Curriculum Vitae

Tung Do

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Education

University of Michigan, Ann Arbor, MI, USA August 2023-Present
M.Sc. in Electrical and Computer Engineering, emphasis in Robotics GPA: 3.9/4.0
Coursework: Embedded Control Systems, Self Driving Cars (A+), Mobile Robotics, Computer Vision, Machine Learning

California State Polytechnic University, Pomona, CA, USA August 2018-May 2023
B.Sc. in Electromechanical Systems Engineering Technology, Valedictorian GPA: 3.69/4.0
Coursework: Robotics, Autonomous Vehicle, Feedback Control Systems, Machine Elements, Finite Elements, Engineering Graphics, C/C++ Programming, Digital Design FPGA/Verilog, Electronic Systems, Electrical Networks, Dynamics, Strength of Materials, Fluid Mechanics, Thermodynamics

Publications

Shrestha, E., Wan, H., **Do, T.**, Rawal, M., Singh, S., & Vasudevan, R. (2024). "Lucid Dreamer: Multimodal World Model for Zero-Shot Policy Transfer in Multi-Agent Autonomous Racing." *Submitted to IEEE International Conference on Robotics and Automation (ICRA).*

Shrestha, E., **Do, T.**, Wakevainen, K., Song, J., & Skinner, K. (2024). "Intelligent Navigation of Autonomous Maritime Robots." (in preparation).

Research Experience

UM-Ann Arbor Field Robotics Group
Research Advisor: Prof. Katherine A. Skinner December 2023–Present
Worked on *Intelligent Navigation of Autonomous Maritime Robots* towards a publication as the second author

- Labeled and processed a 2,230-image dataset to train a U-Net segmentation model for applying the Lucid Dreamer model on the USV, which enhances the USV's perception capabilities and enables improved trajectory planning and navigation in dynamic environments.
- Designed and tested an object avoidance algorithm in Python and C++, demonstrating simulation success and contributing to optimizing the USV's control systems for benchmarking autonomous navigation.
- Conducted real-world navigation tests under varying wave and obstacle conditions to collect sensor data (LiDAR, camera, IMU, GPS, odometry) for multimodal data fusion. Implemented frame alignment and timestamp synchronization to improve Hector SLAM accuracy and performance analysis in RViz.
- Developed a URDF model for the Heron USV in ROS2 and Gazebo Garden to create a realistic simulation environment for testing navigation algorithms and collecting more training data.
- Prepared the Heron USV for deployment by configuring battery, electrical, and mechanical systems, maintaining its functionality for every test. Designed and 3D-printed custom sensor mounts to integrate and calibrate sensors accurately, ensuring synchronized data acquisition.

UM-Ann Arbor Robotics and Optimization for Analysis of Human Motion Lab
Research Advisor: Prof. Ram Vasudevan August 2023–September 2024
Worked on *Lucid Dreamer: Multimodal World Model for Zero-Shot Policy Transfer in Multi-Agent Autonomous Racing* as the third author

- Implemented SLAM using ROS packages, resolved frame transformation issues, and calibrated IMUs to improve system reliability and localization accuracy in dynamic environments for future tests.
- Designed and implemented a waypoint-follower algorithm in ROS for benchmarking Lucid Dreamer, enabling precise navigation and path planning in multi-agent reinforcement learning experiments.

- Prepared and maintained robot hardware for real-world testing by assembling batteries, mechanical components, and sensors (LiDAR, camera, IMU, odometry), ensuring seamless data integration and system functionality.
- Collected and analyzed sensor data during real-world tests to enhance reinforcement learning models, improving the robot's autonomous navigation and control in dynamic scenarios.
- Optimized Jetson TX2 performance for real-time processing, reducing semantic segmentation latency and ensuring efficient operation in resource-constrained environments.

Grad Course Projects

EECS 568 Mobile Robotics with Prof. Maani Ghaffari Winter 2024

- Improved SLAM system accuracy and feature detection in complex, real-world environments by integrating and validating shadow removal techniques within the ORB-SLAM2 pipeline.
- Defined and addressed key limitations of SLAM systems under shadows and varying illumination, evaluating algorithms such as SpA-Former and LAB color space methods on KITTI and FinnForest datasets.
- Collaborated with three graduate students to enhance vision-based SLAM for UGVs by incorporating shadow removal preprocessing, improving object detection and mapping in dynamic environments.

EECS 461 Embedded Control Systems with Prof. James Freudenberg Fall 2023

- Developed Embedded C code, block diagrams, and S-functions to implement Manual Control, Adaptive Cruise Control, and Auto-Steering on the NXP S32 board, enabling precise vehicle control and feedback integration in a car simulation using a haptic wheel connected to an encoder-driven DC motor.
- Programmed Embedded C code enabled real-time communication between car simulations via the CAN network, allowing vehicle position exchange and on-screen visualization to support multi-agent coordination in dynamic simulation environments.

Industry Experience

PACCAR - Peterbilt Motors Company June 2024-August 2024

Advanced Mobility Tech Engineering Intern

- Designed, prototyped, and tested a fully functional robotic tool changer and self-aligning docking mechanism for an automatic trailer hookup system, completing this unique proof-of-concept project within 3 months.
- Developed a self-calibrating suspension system for automatic alignment, achieving 90% docking accuracy in dynamic industrial environments using only simple pneumatic actuators.
- Conducted in-house 3D printing to fabricate the tool's components, reduced project costs by approximately $5,000 by avoiding buying the pre-built tool, and demonstrated the feasibility of cost-effective custom solutions.
- Collaborated with senior engineers to refine designs, select industry-grade parts and electronics, and integrate embedded control systems, significantly improving system efficiency and reliability.
- Enhanced driver safety and operational efficiency by automating manual processes, addressing critical challenges in human-machine interaction and safety-critical systems.

Skills

Robotics & Autonomous Systems: ROS, ROS2, RViz, Gazebo
Machine Learning & Computer Vision: PyTorch, TensorFlow, U-Net, OpenCV
Control & Embedded Systems: Microcontrollers (STM32, Arduino PLC, NXP32, PX4), Single Board Computers (Nvidia Jetsons, Raspberry Pi), Hardware Interface (GPIO, ADC, PWM, Timer, CAN, I2C, SPI, USART), FPGA
Programming & Software: Python, C++, C, MATLAB, Simulink, Linux, Bash/Shell Scripting, Git, Docker
Mechanical Design & Prototyping: SolidWorks, Creo Parametric, 3D printing, ANSYS FEA

Other Experience

Monocular 3D Object Detection in Foggy Conditions, *Robotics Researcher* Oct 2023 – Dec 2023
Hexapod Robot for Multi-Terrain Exploration (Personal Project), *Robotics Engineer* June 2023
Bionic Hand (Personal Project), *Robotics Engineer* June 2023

CPP Northrop Grumman Collaboration Project, *Robotics Engineer* August 2022-May 2023
Autonomous Robot Competition, *Lead Robotics Engineer* August 2022-December 2022
CPP NASA Student Launch 2023, *Parachute Team Lead* August 2022-October 2022
CPP Student Unmanned Aerial Systems Competition 2023, *Mechatronics Volunteer* September 2022
FPT USA Corp., *Embedded Software Engineer Intern* May 2022-August 2022
Autonomous/Remote Control Mecanum Wheel Tesla Roadster in Real-world Project, *Robotics Engineer* January 2022-December 2022
Rakuna - HR Tech Company, *Software Engineer Intern* May 2021-July 2021

Honors and Awards

2023 CPP Valedictorian: Electromechanical Systems Engineering Technology
2019 CPP International Student Award Scholarship – $1,500
CPP Dean's Honor List: 2019, 2020, 2021, 2022; President's Honor List: 2020, 2021

Community Involvement

UM-Ann Arbor IEEE-HKN Beta Epsilon, *Membership pending* January 2024
IEEE Robotics and Automation Society, *Member* August 2023
CPP TBP CA Nu - The Engineering Honor Society, *Vice President* August 2022-December 2022
Prestige English Center, *Teaching Assistant* August 2020-January 2021

References

Prof. Ram Vasudevan
Associate Professor of Robotics Institute at UM-Ann Arbor, **Email:** ramv@umich.edu, **Tel:** (734) 647-5560.

Prof. Katherine A. Skinner
Assistant Professor of Robotics Institute at UM-Ann Arbor, **Email:** kskin@umich.edu

Prof. Dimitra Panagou
Associate Professor of Robotics Institute at UM-Ann Arbor, **Email:** dpanagou@umich.edu, **Tel:** (734) 763-2355.