

# DHYAN THAKKAR

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## Summary

- Graduate Robotics student at the University of Minnesota - Twin Cities, specializing in **applied ML/DL, computer vision, sensor fusion, and robotics**. Experienced in **autonomous navigation, SLAM, and real-time AI applications**. Strong background in deploying AI-powered applications on embedded systems (Jetson, RPi) and cloud (AWS SageMaker/RoboMaker). Researching **deep learning for scene understanding, knowledge distillation, and multimodal AI models**.

## Education

### University of Minnesota - Twin Cities

Sep. 2024 – Present

*Masters in Robotics (MSR)*

GPA: 3.75

### Nirma University, Ahmedabad, India

Sep. 2020 – June 2024

*Bachelor of Technology in Electronics and Communications Engineering*

7.68 PPI

*Minors in Computer Science Engineering*

A Grade

## Technical Skills

**Languages and Tools:** Python, C/C++, MATLAB, Shell, CUDA, Jupyter, Git, AWS SageMaker/RoboMaker, Jetson, RPi

**Technologies/Frameworks:** ROS (Noetic, Foxy, Humble), Pytorch, Tensorflow, Scikit Learn, PX4, OpenCV, MNCV, Intel RealSense, ISAAC Sim (Omniverse), Docker, Github, Linux

## Publications

### MVMS: RNN based Pro-Active Resource Scaling in Cloud Environment

*Cloud Computing, Resource Management, Deep Learning*

April 2023

- Proposed LSTM-based resource prediction for CSPs. Achieved 81% accuracy improvement through hyperparameter optimization.

### IMPERCEPTIBLE MALWARE: BYPASSING MODERN AV - ENGINES BY AI-ASSISTED CODE

*Intrusion Detection, Deep Learning*

May 2023

- Presented a concept of AI-based methods to bypass Static (Signature) and Dynamic (Behavioural) Analysis by Antivirus engines.

### Anticipated Network Surveillance

*Machine Learning, Scikit-Learn, Python, Pandas, Numpy*

July 2022

- Engineered KNN, SVM, and Random Forest models for intrusion detection, achieving 90.52 accuracy with Random Forest and identifying attack types from network data.

## Experience

### Robotics Gallery, Science City

Jan 2024 - June 2024

*Robotics Intern*

Ahmedabad, Gujarat

- Developed Scene Understanding-based **Visual-Inertial Odometry (VIO)** on multicopters using **OAK-D & RealSense**, reducing vertical path deviation by 5%.
- Implemented **Prompt-based waypoint navigation using SLAM**, leveraging 4D Lidar and Camera-based pose estimation on Unitree GO2.
- Engineered **Lidar-based G-SLAM** with 2D Lidar-Odometer sensor fusion on custom autonomous mobile robots.

### Electronics and Communications Department, Nirma University

May 2023 - July 2023

*Inhouse Intern*

Ahmedabad, Gujarat

- Created a **33,000+ traffic image dataset** for training **YOLOv8 at 30 FPS** on Jetson Nano for the Smart Road Assistance for Visually Impaired (SRAV1) project.
- Achieved **94% accuracy** for incoming vehicle classification and **87% precision in speed determination** of incoming vehicle.

### Nirma University

September 2021 - December 2022

*Research Assistant*

Ahmedabad, Gujarat

- Optimizing Routing and Clustering in Underwater Wireless Sensor Networks with algorithms like FF, PSO, ACO and LEACH.
- Integrated remote development and containerization on Param-Shavak and Precision GV-100 for high-performance computing
- Designed Deep Learning Architecture for forecasting Compute usage for Cloud Scaling.

## Projects

### RL Based UAV control for maximal mesh coverage | Python, Nvidia ISAAC Sim, PX4, OpenCV

October 2024

- Designed **Reinforcement Learning-based UAV** control for hovering over target position & trajectory optimization using **RGB-D & EKF** pose estimation.
- Trained **PPO based Control** on a custom RGB+PointCloud+Pose Dataset created using QGroundControl and **ISAAC Sim**.
- Achieved **segmentation-based target object detection** using depth and RGB data.

### Visual Intertial Odometry on Multirotors | Python, MAVROS, OpenCV, OAK, Intel-Realsense

April 2024

- Built a **VIO system** using Python, Computer Vision libraries (OpenCV), and color+depth sensors (**OAK-D Lite, Intel Realsense T265**) for **accurate UAV pose estimation**.
- Suppressed Vertical Odometry Jumps by performed sensor fusion using Extended Kalman Filters on Vision Data and Point Lidar.
- Designed mounting for Raspberry Pi and Camera with Landing Gear for Hexacopter on solidworks and printed on Ender-3.

**LLM powered navigation with LIO-SLAM on Unitree Go2** | *Python, OpenCV, ChatGPT, Unitree SDK2* **February 2024**

- Implemented **Prompt-based navigation** by integrating ChatGPT for **scene understanding** and natural language path planning.
- **Fine-tuned LLM models** to better align with map context, improving localization accuracy in dynamic indoor spaces.
- Developed **multimodal sensor fusion (Lidar-Visual-Inertial)** for real-time localization in 1,500+ sqft mapped environment.
- Achieved **sub-782ms latency** on custom audio pipeline for LLM powered conversations and path generation with the Quadraped

**vSLAM on Locobot for Room Navigation and Maze Solving** | *ROS-Noetic, Intel Realsense* **December 2023**

- Developed and implemented vSLAM-based backtracking algorithms for maze-solving, obstacle avoidance, **global route optimization**, and path planning; interfaced servos, Kobuki, Intel RealSense D345 to Intel NUC with **sub-millisecond delay**.
- Performed **Pointcloud Segmentation** (based on size and color) for Manipulator to sort objects.
- Performed **sensor-fusion using ROS Stack** from Odometry from Kobuki base and IMU-vision data from Intel RealSense D435i.

**Smart Road Assistance for Visually Impaired v1** | *Jetson Nano, GStreamer, Pytorch, YOLO* **September 2023**

- Achieved **89% Accuracy on YOLOv5 & v8** models on 33,000+ from multiple datasets on **Traffic Scene Prediction**.
- Developed 2nd order estimator for **time to contact with oncoming vehicle** and interfaced Buzzer/LED with Jetson Nano.
- Achieved 150% boost in Inference FPS with Parallel implemented **Faster Objects More Objects (FOMO)** with YOLOv8 powered by Nvidia DeepStream.

**MLPerf Inference Benchmarking** | *Pytorch, Python Linux* **November 2023**

- Explored MLPerf inference benchmarking for deep learning models, achieving 80% speed-up in multi-stream processing for scalable AI workloads.
- Benchmarked of 20+ configurations of MLPerf Inference on SOC (RPi4/ Jetson Nano), Intel and AMD Laptops and HPCs (Paramshavak, GV100s)

## Leadership

**IEEE - Student Branch Nirma University**

*Advisory board / Vice-Chairperson*

*Executive Committee Member*

**January 2022 - December 2024**

*Ahmedabad, Gujarat*

**ECO- Electronics and Communications Student Organization**

*Treasurer*

*Technical / Public Relations Executive*

**October 2020 - March 2024**

*Ahmedabad, Gujarat*