

# Tung Hsiao

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## Education

### University of California, San Diego (UCSD)

La Jolla, CA

M.S. ELECTRICAL AND COMPUTER ENGINEERING - INTELLIGENT SYSTEMS, ROBOTICS & CONTROL

Sept. 2023 - Mar. 2025

- Relevant Courses: Advanced Computer Vision, Introduction to Visual Learning, Sensing & Estimation in Robotics, Introduction to Robotics, Statistical Learning, Digital Image Processing, Programming for Data Analysis

### National Taiwan University (NTU)

Taipei, Taiwan

B.S. MECHANICAL ENGINEERING

Sept. 2019 - Jun. 2022

- Relevant Courses: Digital Control System, Applied Electronics, Computer Programming Language, Computer Programming in Python

## Experience

### Intelligent Vehicle & Mechatronics Laboratory, NTU (Advisor: Kang Li)

Taipei, Taiwan

RESEARCH INTERN [ROS, PYTORCH, PYTHON, C++, OPENCV]

July. 2020 - Jan. 2022

- Worked with a team of 10 to design and build food delivery AMR robots, cooperated with NTU social science cafeteria, local grocery store, and Taipei Expo Park.
- Implemented **Convolutional Gated Recurrent Unit** for real-time Occupancy Grid Map Prediction, achieving a performance with an **AUPR of 0.6771** and mitigated speed loss in the DWA path planner, saving up to **65.95%** while maintaining efficiency.
- Enhanced precision docking accuracy from 55% to **94%** by implementing **PID control** strategies and leveraging advanced AprilTag image processing techniques.

### Advanced Medical Device Laboratory, NTU (Advisor: Hao-Ming Hsiao)

Taipei, Taiwan

RESEARCH INTERN [PYTHON, OPENCV, ABAQUS]

Sept. 2020 - Jul. 2021

- Utilized image processing techniques to conduct stroke risk assessment, employing image decomposition and feature extraction. Achieved a **22%** reduction in the diagnosis time for Carotid Artery Stenosis.
- Engineered a cardiac catheterization stent and conducted finite element analysis to simulate and analyze its performance within the blood vessel.

## Selected Projects

### 3D Computer Vision tasks

La Jolla, CA

ADVANCED 3D COMPUTER VISION COURSE PROJECT [PYTHON, PYTORCH]

Apr. 2024 - Jun. 2024

- Designed a denoising training method for **3D object detection** model, achieving equivalent performance with **50%** fewer epochs on the NuScenes dataset.
- Implemented **Point Transformer V3** fusion with **3D Boundary-Aware Transformer** for medical **point cloud segmentation**, reducing inference time by **36.9%** on intracranial aneurysm segmentation while maintaining precision.

### Lidar-based & Visual-Inertial SLAM

La Jolla, CA

SENSING & ESTIMATION IN ROBOTICS COURSE PROJECT [PYTHON, OPEN3D]

Jan. 2024 - Feb. 2024

- Implemented a **Point-cloud** registration algorithm utilizing Iterative Closest Point (ICP) methodology, enhancing precision in sensor fusion by integrating IMU, wheel encoder, and **LiDAR** data.
- Applied visual-inertial SLAM techniques to generate a 2-D landmark map, utilizing Extended Kalman Filter to fuse IMU and **RGBD** camera data.
- Engineered an occupancy grid mapping system by integrating sensor data through a differential-drive motion model and a scan-grid correlation observation model, resulting in highly accurate environmental mapping and localization for autonomous navigation.

### Qualcomm RB5 MegaBot mBots

La Jolla, CA

INTRODUCTION TO ROBOTICS COURSE PROJECT [ROS, PYTHON, OPENCV]

Oct. 2023 - Dec. 2023

- Developed a robust **visual SLAM** system utilizing **Kalman filtering** and AprilTags for precise pose estimation and accurate localization in robotic applications.
- Innovatively crafted Motion Planning Algorithms that enhanced navigation safety rates by **18%** and reduced time consumption by **46%**, optimizing overall efficiency in robotic navigation systems.

### Autonomous Fan-Propelled Lane-Tracing Robot

Taipei, Taiwan

PRACTICE OF MECHANICAL ENGINEERING FINAL COURSE PROJECT [PYTHON, OPENCV]

Feb. 2021 - Jun. 2021

- Applied **image processing techniques**, including camera calibration, Hough transform, and color/gradient thresholding, to successfully implement real-time lane-tracing operations, ensuring precise and responsive performance.
- Developed comprehensive electrical layouts for various vehicle functions, ensuring seamless integration. Conducted stress and aerodynamics analyses on mechanical components using **Finite element analysis** to optimize performance and reliability.
- Demonstrated effective leadership as a team leader, overseeing the optimization of robot hardware and contributing to successful problem-solving initiatives.

## Awards

2021 **1st place**, NTUME Billiards Robot Competition

Taipei, Taiwan

## Technical Skills

### Programming Languages

C/C++, Python, MATLAB

### Robotics

SLAM, Gazebo, Navigation, System Control, Computer Vision, Motion Planning

### Libraries & Toolkits

PyTorch, TensorFlow, Scikit-learn, OpenCV, NumPy, Matplotlib, Inventor, AutoCAD, Solidworks, Abaqus

### Operating System

ROS, Linux, macOS, Windows