Muhammad Fadli Alim Arsani

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EDUCATION

University of California San Diego **San Diego, CA**
B.S. Electrical Engineering - Machine Learning & Controls (GPA: 3.92) *Graduation Date: June 2024*

- Relevant courses: Robotics, Computer Vision, Deep Learning, C++, Python For Data Analysis, Linear & Non-Linear Optimization, Machine Learning Algorithms, Intro To Autonomous Vehicles, Controls Theory, Signals & Systems, Data Structures & Algorithms, C Programming, Circuits Theories, Probability & Statistics, Calculus (I, II, III), Linear Algebra, Physics, Differential Equation.

TECHNICAL SKILLS

Programming Language: C++, Python, C

Concepts/Libraries: ROS2, Point Cloud Library (PCL), OpenVDB, PyTorch, OpenCV, Eigen, Boost, Numpy, Parallel Programming, Image Processing, Object Detection & Recognition, Behavior Trees

WORK EXPERIENCE

Perception Software Engineer Intern **Pittsburgh, PA**
Moss Robotics Inc. *July 2023 – September 2023*

- Implemented **point cloud accumulator** module, enabling more advanced tree detection algorithms which were previously hindered by reliance on single-scan LiDAR data.
- Developed a **multi-sensor fusion** module for **real-time tracking** and improved final detection output.
- Introduced a **graph-based approach** to identify target tree blocks, **capturing local information** and providing crucial support to other perception components.
- Improved **tree detection** and **row-following** accuracy with density-based clustering and parallel line fitting.
- Built an **exit detection algorithm**, enabling zero-intervention row-to-row and block-to-block navigation.
- Enhanced real-time performance by enabling **multi-threaded**, **thread-safe** perception stack components.

Research Software Engineer **San Diego, CA**
Existential Robotics Lab, Contextual Robotics Institute (CRI) UC San Diego *September 2022 – March 2023*

- Built implementations & visualizations of **mobile robots algorithms** for **localization**, **mapping**, & **controls**.
- Implemented various robotics algorithms like **Octree Mapping, Particle Filter, SLAM, A* search, etc**.
- Worked with **point cloud data** in the simulation (retrieving, processing, etc.).
- Programmed a **navigation environment** in **PyBullet real-time physics simulation engine**.

Research & Software Engineer Intern **San Diego, CA**
Autonomy Lab, Contextual Robotics Institute (CRI) UC San Diego *March 2022 – September 2022*

- Deployed **Reinforcement Learning policy** on the **Unitree A1** robot allowing it to traverse challenging terrains.
- Worked with **depth camera (Intel RealSense D435)** and other sensors on the robot.
- Collected **real-world data** to bridge the gap between **Sim2Real** and uncertainties in the real world.
- Utilized **GPU clusters** and other MLOps tools like **Kubernetes** and **WANDB** to train the models.

PROJECTS

BEDSR - Budget Enhanced Deep Residual Networks for Single Image Super-Resolution *Winter 2022*
PyTorch, Python, Deep Learning, Computer Vision

- Designed and implemented a **resource-constrained neural net**, inspired by Bee Lim et. al. **EDSR** paper.
- Achieved an average peak signal-to-noise ratio **(PSNR) of 33.43 dB** on popular SR datasets.
- Built and wrote the entire model, training & testing pipelines, data preprocessing, etc. from scratch.

Jetson-Nano-Powered Self-Driving RC Car *Spring 2021*
C++, Python, ROS, Jetson Nano, Camera, Brushless DC Motor, etc.

- Wrote a **ROS package**, utilizing **OpenCV** library for **lane switching** and **line detection**.
- Implemented a **Python module** that handles **sending of messages**, (ex: steering, throttle) to the **ESP32**.
- Built a **ROS client** for the **ESP32** that **enables communication** of steering and throttle messages with **ROS.**