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Education

- **National University of Singapore -** MSc in MechEng (Robotics and AI), December 2025, *Expected:* Honors with High Distinction (4.83)
  Modules: Machine Learning in Robotics, Machine Vision, Navigation Policies for UAVS
- **Nanyang Technological University** – B.Eng (Mechanical Engineering - Robotics and Mechatronics), May 2023, Honors with Distinction, **(NTU-MOE Bond Scholar)**

Work Experience

- **Robotics Engineer Intern at MOVEL AI** (*Jul '24 – Present*)
  - ➤ Developed a pattern matching algorithm with Lidar scan data using Iterative Closest Point (ICP) algorithm, for object detection of tables, chargers and workbenches using their distinctive features for robots to dock at specific points and orientations.
  - ➤ Implemented Model Predictive Control planner for omnidirectional robots as a local planner for client robot as a ROS2 package.
  - ➤ Assisted with deployment of Movel AI's Remote Navigation Software at client sites and remotely, with both ROS1 and ROS2 packages, using a Docker System.
- **UAV Systems Engineer Intern at GARUDA ROBOTICS** (*May '22 – Aug '22*)
  - ➤ Worked on creating a Mock Power Management System designed to interact with a future in-house Battery Management System and CoPilot.
  - ➤ Managed telemetries of multiple smart batteries and perform battery management actions in ROS2 Docker Container.
  - ➤ Worked with ROS2 to create a node for publishing telemetry to topics received from a Teensy microcontroller on Arduino IDE through Serial Communication.

Academic Projects

- **AI/ML Project – Tennis Analysis System**
  - ➤ This project analysed Tennis players in a video to measure their speed, ball shot speed and number of shots.
  - ➤ Detection of players with YOLOv8, detection of ball by training a YOLOv11 model on Roboflow dataset of tennis balls in matches, and key point detection through training a CNN (ResNet) using PyTorch on court key points.
  - ➤ Creation of visualizations of ball trajectory, bounce detection, player movement and court key points on a mini court graphic on the tennis video using OpenCV and Pandas.

- **Advanced Computer Vision with Tensorflow (Deeplearning.ai)** –
  - ➤ Image Classification, Segmentation, Object Localization and Detection using the Tensorflow library. Transfer learning for object localization and detection tasks.
  - ➤ Implemented object detection using models like R-CNN and ResNet-50. Image segmentation using Fully Convolutional Networks (FCN), U-Net and Mask-RCNN
  - ➤ Built custom models to detect and localize objects and utilized ML interpretation techniques, including class activation maps and saliency maps, to inspect and improve model design (e.g., AlexNet)

- **Reinforcement Learning for 7-DOF Robot Arm Manipulation**
  - ➢ Developed a reinforcement learning environment using MuJoCo and Gymnasium-Robotics to train a 7-DOF robotic arm for precise object manipulation.
  - ➢ PPO-Based Network: Built a neural network in PyTorch using PPO, where the actor outputs actions to maximize rewards and the critic provides value estimates for stable policy updates in a continuous action space
  - ➢ Environment and Rewards: Configured a custom action space for end-effector movements, integrating positional, velocity, and rotational observations to capture the full state of the arm and target object.
  - ➢ Designed dense rewards based on Euclidean distance to the goal and a sparse binary reward for goal completion, balancing exploration with efficient learning

Co-Curricular Activities

- **Self-Driving Cars Specialization (UofToronto -Coursera)** –
  - ➢ Geometric and Dynamic Model Predictive Control Approach. Key methods for parameter and state estimation, Model for sensors i.e. GPS and IMUs, Kalman Filters (Extended and Unscented), LIDAR scan matching and Iterative Closest point algorithm.
  - ➢ Extrinsic camera calibration, Image features and CNNs, Visual Odometry, Objection detection and Tracking, Semantic Segmentation for drivable surface estimation.
  - ➢ Dijkstra's and A* algorithm, Finite State machines, Velocity profiles, Building occupancy grid maps for collision checks
- **Robotics Arm Project –** Designed and Developed a 3DOF robotic system completing tasks in 3D space. With 7 group members, brainstormed and validated features for a robot to automate warehouse processes utilizing robotic arm and gripper. Designed using ROS package of Dynamixel Servos in python, built and refined the 3-D structure with CAD, and layout of robotic prototype to implement essential features.

Skills

- Data Structures and Algorithms – Self-learned DSA from pythondsa.com and attained certification for the course in Python 3.10.
- Computer Vision – Image processing, OpenCV, feature extraction, object detection (YOLO, R-CNN), CNNs (ResNet, VGG), segmentation (U-Net, Mask R-CNN)
- Machine Learning – Linear Regression, k-means clustering, PCA and Randomforest
- ROS2 and ROS –Nodes, Publishers, Subscribers, Server, Clients, Msg, Srvs and Parameters. Using tools like Rviz for visualization, and Gazebo for simulation.
- Docker Desktop – Docker Containers to run ROS and ROS2
- Proficient in Python coding from NTU Course - MA1008, Introduction to Computational Thinking
- Proficient in C++ coding for Arduinos to make small appliances like Calculator, Position Sensors and Encoder related programming.
- Embedded C – Learnt it from course Real time Software Processing for QNX systems.
- Proficient in SolidWorks and AutoCAD in making 2D and 3D CAD models, with experience from course MA2005 – Engineering graphics
- Proficient in using MATLAB in circuit analysis with experience from courses MA2011-Mechatronics System Interfacing and MA3005- Control Theory