Haixin Jin

3787 Miramar Street, La Jolla, CA, 92037 haj013@ucsd.edu Personal Website 619 922 8604

Education

University of California, San Diego *Sept 2024 – Present*
MS in Electrical and Computer Engineering, advised by Prof. Sylvia Herbert and Prof. Michael Yip

- Cumulative GPA: 3.75/4.0

University of Toronto *July 2022 – Oct 2022*
Overseas Short-term Study Program

- Hours of Study: 116

Jiangsu University *Sept 2020 – June 2024*
BE in Automation, Jinshan Talent Class (Top 25 among 5,000 engineering students)

- Cumulative GPA: 3.59/5.0 (85.9/100)
- Academic Honors: Third-class Scholarship and Merit Student Award (2020-2021, 2021-2022, 2022-2023)

Research Interests

My research background includes **learning-based safety control for manipulation** in dense clutter during my master's studies and **autonomous navigation** during my undergraduate studies. My additional research interests include **mobile manipulation**, **general-purpose manipulation**, and **safety control for diverse robotic systems**.

Publication

"Learning to Nudge: A Scalable Barrier Function Framework for Safe Robot Interaction in Dense Clutter". **Haixin Jin**, Nikhil Shinde, Soofiyan Atar, Hongzhan Yu, Dylan Hirsch, Sicun Gao, Michael C. Yip, Sylvia Herbert, Under review at *IEEE International Conference on Robotics and Automation (ICRA) 2026*.

Research Experience

Dense Contact Barrier Functions for Safe Robot Interaction *San Diego, CA*
Research Assistant, supervised by Prof. Michael Yip & Prof. Sylvia Herbert & Prof. Sicun Gao, UCSD *May 2025 – Sept 2025*

- Developed a novel Dense Contact Barrier Function framework for manipulation, leveraging supervised learning in Isaac Lab to train robot arms to operate in dense, contact-rich environments.
- Designed and implemented an object-centric neural barrier model that implicitly encodes inter-object contact dynamics through history-conditioned representations, supporting scalable and generalizable safety reasoning.
- Validated the framework across environments with up to 40 heterogeneous objects, demonstrating strong transfer and robustness in dense multi-object scenarios despite training solely on 4-object settings.

Imitation Learning for Robotic Manipulation with Franka Arm *San Diego, CA*
Research Assistant, supervised by Prof. Michael Yip, UCSD *Feb 2025 - May 2025*

- Implemented a mouse teleoperation system in PyBullet for a T-shaped block manipulation task and collected demonstration data to train diffusion policies within the LeRobot framework.
- Built a mobile-device teleoperation pipeline using ARKit's 6-DOF pose tracking and UDP networking to stream homogeneous transformation matrices for real-time robotic control and data collection.

Design of Orchard Obstacle Avoidance Control System Based on LiDAR *Jiangsu, China*
Individual Final Project, supervised by Yue Shen, JSU *Nov 2023 – May 2024*

- Developed a multi-sensor navigation system for autonomous navigation in orchard environments.
- Utilized the Navigation2 package and performed extensive simulation experiments in RViz and Gazebo, then validated obstacle avoidance performance in real world.

A Fruit Picking and Sorting Machine *Jiangsu, China*
Leader of 5-person Team, supervised by Zhaowei Wang & Prof. Yue Shen, JSU *Sept 2022 – May 2023*

- Developed a multi-sensor, multi–loop closed-loop distributed control system integrating three control circuit boards, three power boards, and two motor driver boards in coordinated operation.
- Built the full mechanical structure, tested microcontroller peripherals and actuators, utilized a combination of serial and parallel non-linear PID controllers.

Selected Course Projects

Project of Robot Sensing and Estimation *San Diego, CA*
Sensing and Estimation Robotics *Jan 2025 – Mar 2025*

- Built a complete SLAM system integrating encoder, IMU, and LiDAR sensors, generated occupancy grids and textured floor maps, and optimized robot trajectories through pose graph optimization and loop closure method.
- Implemented a visual–inertial SLAM pipeline using an Extended Kalman Filter, fusing stereo camera and IMU data for landmark mapping and accurate trajectory estimation.

Project of Vision Navigation on ROS 2 *San Diego, CA*
Introduction to Robotics *Sept 2024 – Dec 2024*

- Developed a closed-loop control system using ROS 2 on a Mecanum-wheeled robot, achieving precise waypoint navigation with AprilTag-based localization.
- Implemented a Kalman Filter to estimate robot trajectories and landmark positions for mapping and localization.

Technical Skills

- Programming Languages: Python, C, C++, HTML
- Software: IsaacLab, PyBullet, MATLAB, Simulink, Keil5, SolidWorks, AutoCAD, Altium Designer
- Libraries & Frameworks: PyTorch, OpenCV, ROS2, JAX, GTSAM

Activities

Peer Mentoring Program *Jiangsu, China*
Lab-based, supervised by Prof. Yue Shen, JSU *Jun 2022 – Oct 2023*

- Delivered training sessions to 8 students in tutor's lab on basic operations of Keil, C language syntax, microcontroller peripherals and codes for embedded control system.
- Oriented new lab members on regulations, routines, and equipment, and assisted juniors with technical questions during daily work and competition preparation.