

Jianghan Zhang

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Education

New York University, New York, NY.

Jan 2022 – May 2025

- B.S. in Mechanical Engineering, minor in Robotics and Mathematics
- GPA: 3.934/4.0

(Transferred from Beijing University of Posts and Telecommunications in January 2022)

Research Experience

Undergraduate Research Assistant, Machines in Motion Lab, NYU

Jun 2023 – Present

Advised by Prof. Ludovic Righetti

Research Project: Accelerated gradient descent algorithm for MPC

Jun 2023 - Apr 2024

Keywords: Non-linear MPC, Accelerated Gradient Descent, C++, Real-robot deployment

- Designed and developed an accelerated gradient descent algorithm for real-time, high-frequency Nonlinear Model Predictive Control, achieving performance comparable to Differential Dynamic Programming at 1 kHz (LBR paper accepted by the 21st International Conference on Ubiquitous Robots)
- Enhanced solver efficiency by systematically investigating various first-order optimization algorithms for non-linear MPC problems, resulting in an algorithm 4x faster than a SOTA DDP solver per iteration.
- Reduced computation time to **less than 1ms** per control cycle for a 7-DoF manipulator by implementing advanced acceleration techniques (e.g. parallelization) in C++, enabling high frequency deployment.
- Presented a poster of this work at the 21st International Conference on Ubiquitous Robots.

Research Project: Contact Implicit Trajectory Optimization

Jun 2024 - present

Keywords: Trajectory Optimization, MuJoCo, Contact Model, Dexterous Manipulation, Legged Locomotion

- Developing contact implicit trajectory optimization algorithms to enhance robotic interaction with environments, enabling dexterous manipulation and legged locomotion without pre-specified contact sequences.
- Integrated the MuJoCo contact model into trajectory optimization, effectively generating **a range of motion trajectories for a quadruped robot**.
- Exploring alternative contact models, including learned models, to enhance the performance and versatility of the algorithm for dexterous manipulation tasks.

Undergraduate Research Assistant, AI4CE Lab, NYU

Jun 2023 – Sep 2023

Advised by Prof. Chen Feng

Research Project: Predicting 3D Action Target from 2D Egocentric Vision for HRI

Keywords: Machine learning, HRI, Real-world Scenarios, Obstacle Avoidance, Human action prediction

- Improved safety and efficiency in Human Robot Interaction with a 3D human action target prediction algorithm from 2D egocentric vision using machine learning, and implemented real-world HRI demonstrations on a UR10E cobot (paper accepted by ICRA 2024)
- Augmented the size and diversity of the EgoPAT3D dataset and enhanced the baseline algorithm using a **large pre-trained model** and **human prior knowledge**.
- Proposed HRI demonstrations that showcased **real-world scenarios** where a human and a robot shared a common workspace
- Developed **obstacle avoidance** controllers to avoid the predicted human action targets.
- Integrated the algorithm with obstacle avoidance controllers and deployed the combined system on a UR10e for real-world HRI demonstrations.

Publications

EgoPAT3Dv2: Predicting 3d action target from 2d egocentric vision for human-robot interaction

Irving Fang^{*}, Yuzhong Chen^{*}, Yifan Wang^{*}, **Jianghan Zhang**[†], Qiushi Zhang[†], Jiali Xu[†], Xibo He, Weibo Gao, Hao Su, Yiming Li, Chen Feng[†] (*,† for equal contribution)

In 2024 IEEE International Conference on Robotics and Automation (ICRA) 2024

Accelerated gradient descent for high frequency Model Predictive Control

Jianghan Zhang, Armand Jordana, Ludovic Righetti

In 2024 21st International Conference on Ubiquitous Robots (UR) 2024 (As a late breaking results paper)

Work Experience

Java SWE, Beijing Qingzi Future Network Technology Co., Beijing, China

Jul 2019 - Sep 2019

- Implemented robust database systems and table structures for the ToTok Game Center platform, utilizing Spring Boot, JavaScript, and Linux.
- Applied architectural methodologies to support the design and optimization of backend functionalities, contributing to scalable and efficient data management.
- Collaborated with cross-functional teams to ensure database implementation strategies aligned with overall project objectives, enhancing system performance and user experience.

Technical Skills

Programming Languages: C++/C, Java, Python, SQL, MATLAB, T_EX

Frameworks/Libraries: ROS, Crocoddyl, Pinocchio, PyTorch, MuJoCo, Pybullet, Boost.Python, Numpy

Mechanical Engineering: SolidWorks, Fusion 360, Ansys (FEA), 3D Printing