

YIBO ZHOU

Visiting Master Thesis Student, Imperial College London, UK

M.Sc. Student in Systems, Control and Mechatronics, Chalmers University of Technology, Sweden

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I am interested in bridging expressive **learning-based methods** with **nonlinear and robust Model Predictive Control** for complex robotic systems. My goal is to combine the flexibility of learned models with the reliability, constraint handling, and optimization structure that MPC provides.

Education

Department of Electrical Engineering, Chalmers University of Technology, Sweden

• M.Sc. in Systems, Control and Mechatronics, **GPA: 4.75/5.0** *September 2024 – Present*

National Elite Institute of Engineering, Chongqing University, Chongqing, China

• B.E. in Robotic Engineering *September 2020 – June 2024*

Research Experience

Master Thesis: Data-driven Design of Nonlinear Robust MPC

Supervisor: Prof. Johannes Köhler, Imperial College London, UK

January 2026 – Present

- **Goal: Develop a data-driven nonlinear robust MPC pipeline** for partially unknown dynamical systems, with stability and feasibility guarantees under noisy and limited data.
- **Current focus: differentiable system identification:** studying partially observed nonlinear systems with a combined PEM+MHE framework, where MHE acts as the state observer and PEM estimates model parameters.
- Identified a scalability bottleneck in existing gradient computation: explicit cross-Hessian construction between the MHE state trajectory and neural model parameters becomes impractical for large neural/hybrid dynamics.
- Developing an **implicit-differentiation and adjoint/VJP-based** gradient computation to avoid explicitly forming the intermediate Hessian; implementing the main algorithm in a neural/hybrid MPC pipeline and am evaluating it against partial-observation identification baselines.

Branch MPC Design for Autonomous Driving

Design Project Course, Chalmers University of Technology, Sweden

September 2025 – January 2026

- Designed a **Branch MPC** planner for autonomous driving under multi-modal uncertainty for trajectory.
- Integrated probabilistic predictions into risk-aware MPC and evaluated safety–performance trade-offs in simulation and dataset-based scenarios.

Bachelor Thesis: Deep Reinforcement Learning-based Planning for Robotic Food Preparation Arms

National Elite Institute of Engineering, Chongqing University, China

December 2023 – June 2024

- Developed a learning-based manipulation pipeline for robotic food-cutting tasks, using **imitation learning** for pretraining and **actor-critic reinforcement learning** for policy improvement.
- Built a simulation environment for long-horizon manipulation under sparse rewards and compared Actor-Critic, Behavior Cloning, and chain-of-thought (CoT)-based policy learning methods.
- Designed and fabricated a **Delta-type robotic arm** platform for experimental validation, connecting mechanical design, simulation, and learned control policies.

Quadruped Guide Robot

Research Intern, Westlake University, China

July 2022 – March 2023

- Proactively contacted Westlake University and joined a 7-month research internship on a quadruped guide robot. Contributed to **MPC-based locomotion and trajectory-tracking** control, simulation, and real-robot system integration for human-guiding scenarios.
- Took a leading student role in a 5-person team, coordinating technical direction, implementation, and testing on the physical quadruped platform.
- The project was ultimately **field-tested by blind users at the Asian Paralympics**, with official media coverage.

Main Courses

[SSY281] Model Predictive Control

Prof. Nikolce Murgovski, Chalmers University of Technology

January 2025 – March 2025

[SSY316] Advanced Probabilistic Machine Learning

Prof. Alexandre Graell Amat, Chalmers University of Technology

November 2025 – January 2026

[TMA947] Nonlinear Optimization

Prof. Axel Ringh, Chalmers University of Technology

September 2025 – October 2025

[SSY285] Linear Control System Design

Prof. Torsten Wik, Chalmers University of Technology

November 2024 – January 2025

Additional Experiences

Real-Time Quadrotor Control with FreeRTOS

Chalmers University of Technology, Sweden

April 2025 – May 2025

- Implemented an embedded real-time control pipeline for a quadrotor with task scheduling, safe data handling, LQR control, and state estimation in embedded C using **FreeRTOS**.

Vision-Servo Agricultural Quadcopter

Chongqing University, China

July 2021 – November 2021

- Built a quadrotor system with two teammates, integrating mechanical redesign, embedded control, PCB/electronics work, and vision-based tracking.
- Modified STM32-like flight-control code and tuned a **dual-loop PID** controller for stable flight and target tracking.
- Awarded 2nd place (provincial level) in the National Undergraduate Electronics Design Contest.

Skills

Programming & Tools	Python, PyTorch, C/C++, MATLAB, CasADi, acados, l4casadi, MuJoCo, ROS, Gazebo, Webots, FreeRTOS, STM32, Arduino
Hardware & Design	SolidWorks, 3D printing, CNC, mechanical assembly, Altium Designer (PCB)
Languages	English (Fluent, IELTS 7.0), Chinese (Native), French (Basic)