Tung Do

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EDUCATION

Master of Science, Electrical and Computer Engineering, emphasis in Robotics　　Aug 2023 – Apr 2025
University of Michigan, Ann Arbor, MI, USA　　GPA: 4.0/4.0
Research: *Multimodal Perception & Reinforcement Learning for UxV Guidance & Control*
Supervisors: Prof. Ram Vasudevan, Prof. Katherine A. Skinner, Dr. Elena Shrestha
Organizations: ROAHM Lab, UMich Field Robotics Group, Institute of Electrical and Electronics Engineers
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
Awards and Honors: Valedictorian, International Student Award Scholarship; Dean's Honor List and President's Honor List
Organizations: Northrop Grumman Collaboration Project Team, Tau Beta Pi – The Engineering Honor Society
Relevant Coursework: C/C++, Robotics, Autonomous Vehicle, Feedback Control Systems, Digital Design FPGA, Engineering Graphics
Udemy Certificates: Python Pro Bootcamp 2023, ARM Cortex STM32 Programming, C Programming, ROS Self-Driving

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 deep-learning research.
- Developed an object avoidance algorithm using Python and C++ to assess the experiment's performance in both real-world and simulated environment.
- 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.
- Built and programmed embedded control systems on STM32 VESC and Jetson TX2 board's Linux environment for a second autonomous rover. Set up basic teleop controller, lidar scan, IMU calibration, and SLAM with cartographer. Fixed the cartographer_ros flipping issue between multiple frame transforms.
- 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*　　Oct 2023 – Dec 2023
Approach for Autonomous Vehicles

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, *FPGA Toolchain for MacOS*   Jan 2023 – May 2023
- Developed a macOS-compatible FPGA development toolchain using VHDL/Verilog, integrating tools like Icarus Verilog, Yosys, and openFPGALoader with VS Code and Bash Shell for synthesis, simulation, RTL schematic generation, bitstream generation, and board programming, overcoming the traditional reliance on Windows-based systems for chip design.
- Streamlined the FPGA design process on Apple platforms by creating a unified toolchain that supports the entire development lifecycle, from integration and compilation to implementation.
- Released the toolchain as an open-source project on GitHub, complete with comprehensive documentation and support, to enhance accessibility and utility for the FPGA and macOS developer communities.

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.

FPT USA Corp., El Segundo, CA, USA

Embedded Software Engineer Intern   May 2022 – Aug 2022
- Completed comprehensive BrightScript training from the Roku Developer website, acquiring specialized skills in streaming platform development.
- Developed a streaming platform for Roku devices using BrightScript and the SceneGraph library, contributing to the enhancement of user experience and content accessibility.

Rakuna, Hanoi, Vietnam

Software Engineer Intern   May 2021 – Jul 2021
- Developed Rakuna's recruiting website, employing Ruby on Rails, ReactJS, HTML/CSS, SQL, and RESTful APIs, enhancing the platform's functionality and user experience.
- Applied skills gained from The Odin Project to execute additional projects, including a social media platform and a flight booking website, demonstrating proficiency in full-stack development and version control using Git.

PROJECTS

Embedded Software Engineer, *Advanced Driver Assistance Systems (ADAS) Simulation*   Aug 2023 – Dec 2023

- Developed Embedded C code, block diagram, and S-function for implementing Manual Control, Adaptive Cruise Control, and Auto-Steering on the NXP S32 board. This setup controls car simulation in Simulink using a haptic wheel connected to an encoder DC motor.
- Developed embedded C code that enables communication with other car simulations via the CAN network. This allows for the mutual transmission of each car's position to be displayed on the screen.

Lead Engineer, *Autonomous Robot Competition*   Aug 2022 – Dec 2022
- Led the design and execution of a multifunctional robot for a 5-discipline competition, securing 2nd place with innovative aerodynamic and mechanical design, excelling in stability and performance.
- Spearheaded the integration of hardware and software systems, utilizing skills in OpenCV, Python, C/C++, and microcontroller programming, resulting in the robot's best overall performance accolade.

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