Dinethra Rajapaksha

Electronic and Telecommunication Engineering Undergraduate, University of Moratuwa
DinethraDivanjana2001|Dinethra Rajapaksha|dinethrarajapaksha.vercel.app
divanjanad@gmail.com | rajapakshaipdd.21@uom.lk | +94-704916740
Address: 113/5H, Siyambalape Waththa, Delgoda, Sri Lanka.

SUMMARY

Final-year undergraduate from the University of Moratuwa with a focus on machine learning, Computer Vision and software development supported by a strong background in embedded systems and IoT. Seeking opportunities to contribute to software and AI-driven engineering projects in innovative environments.

EXPERIENCE

Magicbits (PVT) Ltd *Dec 2024 – Jun 2025 — On-site*
Software & IoT Engineering Intern

- Designed and deployed end-to-end IoT software pipelines covering device data ingestion, cloud processing, and interactive dashboards using ThingsBoard, MQTT, and REST APIs.
- Developed scalable, hierarchical dashboards and rule-chain logic for industrial clients (Windforce, LECO, ANSELL, Quick Tea – Wattala), enabling real-time monitoring, aggregation, and anomaly filtering across 30+ sites.
- Implemented RPC-based and attribute-driven remote control workflows for industrial inverters, including bulk and individual actions, with supporting backend logic and firmware coordination.
- Built data processing scripts for alarm decoding, outlier suppression, and time-series aggregation, improving data accuracy, reliability, and client usability in production deployments.

EDUCATION

University of Moratuwa, Moratuwa, Sri Lanka July 2022 – Present
B.Sc. Engineering (Hons.) in Electronic and Telecommunication Engineering GPA: 3.67 / 4.00
Dean's List: Semester 4, Semester 6, Semester 7

- *Relevant Coursework:* Data Structures and Algorithms, Applied Statistics, Signals and Systems, Machine Learning, Deep Learning for Vision, Image Processing and Machine Vision, Pattern Recognition, Neural Networks and Fuzzy Logic, Engineering Optimization, Autonomous Systems, Software Design Competition

Bandaranayake College, Gampaha, Sri Lanka. January 2012 - October 2020
GCE Advanced Level - Physical Science Stream; Z-Score 2.5516.

- *Combined Mathematics, Physics, Chemistry.*

GCE Ordinary Level ; 9As.

PROJECTS

Quadruped Mobility System for Dynamic Sensing (Unitree Go2) — FYP – Ongoing (Ongoing)

- **Tools & Technologies:** Python, C++, CUDA, ROS 2 Humble, VLM, PyTorch, YOLOv11-OBB, YOLOv8, OpenCV, FastAPI, SQLite, Docker, Jetson Orin Nano, Unitree Go2, EasyOCR, PaddleOCR, scikit-learn, NumPy,TensorRT
- **Project Overview:** Designed a real-time visual inspection system for quadruped-mounted industrial monitoring, integrating GPU-accelerated object identification and understanding, multi-stage analog gauge reading, and distributed edge–server workflows for autonomous inspection.

- **My Contributions:**
  - Architected a distributed inspection pipeline with Jetson-based edge inference and an asynchronous FastAPI server for ROI-based job scheduling and result retrieval over Wi-Fi LAN.
  - Developed a hybrid analog gauge reading system combining CNN, vision transformer-based keypoint regression, geometric ellipse fitting, OCR with rotation normalization, and RANSAC-based angle-to-value regression, segmentation based needle detection.
  - Integrated zero-shot VLM-based gauge reasoning with structured JSON parsing as a fallback pipeline, achieving 98.1% accuracy under unseen gauge types.

TransX – Transformer Maintenance Platform November 2025

- Developed a full-stack AI-powered platform for transformer inspection, integrating React/TypeScript frontend, Spring Boot backend, and a YOLOv8-based Python ML microservice for real-time thermal anomaly detection and interactive annotation workflows.
- Implemented the complete database schema (MySQL,relational database), REST API endpoints, and frontend modules for inspection management, annotation canvas, and maintenance record generation.

Enterprise Time-Series Forecasting & Anomaly Detection System (Ongoing)

- Architected and deployed a production-grade machine learning pipeline for electricity load forecasting and real-time anomaly detection, leveraging XGBoost with engineered lag features (achieving R^2=0.96), statistical baseline models (Seasonal Naive, Moving Average), and configurable anomaly detection algorithms (Z-score, Isolation Forest) on synthetic time-series data spanning 17,000+ hourly observations, demonstrating proficiency in supervised learning, feature engineering, and MLOps best practices.
- Independently developed end-to-end ML infrastructure including: modular Python codebase with type hints and comprehensive logging, YAML-based configuration management for hyperparameter tuning, automated virtual environment setup scripts, reproducible data pipeline with feature extraction (lag features, rolling statistics, temporal encodings), model persistence with joblib, evaluation framework with multiple metrics (MAE, RMSE, MAPE), and automated visualization generation using Matplotlib/Seaborn—showcasing full-stack ML development capabilities from data preprocessing to model deployment.

Event-Driven Workflow Management Platform (Ongoing)

- Designed and implemented a full-stack event-driven workflow platform using Apache Kafka for asynchronous task processing, featuring REST API with Express, Kafka-based event streaming, and React frontend with real-time status updates demonstrating microservices architecture and distributed systems patterns.
- Independently developed all system components: backend API with event publishing, Kafka consumer worker with step-by-step processing logic, React UI with auto-refresh capabilities, Docker-based infrastructure setup, and comprehensive technical documentation including architecture design, API specifications, and event schemas.

YOLO & Kalman filter based Target Tracking System December 2025

- Designed and implemented an end to end video object tracking system combining YOLO-based detection with Kalman filter multi object tracking for robust, real-time tracking by detection, including occlusion handling and jitter reduction.
- Independently developed all modules: dataset preparation, model training, inference pipelines, Kalman tracking logic, visualization utilities, and automated result analysis with annotated videos and performance plots.

FasterViT-OCI: Boundary-Aware Hierarchical Vision Transformer Extension December 2025

- Implemented and evaluated the FasterViT architecture, extending the original paper with OCI improvements to enhance hierarchical attention mechanisms; conducted three comprehensive experiments: inference throughput replication on ImageNet-1K, transfer learning on CIFAR-10, and object detection benchmarks with Detectron2 backbones on Pascal VOC.

- Designed and executed the full training and evaluation pipeline for FasterViT-0 on CIFAR-10, including data preprocessing, augmentation, checkpointing, and metric logging. Implemented the OCI extension in PyTorch, trained and evaluated both baseline and OCI models, and performed quantitative and qualitative comparisons.

Smart Rolling Door Device August 2025

- Developed embedded firmware for ESP32-based controller, implementing MQTT communication, state management, fault handling, and real-time device telemetry for reliable remote operation.
- Designed and implemented a web-based control interface for door operation, live status visualization, and configuration management, focusing on usability and low-latency command execution.
- Integrated cloud-based messaging and event-driven workflows to enable secure remote access, automation triggers, and scalable device control.

Vision-Based Object Tracking and Control System (Robotic Arm) July 2025

- Developed a real-time vision-based system that detects and tracks a selected target object and generates continuous control commands to align and follow the target using a robotic arm.
- Implemented the complete perception-to-control pipeline, including camera-based object detection and tracking, coordinate mapping from image space to actuator commands, and embedded control logic for smooth and stable object-following behavior.

CLRerNet Improving Confidence of Lane Detection with LaneloU August 2024

- CLRerNet enhances lane detection confidence using the LaneloU architecture, improving accuracy in complex driving scenarios. The project focuses on advanced neural network techniques to refine lane recognition in real-time.
- Develop the CLRerNet algorithm using Python, leveraging the LaneloU architecture to improve lane detection confidence. The implementation will involve training and fine-tuning the neural network to enhance accuracy in detecting lanes under diverse driving conditions.

Hand Gesture Detection using machine learning and Image processing June 2024

- This project harnesses the power of machine vision and deep learning to create a image recognition system.
- implemented a hand gesture detection system using CNNs, achieving high accuracy in gesture recognition. I optimized the model for real-time tracking and classification.

Ratatouille : Fast Maze Traversing Micro mouse June 2024

- The Fast Maze-Traversing Micro mouse navigates complex mazes autonomously using advanced sensors and algorithms.
- Designed schematics and PCBs and working with Webots to simulate and optimize the micro mouse's performance.

Industrial Smart Soldering Station March 2024

- The Smart Soldering Station is a high-performance soldering solution with a soldering iron and hot air gun, featuring advanced PID temperature control and multiple modes for precise, efficient, and reliable soldering.
- Research on the circuit, designed AC and DC circuit schematics and PCBs, developed PID control algorithm, selected components, and assisted in enclosure design soldering and testing.

TechbBot : STM32/Vision-Based Robot March 2023

- An innovative robot featuring a custom-designed 4-layer PCB with an STM32F405VGT6 ARM-M4 microcontroller and a Raspberry Pi 4b for advanced machine vision tasks.
- Designed the shooter mechanism, worked with Cube IDE for development, tested sensors, assembled mechanical and electronic components, and was involved in algorithm design using C++.

IoT Based Medicine Storage May 2023

- The Smart MediBox assists users in managing their medication schedules with timely audio and visual reminders, environmental tracking, and remote management via a web-based dashboard.
- Indipendently designed and developed the circuit, PCB, and dashboard designed using Node-RED, and programmed ESP32 microcontroller using the Wokwi simulator.

Turbi-Detector-Iot Base Solution for Contaminated Water July 2023

- The roject aims to develop a smart device using an infrared sensor and control system to detect mud in water pipelines. It ensures clean water supply by diverting contaminated water and notifying users via a mobile app.
- Designed the circuitry, schematics, and PCB layout for reliable operation. Created graphic designs for marketing, algorithm-designed , system integration.

Path Planning in Robot Operating System ROS2 August 2024

- This project implements the Dijkstra algorithm for path planning in ROS2, enabling efficient autonomous robot navigation by finding the shortest path while avoiding obstacles.
- Implement the Dijkstra algorithm in ROS2 for autonomous path planning by integrating the navigation stack with real-time obstacle avoidance.

Nanonaut : Tasks Completing Line Following robot December 2024

- The Nanonaut Robotics Project features a robot capable of accurate line following, intelligent wall avoidance, ramp navigation, mechanical arm operation, sound responsiveness, color detection, maze traversal, and obstacle avoidance.
- Designed the robot's electronics and mechanical assembly, selected sensors and components, implemented sensor algorithms, and contributed to the 3D design for optimal functionality and performance.

UART Transceiver Implementation in FPGA May 2023

- Implemented a UART transceiver using FPGA, enabling reliable serial communication for data transmission and reception.
- Testing the transceiver for accurate data handling and simulate the idea.

AWARDS AND SCHOLARSHIPS

Finalist — Sri Lanka Robotic Challenge 2024
Competed in the prestigious Sri Lanka Robotic Challenge 2024, demonstrating advanced robotic design and programming skills. Achieved finalist status by successfully navigating through complex challenges and showcasing innovative solutions in the university category.

Mahapola Higher Education (Merit) Scholarship.
For outstanding performance in the GCE A/L Examination. Ranked #124 out of 34389 students.

TECHNICAL SKILLS AND INTERESTS

Languages: English (Professional), Sinhala (Native)

Programming: Python, C/C++, MATLAB, SQL, React.js

Developer Tools: Altium Designer, SolidWorks, LTspice, Multisim, Quartus Prime, Arduino, Atmel Studio, PIStudio, Webots, Version Control (Git and GitHub), SLAM toolbox, TensorFlow

Frameworks & Libraries: TensorFlow, PyTorch, Scikit-learn

Cloud / Databases: SQL, Firebase

Soft Skills: Problem Solving, Decision Making, Project Management, Team Leadership, Marketing

Coursework: Machine Vision, Deep Learning, Applied Machine Learning, Engineering Project Management

Areas of Interest: Software development, Deep Learning for Computer Vision, Machine Learning, Embedded Systems, Electronic Product Design

Sports & Other: Badminton, Playing the Guitar

CERTIFICATIONS

Deep Learning & Machine Learning: Convolutional Neural Networks (DeepLearning.AI, 2025), Structuring Machine Learning Projects (DeepLearning.AI, 2025), Supervised Machine Learning: Regression and Classification (DeepLearning.AI, Stanford University, 2024)
Programming & Problem Solving: Problem Solving – Basic (HackerRank, 2024), Problem Solving – Intermediate (HackerRank, 2024), Python – Basic (HackerRank, 2024)

VOLUNTEER EXPERIENCE

Career Fair 2023 - University of Moratuwa

- Company Coordinator : ADL(Axiata Digital Lab)

Sri Lanka Robotic Challenge 2023 - University of Moratuwa

- Coordinator : Video Streaming

Abhina 2023 - University of Moratuwa

- Coordinator : Video Streaming

Exmo exhibition - University of Moratuwa

- Coordinator

Rotaract Club of University of Moratuwa.

- *General Member* *June 2022 - April 2023*
- *Engaged as an organizing committee member for various projects(Professional Development projects, Membership Development projects, Community Service projects)*

Science Society - Bandaranayake College, Gampaha

- Coordinator : Organized and led various science-related activities and events, including the Xban Exhibition.

Scout Association - Bandaranayake College,Gampaha

Buddhist Society - Bandaranayake College,Gampaha

Xban Exhibition 2018 and 2014 - Bandaranayake College, Gampaha

- Coordinator (2014): Led the coordination of an astronomy-related project, organizing team activities, overseeing project development, and ensuring the successful presentation of the project.
- Coordinator (2018): Managed and coordinated a project related to pyramid technology, facilitating team collaboration, guiding project execution.

REFERENCES

Dr. Ranga Rodrigo
Senior Lecturer
Department of Electronic and Telecommunication Engineering,
University of Moratuwa, Sri Lanka
Email : ranga@uom.lk

Peshala Jayasekara,PhD
Senior Lecturer
Department of Electronic and Telecommunication Engineering,
University of Moratuwa, Sri Lanka
Email : peshala@uom.lk