# Jinyuan Zhang

## Education

**University of Pennsylvania** Philadelphia, US
*MSE in Robotics* Aug 2024 – May 2026

- Current GPA: 3.83/4.0
- Coursework: Machine Perception, Learning in Robotics, Advanced Robotics, Control and Opt. in Robotics.

**University College London** London, UK
*BEng in Electronic and Electrical Engineering* Sep 2020 – May 2024

- GPA: 3.9/4.0 (10%)
- Awarded for High-Scoring Final Year Dissertation
- Coursework: Analog Electronics, Digital Design, Control Systems, Introduction to Robotics.

## Academic Experience

**Model Predictive Control and Reinforcement Learning for Autonomous Drone Racing** Philadelphia, US
*Apr 2025 – May 2025*

- Implemented a linear MPC-based tracking controller to follow the offline planned time-optimal path.
- Implemented the PPO and related AC algorithms for continuous control tasks in PyBullet to train a quadrotor on a circular track for autonomous drone racing.

**Quadrotor's State estimation, Planning and Control** Philadelphia, US
*Jan 2025 – April 2025*

- Implemented a quaternion-based Error-State Kalman Filter for Visual-Inertial Odometry to estimate 6-DoF pose by fusing stereo vision and IMU measurements.
- Developed a motion planning pipeline that computes collision-free paths using A* in a voxel-based environment, refines waypoints via a DP algorithm, and generates a piecewise smooth trajectory through minimum-snap polynomial with full differential flatness outputs.
- Implemented an SE(3) geometric controller that performs position tracking via PD feedback (outer loop) and computes the desired attitude from the thrust direction and yaw angle for SO(3)-based nonlinear attitude stabilization (inner loop).

**Distributed Cooperative Control and Motion Planning for Multi-Agent Systems in Unknown Environments** London, UK
*Sep 2023 – Mar 2024*

- Developed a distributed control algorithm using a leader-follower strategy for multi-agent formation and containment control.
- Designed and proved a safety-guaranteed motion planning controller for obstacle avoidance by improving the artificial potential field method.
- Demonstrated the proposed method through a robot rescue mission (using a multi-agent formation system to retrieve the lost robot), showcasing its ability to achieve target formations while avoiding any potential collisions in a cluttered environment.

**Bi-level Learning for Traffic Simulation** Hangzhou, CHN
*Jun 2024 - Jul 2024*

- Implemented a bi-level learning framework composed of a Spatial Goal Network (high-level goals 2D distribution inference) and a Goal-Conditioned Policy (for learning low-level driving controls that move the vehicle towards goals).
- Integrated a neighbor-agent future prediction sub-module that leverages CNN + ROI Align to extract per-vehicle local features, then employs an MLP to output each neighboring agent's future trajectory, providing accurate context for collision checks.
- Implemented an action selection module that combines candidate trajectories from the bi-level policy with the neighbor-agent predictions, evaluates potential collisions or road departures using a cost function, and then selects the safe and efficient trajectory to execute.

**Robot Arm End Effector Design** London, UK
*Jan 2024 - Feb 2024*

- Designed a soft, multi-modal gripper to prevent multiple picks and avoid package defects, validated on the Amazon Robotic Manipulation Benchmark dataset.

- Designed an ultrasonic bone knife-based end effector for a surgical robot to remove tumors.

**Robot Arm Pick and Place Task** London, UK
*Oct 2023 - Oct 2023*

- Implemented an image processing algorithm from scratch to detect the object's position, orientation, circularity, edges, and corners. Performed camera and robot calibration to enable coordinate transformations among the world, camera, and robot frames.
- Used a cubic polynomial to generate the robot arm's trajectory, thus reducing wear and tear on the motors.

## Technologies

**Robotics:** Control Theory, Motion Planning, Multi-Agent Systems,State Estimation, Deep Learning
**Programming and Tools:** Python, MATLAB, C, SystemVerilog, RISC-V, CAD.
**Language:** English, Chinese(Mandarin).