Yuxin Li

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Education

University of Pennsylvania — Philadelphia, PA
Master of Science in Engineering, Mechanical Engineering and Applied Mechanics (Robotics track) — Sep 2023 – May 2025

Imperial College London — Online
Data Science Summer Course — Jun 2022 – Aug 2022

University of Nottingham, UK — Nottingham, UK
Exchange Student — Sep 2021 – Jul 2022

University of Nottingham, Ningbo (UNNC) — Ningbo, China
BEng (Hons) Mechanical, Material and Manufacturing Engineering — Sep 2019 – Jul 2023

Scholarships

2022 Provost's scholarship (Rank Top 5%), UNNC

Research Interests

Robotic Manipulation, Motion Planning and Control

Machine Learning, Deep Learning, Reinforcement Learning, LLMs

Publications

Preprints under review

P1. **Yuxin Li**. "Behavior Modulation for Dynamical System-based Motion Policy." *Under Review.*

Research Experience

GRASP Lab at the University of Pennsylvania — Philadelphia, PA
Research Assistant (Advisor: Dr. Nadia Figueroa) — May 2025 – Present

Behavior Modulation for Dynamical System-based Motion Policy

- Developed a real-time behavioral modulation system for robotic motion, utilizing a novel strategy to adapt Dynamical System-based policies for safety and task compliance;
- Leveraged Gaussian Process Regression and Riemannian geometry for online learning and safe adaptation, resulting in a system capable of handling unexpected external collisions or dynamic task changes.

Manipulability-Guided Motion Policy Optimization

- Acquired and pre-processed trajectory data from a UMI gripper and a motion capture system, and implemented a Quadratic Programming (QP)-based Inverse Kinematics solver for precise, real-time trajectory tracking;
- Engineered a novel manipulability-gradient optimization method to algorithmically modify human-demonstrated motions for safe, singularity-avoiding execution on a 7-DOF Franka Emika robotic arm.
- Implemented a robust motion planning algorithm, utilizing the combination of Gaussian Mixture Model clustering and Linear Parameter Varying Dynamical Systems to systematically encode complex human-demonstrated movements.

Rushworth's Lab at the University of Nottingham, Ningbo — Ningbo, China
Project Coordinator (Advisor: Dr. Adam Rushworth) — Sep 2022 – Jul 2023

Design and navigation of 4-wheel drive omni-directional robotic platform

- Spearheaded the design and fabrication of a custom omni-directional mobile robot, encompassing SolidWorks mechanical design, precise component selection, and full system assembly to achieve enhanced maneuverability and payload capacity;
- Engineered a customized ROS (Robot Operating System) navigation stack, improving SLAM and localization algorithms to enable robust, fully-autonomous navigation and path planning in cluttered or dynamic environments.

Dunant's Lab at University of Nottingham, Ningbo — Ningbo, China
Research Assistant (Advisor: Dr. Dunant Halim) — Jun 2021 – Aug 2021

Active Suspension Control Architecture and Mechanical Design

- Developed high-fidelity MATLAB/Simulink models for a motorcycle shock absorber system and implemented PID control algorithms to optimize the active suspension performance for an Electric Vehicle prototype;
- Executed mechanical design via SolidWorks to create and refine motorcycle frame component CAD models, followed by FEA structural analysis to ensure optimal integration and structural integrity of the suspension system.

Course Project

Robotic Grasp and Placement Challenge Philadelphia, PA

MEAM 5200 *Introduction to Robotics* Final Project Oct 2023 – Dec 2023

- Engineered a comprehensive control system in Python for the Franka Emika Panda 7-DOF robot, integrating a real-time Inverse Kinematics solver and a perception-based object detection pipeline to execute dynamic pick-and-place tasks;
- Developed robust manipulation and stacking algorithms that incorporate real-time environmental compensation via sensor fusion to handle positioning uncertainty, with validation across Gazebo simulation and physical hardware.

4WS-4WD Autonomous Racing Vehicle Control Philadelphia, PA

MEAM 5170 *Advanced Control and Optimization* Final Project Oct 2023 – Dec 2023

- Constructed a high-fidelity nonlinear vehicle dynamics model for a 4-wheel steering / 4-wheel drive (4WS-4WD) autonomous racing platform using the PyDrake simulation and control framework;
- Implemented a stable, minimum-time Model Predictive Control system incorporating track constraints, utilizing the SNOPT solver to efficiently compute control inputs.

Competition Experience

Formula Student Electric China Ningbo, China

Team Member, 2021 Season Third Prize Winner May 2021 – Aug 2021

- Engineered and implemented a distributed drive Electronic Differential System (EDS) to optimize torque vectoring and vehicle stability;
- Validated the EDS performance using MATLAB/Simulink models and integrated low-level motor control via PID control and direct PWM programming for precise actuator response;
- Integrated a LiDAR-based localization and mapping pipeline within ROS to provide the vehicle with real-time, high-precision environmental perception.

Skills

Programming Capabilities: ROS, ROS2, MATLAB, Python, C++

Simulation Environments: PyBullet, Gazebo, Isaac Gym

Deep Learning Frameworks: PyTorch, TensorFlow

Others: 3D modeling and printing, SolidWorks, FEA, RViz, Blender