Po-Hsun Chang

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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

Work Experience

Machine Vision Engineering Intern May 2025 – Aug. 2025
Tesla Inc. *Austin, TX*
- Deployed a laser scan profilometer-based height measurement program, achieving **3.5x improved repeatability** for critical plunge force analysis, preventing production line stoppages.
- Collaborated with cross-functional teams to design 3D-based **crack and bowing 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 **94% accuracy** defect classification model, reducing manual inspection and empowering root cause analysis
- Enhanced defect detection capabilities by implementing precise color calibration techniques, directly leading to improved quality control and product reliability

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
- Reduced IMU **attitude estimation** drift error by performing sensor fusion of accelerometer and magnetometer data utilizing the **Madgwick algorithm** and **Kalman filter**
- Built a GTK and RVIZ-based user interface for real-time visualization of satellite pointing angles, significantly improving operational efficiency for antenna tracking systems

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 identification 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

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**

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