

Po-Hsun Chang

☎ +1(734)216-1787 | ✉ pohsun@umich.edu | 🌐 po-hsunchang | 📺 CharlesChang012 | 🧑 personal website

Education

University of Michigan - Ann Arbor

Aug. 2024 – May 2026

M.S in Electrical and Computer Engineering: Robotics (GPA: 4.0/4.0)

Ann Arbor, MI

- Courses: Mobile Robotics, Robotics Systems Lab, Introduction to Algorithmic Robotics

National Cheng Kung University

Sep. 2019 – Jun. 2023

B.S in Electrical Engineering

Tainan, Taiwan

- Courses: Practice of Autonomous Driving, Control Engineering, Data Engineering for Smart Cities, Single Chip Design

Technical Skills

Programming: C/C++, Python, MATLAB, HTML/CSS

Hardware: IMU, GNSS, 3D camera, LiDAR, Encoder, Profilometer, LMI Controller, SWIR camera, RPi5

Tools: ROS/ROS2, Linux, Git, NumPy, OpenCV, PyTorch, HALCON, Gazebo, Docker, JIRA, Bash, Fusion360, Pandas

Work Experience

Machine Vision Development Intern

May 2025 – Aug. 2025

Tesla Inc.

Austin, TX

- Deployed a measurement program, achieving **3.5x improved repeatability** and preventing production line stoppages
- Collaborated with cross-functional teams to design 3D-based inspection systems utilizing **OCR** to prevent **\$4.5M** material loss and **5-day downtime** by ensuring robustness to surface residue and lighting variations
- Trained a **97% accuracy** defect classification model, reducing manual inspection and empowering root cause analysis
- Enhanced **8%** defect detection accuracy by implementing precise **color calibration**, reducing **53%** color difference
- Built and maintained ML pipelines to automate model training and validation, improving efficiency and reproducibility

Undergraduate Student Research Assistant

Jan. 2022 – Jun. 2023

NCKU Space Lab

Tainan, Taiwan

- Led a team of 5 to establish a modular **ROS** framework for user-selected sensor in satellite communication on-the-move antenna tracking, validated performance with TMYTEK mmWave kit, and published at ICCAS 2023
- Achieved accurate **attitude estimation** through incorporating GNSS and reducing IMU drift error by performing **sensor fusion** of accelerometer and magnetometer data utilizing the Madgwick algorithm and **Kalman filter**

Projects

Autonomous Mobile Robot Exploration and Warehouse Operations

Mar. 2025 – May 2025

- Engineered precise trajectory tracking system for mobile robots with **PID** loop, pure pursuit controller and odometry **sensor fusion** with IMU for robust navigation
- Achieved **2cm RMSE** in **pose estimation** by implementing **LiDAR-SLAM** using **particle filter** and **occupancy grid mapping**; performed **visual-SLAM** using **ORB-SLAM3** with monocular 2D images for enhanced localization
- Executed autonomous navigation and frontier exploration algorithms, including A* search and obstacle distance grid mapping, enabling efficient exploration of unknown environments
- Automated a pick-and-place warehouse simulation utilizing YOLOv11 for precise object detection and localization of crates and drop-off points, optimizing logistics operations

Automatic Block Stacking with Robotic Arm and RealSense Camera

Jan. 2025 – Mar. 2025

- Optimized 3D image perception for robotic manipulation by **improving 10% depth accuracy** through **camera calibration**, homography transform and fusion of intrinsic matrices
- Developed an **object detection** pipeline incorporating 3-stage filtering in **OpenCV**, achieving **85% IoU** for robust object recognition in a robotic stacking task
- Automated pick-and-place operations for a 5-DOF RX200 robotic arm, ensuring collision-free and efficient block stacking

3D Trajectory Optimization with Factor Graph

Mar. 2025

- Optimized motion trajectories from 2D and 3D pose data in g2o format using **GTSAM**, enhancing accuracy and efficiency in pose estimation.

Robust Motion Planning Simulation for Autonomous Mobility

Jun. 2024 – Dec. 2024

- Designed a 2-wheel mobile robot in **Fusion 360** and simulated ROS navigation stack within a custom **Gazebo** environment, applying collision-free motion planning using A*, PRM, RRT-connect, and gradient-based algorithms
- Reduced path planning runtime by **50%** by implementing ANA* algorithm with custom-designed heuristic in **PyBullet**