Xinyu Jia

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EDUCATION

National University of Singapore   **Singapore, Singapore**
Ph.D. in Engineering (Robotics)   *2020.08 - 2025.01*
Thesis: Efficient Motion Control via Estimation and Optimization for Robotic Manipulation

Jilin University   **Changchun, China**
B.Eng. in Vehicle Engineering   *2014.09 - 2018.06*

RESEARCH INTERESTS

Motion Planning, Motion Control, Optimization, Model Predictive Control, Robust Control, Nonlinear Control, Robot Manipulation, Robot Locomotion, Robot Perception, Robot System Design, Mechatronics

SKILLS AND EXPERTISE

Programming: C++, Python, MATLAB
Libraries and Tools: ROS, Gazebo, MoveIt, CoppeliaSim, ViSP, Pinocchio, Crocoddyl, CasADi, QuadProg, qpOASES, Ipopt, Eigen, Numpy, pthreads, CMake, Arduino, CAN, UDP, TTL, CATIA, AutoCAD, Adams, ANSYS, Altium Designer
Languages: Chinese (mother tongue), English (fluent)

WORK EXPERIENCE

NUS Advanced Robotics Centre, Singapore
Research Engineer   *2022.04 - 2023.04*
- Developed novel motion planning and control algorithms for high-degree-of-freedom robots.
- Designed and built an 18-DoF quadruped manipulator for dynamic loco-manipulation (link).
- Designed and developed a 12-DoF bimanual cobot for physical human-robot interaction (link).

NUS Advanced Robotics Centre, Singapore
Research Assistant   *2021.07 - 2022.03*
- Developed a 12-DoF, 16.5 kg, electrically actuated, torque-controllable quadruped robot.
- Designed and developed a 6-DoF, 3.5 kg robotic arm with 1 kg payload at 0.6 m maximum reach.

Shenzhen DJI Technology Co., Ltd., China
Mechanical Engineer   *2018.07 - 2020.06*
- Developed hardware of an electronic control unit and a stereo camera for autonomous driving.

Shenzhen DJI Technology Co., Ltd., China
Chassis Engineer (Intern)   *2018.01 - 2018.05*
- Analyzed and evaluated vehicle chassis performance via numerical simulation.

COMPETITION EXPERIENCE

2018 Formula Student China (FSC 2018)
Technical Consultant   *2017.12 - 2018.06*
- Provided technical direction for Gspeed Formula Racing Team (link).
- Led the design and development of a carbon-fiber-reinforced-polymer (CFRP) monocoque chassis.

2017 Formula Student China (FSC 2017)
Technical Leader   *2016.12 - 2017.11*
- Led the development of a racing chassis including suspension, steering, and braking systems (link).
- Proposed and built a novel third-spring suspension system, enhancing vehicle handling stability.

2016 Formula Student China (FSC 2016)
Head of a Suspension Group   *2015.12 - 2016.11*
- Led the development of a suspension system involving simulation, design, integration, and testing.

2015 Formula Student China (FSC 2015)
Member of a Suspension Group   *2014.12 - 2015.11*
- Designed, optimized, and implemented a lightweight suspension upright structure for a race car.

PUBLICATIONS

- **X. Jia**, W. Wang, J. Yang, Y. Pan and H. Yu, "Multi-layered safety of redundant robot manipulators via task-oriented planning and control," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2025 (under review).
- **X. Jia**, J. Yang, T. Shi, W. Wang, Y. Pan and H. Yu, "Robust Precision Motion Control based on Enhanced Unknown System Dynamics Estimator for High-DoF Robot Manipulators," *IEEE/ASME Transactions on Mechatronics*, 2024.
- **X. Jia**, J. Yang, K. Lu, Y. Pan and H. Yu, "Enhanced Robust Motion Control based on Unknown System Dynamics Estimator for Robot Manipulators," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2024.
- J. Yang, **X. Jia**, Z. Hou, Y. Pan and H. Yu, "Robust Reference Tracking of Linear Uncertain Systems via Uncertainty Estimation and Composite Control," in *IEEE Conference on Decision and Control (CDC)*, 2023.
- K. Lu, S. Han, **X. Jia** and H. Yu, "Inverse Optimal Adaptive Prescribed Performance Control With Application to Compliant Actuator-Driven Robot Manipulators," in *IEEE Conference on Decision and Control (CDC)*, 2023.

HONORS AND AWARDS

- **Competitions:** National Champion of FSCC 2018, First Prize of FSC 2017, Second Prize of FSC 2016
- **Academics:** Third Class Scholarship & Individual Scholarship in 2018, Third Class Scholarship in 2015

INVITED TALKS

- "Multi-layered Safety of Redundant Robot Manipulators" (NUS Graduate Seminar, 2024.10.30).
- "Motion Control Methods for High Degree of Freedom Robots" (TechBeat, video, 2024.06.13).
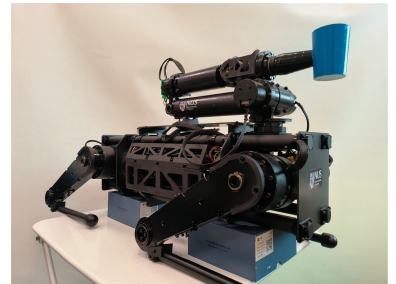- "Locomotion Control for a Quadruped Robot" (NUS Graduate Seminar, 2021.08.25).

ROBOTS I BUILT
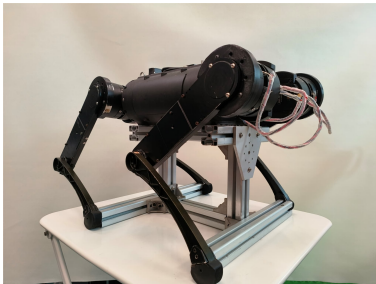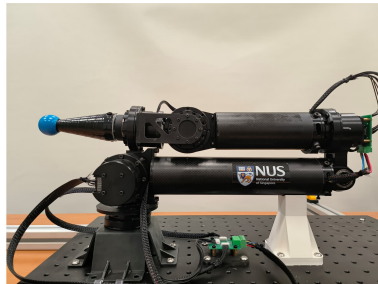
| Quadruped Robot | Robotic Manipulator | Bimanual Cobot | Quadruped Manipulator |