

# Tung Do

**Portfolio:** <https://sontung1010.github.io> • [sontungcodedao@gmail.com](mailto:sontungcodedao@gmail.com) • tungsdo@umich.edu • 909-739-0205

## EDUCATION

### Master of Science, Electrical and Computer Engineering, emphasis in Robotics

Aug 2023 – Apr 2025

University of Michigan, Ann Arbor, MI, USA

GPA: 3.9/4.0

Research: Multimodal Perception & Reinforcement Learning for UxV Guidance & Control

Supervisors: Prof. Ram Vasudevan, Prof. Katherine A. Skinner, Dr. Elena Shrestha

Relevant Coursework: Embedded Control Systems, Self-Driving Cars, Computer Vision, Mobile Robotics, Math for Robotics

### Bachelor of Science, Electromechanical Systems Engineering Technology – Valedictorian

Aug 2018 – May 2023

California State Polytechnic University, Pomona, CA, USA

GPA: 3.7/4.0

Thesis: Autonomous/Remote Control Mecanum Wheels Tesla Roadster in real-world

Advisor: Prof. Scott Boskovich

Relevant Coursework: C/C++, Robotics, Autonomous Vehicle, Feedback Control Systems, Digital Design FPGA, Engineering Graphics

## ACADEMIC RESEARCH EXPERIENCE

### University of Michigan, Ann Arbor, MI, USA

Research Assistant, Multimodal Perception & Reinforcement Learning for UxV Guidance & Control

Aug 2023 - Present

Supervisors: Prof. Ram Vasudevan, Prof. Katherine A. Skinner, Dr. Elena Shrestha

For USV Autonomous Maritime Robots with UM Field Robotics Group

- Programmed the Unmanned Surface Vehicle's (USV) Unified Robot Description Format (URDF) model and the University of Michigan's Marine Hydrodynamics Lab "world" model to establish the simulation environment using ROS2 and Gazebo Garden. This setup facilitated the testing of autonomous functions and the conduct of reinforcement learning research.
- Developed an object avoidance algorithm using Python and C++ and assessed the experiment's performance in both real-world and simulated environments to produce better tuning parameters for subsequent simulations.
- Conducted real-world tests to collect LIDAR, odometry, drive, velocity, and IMU data, which was then replicated in the simulation environment. Currently, efforts are focused on analyzing and post-processing the data using Python.

For TD-Rex Autonomous Rover with ROAHM Lab

- Developed waypoint-follower algorithm for multi-agent experiments using the 'cartographer\_ros' package for map building and localization, contributing to the reinforcement learning experiment.
- Accelerated the project's progression to the testing phase by building and programming embedded control systems on STM32 VESC and Jetson TX2 board's Linux environment for a secondary autonomous rover. Successfully configured a basic teleoperation controller, conducted lidar scans, calibrated IMUs, and implemented SLAM using the cartographer. Resolved critical issues with cartographer\_ros frame transformations, enhancing system reliability and performance.
- Participated in optimizing the board's performance using the UNet deep learning architecture to enhance the efficiency of semantic segmentation by reducing its callback duration by 5 times.

Researcher, Hexapod Robot for Multi-Terrain Exploration

Jun 2023 - Present

- Currently developing a Hexapod Robot project, aimed at designing a robotic system capable of navigating and exploring diverse terrain types.
- Focusing on the integration of advanced robotics principles, including mechanical design, locomotion algorithms, and sensory feedback systems, to enhance the robot's adaptability to various environments.

Researcher, Enhancing Vision based SLAM through Shadow Removal Processing

Feb 2024 – Apr 2024

Advisor: Prof. Maani Ghaffari

- Applied the SpA-Former algorithm on the KITTI and FinnForest datasets, analyzing its effectiveness compared to traditional shadow removal methods in dynamic and variable lighting environments.
- Collaborated with a research team to integrate and test advanced machine learning techniques in vision-based SLAM, demonstrating the benefits of using existing shadow removal algorithms to refine object detection and environment mapping.

Researcher, Enhancing Monocular 3D Object Detection in Foggy Conditions: An Adapted MonoCon Approach for Autonomous Vehicles

Oct 2023 – Dec 2023

Advisor: Prof. Maani Ghaffari

- Led the enhancement of the MonoCon model using PyTorch, focusing on transfer learning and image processing techniques to improve 3D object detection in fog.

- Implemented the and fine-tuned advanced image augmentation and pre-processing strategies to enhance detection accuracy and robustness under varied weather conditions.

## California State Polytechnic University, Pomona, CA, USA

Researcher, Autonomous/Remote Control Mecanum Wheel Tesla Roadster in real-world

Jan 2022 – Dec 2022

Advisor: Prof. Scott Boskovich

- Independently designed and fabricated a 1:6 scale model of a Tesla Roadster with mecanum wheels, integrating omnidirectional mecanum wheels to investigate enhanced mobility in electric vehicles for urban settings.
- Leveraged SolidWorks for the detailed design and manufacture of mecanum wheels, emphasizing the creation and assembly of wheel components for optimal functionality, while also engineering the overall vehicle to meet the scale model's specification and aesthetic requirements.
- Developed autonomous navigation and obstacle avoidance systems using Arduino, implementing sensors and control algorithms to enable smart vehicle functionalities.
- Constructed a dual-mode control system for the vehicle, facilitating both manual remote control and autonomous operations, and performed extensive testing to assess maneuverability and self-parking capabilities.
- Analyzed and refined the vehicle's design and functionality through iterative testing, optimizing the integration of mecanum wheels for improved maneuverability and space-efficient parking in urban environment.

## PROFESSIONAL EXPERIENCE

### Northrop Grumman Collaboration Project, California State Polytechnic University, Pomona, CA, USA

Embedded Software Engineer, Unmanned Aerial & Ground Vehicles (UAV & UGV)

Aug 2022 – May 2023

- Developed Python scripts for the Jetson Nano computer to implement autonomous in-flight control on the Pixhawk controller. Successfully met the Northrop Grumman Demo's requirement by autonomously piloting the UAV at 200 feet from the ground for 10 minutes to scout the test area for wildfires and injured hikers.
- Programmed embedded software using Embedded C with STM32 microcontroller and developed ROS Python scripts for communication between two Raspberry Pi computers to wirelessly control the UGV over a range of 700ft. Achieved the Northrop Grumman Demo's objective of safely transporting the injured hiker back to the Ground Control Station.

## SKILLS

- Robotics: ROS, ROS2, Simulation (Rviz, Gazebo), Sensor Integration (LIDAR, Camera, IMU), SLAM, Machine Learning (PyTorch, TensorFlow), Control Systems (PID, MATLAB, Simulink), Computer Vision (OpenCV)
- Software: Python, C++, C, Linux, Bash/Shell Scripting, Git, Debugger, Docker
- Hardware: Microcontrollers, ARM, GPIO, ADC, PWM, Timer, ISR, RTOS, CAN, I2C, SPI, USART, USB
- CAD: SolidWorks, 3D Printing, ANSYS FEA

## PUBLICATIONS

- (Unofficial) Enhancing Vision based SLAM through Shadow Removal Processing
- (Unofficial) Enhancing Monocular 3D Object Detection in Foggy Conditions - An Adapted MonoCon Approach for Autonomous Vehicles
- (Unofficial) Autonomous/Remote Control Mecanum Wheels Tesla Roadster in real-world

## HONORS & AWARDS

- Valedictorian of the Electromechanical Systems Engineering Technology program for the 2022-23 graduating class, issued by California State Polytechnic University, Pomona
- International Student Award Scholarship, issued by California State Polytechnic University, Pomona
- The distinction of being included on the Dean's Honor List in 2019, 2020, 2021, 2022; President's Honor List in 2020 and 2021, issued by California State Polytechnic University, Pomona

## ORGANIZATIONS

- ROAHM Lab - Robotics and Optimization for Analysis of Human Motion
- UMich Field Robotics Group
- Tau Beta Pi - The Engineering Honor Society (TBP)
- Eta Kappa Nu - International Honor Society of Electrical and Electronics Engineers (IEEE-HKN)
- Institute of Electrical and Electronics Engineers (IEEE)
- Northrop Grumman Collaboration Project