Graduate Academic Scholarship (second-class)

November 2024

Frontrunner 5000 Top Articles in Outstanding S&T Journals of China

September 2023

Graduate Study Scholarship at NCUT (first-class)

November 2020

Graduate Study Scholarship at NCUT (first-class)

November 2019

Outstanding Graduate of Shandong Province (No. 201814223)

December 2018

The First Prize in the 9th National Undergraduate Mathematics Competition

November 2017

- (Non-Mathematics Major Category), Shandong Province Division (No. CMS F2017026)

China National Scholarship for Undergraduate Students (No. 2015-34383)

November 2015

Skills

Programming Languages: C++, Python, Matlab and Tex.

Software Skills: ROS, CoppeliaSim, Mujoco, Isaac Lab.

Languages: English: Proficient (Academic and Technical Writing, Fluent Speaking); Mandarin Chinese: Native.