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, RealSense, RPi5, LiDAR, Encoder, Gocator, ITALA, LMI Controller, GelSight, SWIR camera

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

Work Experience

Machine Vision Development Intern May 2025 – Aug. 2025
Tesla Inc. *Austin, TX*
- Deployed a **height measurement** program with **3.5x** improved repeatability to production lines for cross-functional teams to analyze correlation between plunge force to avoid stuck in tester
- Designed 2D and 3D-based **crack and bowing inspection** systems with ML-driven **OCR** in **HALCON** to prevent **$4.5M** material loss and **5-day** downtime, achieving robustness to sensor angles, surface residue and lighting variants
- Trained a defect classification model with **94%** accuracy, empowering the quality team's root cause analysis
- Increased defect detection capability through precise color calibration, leading to enhanced quality control

Undergraduate Student Research Assistant Jan. 2022 – Jun. 2023
NCKU Space Lab *Tainan, Taiwan*
- Led a team of 5 and established a modular **ROS** framework for user-selected sensor in satellite communication on-the-move antenna tracking, validated performance with TMYTEK mmWave kit, and presented at ICCAS 2023
- Sensor Fusion: Obtained vehicle **attitude estimation** from Xsens IMU utilizing the **Madgwick algorithm**
- Visualization: Conceived a real-time software with GTK and **RVIZ** showing pointing angles of targeted satellites

Projects

Autonomous Mobile Robot Exploration and Warehouse Operations Mar. 2025 – May 2025
- Controls: Engineered precise trajectory system with **PID** loop, pure pursuit controller and IMU-based **sensor fusion**
- SLAM: Delivered **2cm RMSE** in **pose estimation** by implementing RPi **LiDAR-SLAM** using particle filter and occupancy grid mapping; performed **visual-SLAM** using ORB-SLAM3 with monocular images
- Computer Vision: Deployed **YOLOv11** to accurately identify destination and crate positions for warehouse simulation
- Executed autonomous navigation using **A*** with obstacle distance grid and frontier exploration in unknown terrain

Automatic Block Stacking with Robotic Arm and RealSense Camera Jan. 2025 – Mar. 2025
- Performed **camera calibration** with intrinsic and extrinsic matrices using AprilTags and **homography transform**
- Kinematics: Automated a 5DoF RX200 arm by solving forward and inverse kinematics with DH table and geometry
- Computer Vision: Developed an **objection detection** pipeline in OpenCV, achieving **85% IoU** in real-time capability

Robust Motion Planning Simulation for Autonomous Mobility Jun. 2024 – Dec. 2024
- Simulation: Crafted CAD for a 2-wheel robot using **Fusion 360**, and spawned it with a custom world in **Gazebo**
- Path Planning: Implemented **obstacle avoidance** using **A***, **PRM**, **RRT-connect**, and gradient-based algorithms
- Constructed ANA* algorithm in Python and **pybullet** with custom heuristic function and reduced **50%** runtime

Real-Time Vehicle Classification Using YOLO Feb. 2023 – Jun. 2023
- Applied **object classification** on video stream by training YOLO v4/v7 models with meticulously pre-processed data

Predictive Modeling for Dynamic Crowd Management Sep. 2022 – Jan. 2023
- Collaborated with local government and built a GRU model to forecast tourist flow achieving **MAPE under 30%**
- Conducted exploratory data analysis across multi-source datasets (ie. mobile) to identify critical correlation for modeling