Rebecca Fernando

Biomedical Engineering Undergraduate, University of Moratuwa
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SUMMARY

I'm a fourth-year Biomedical Engineering undergraduate with strong foundations in machine learning, deep learning, signal processing, and software development. I have hands on experience developing Python based systems for computer vision, physiological signal analysis, and data driven automation, including emotion recognition pipelines, CNN-based medical diagnostics, and vision transformer evaluations. Skilled in building end to end solutions, from data preprocessing and model development to evaluation and system integration and delivering practical, scalable, and human centered technologies.

EDUCATION

University of Moratuwa, Moratuwa, Sri Lanka. July 2022 - Present
B.Sc. Engineering (Hons.) in Biomedical Engineering; GPA: 3.79/4.0.

- *Pattern Recognition, Image Processing and machine vision, Deep learning for Vision, Data Structures and Algorithms, Neural Networks and Fuzzy Logic, Software Design Competition, Digital Signal Processing, Biosignal Processing, Medical Imaging, Medical Electronics and Instrumentation, Electronic Instrumentation, Biomedical Device Design, Anatomy, Modelling and Analysis of Physiological Systems, Electronic Control Systems, Linear Algebra, Applied Statistics, Circuits and Systems Design, Technical and Scientific Writing*

Srimavo Bandaranaike Vidyalaya, Colombo 07, Sri Lanka. January 2007 - October 2020
GCE Advanced Level - Physical Science Stream; Z-Score 2.5332.

- *Combined Mathematics, Physics, Chemistry.*

AWARDS AND SCHOLARSHIPS

Semifinalist - Brainstorm 2024 - Sri Lanka's Premier Biomedical Engineering Competition.
Semifinalist - Spark Challenge 2024 - A flagship year long innovation competition organized by the Department of ENTC
Mobile application designed to revolutionize the management of baby health records in Sri Lanka.

Dean's List.
Semester 2, Semester 4, Semester 6.

Spirit of Service Award - Rotaract Club, University of Moratuwa.
The certificate recognizes outstanding dedication and commitment demonstrated throughout the 2022/23 term in the Rotaract Club of University of Moratuwa.

EXPERIENCE

Research Intern – Human Computer Interaction Dec 2024- July 2025

- AID Lab, The University of Sydney, Australia
- Developed a Python based automated pipeline for the design and evaluation of ankle–foot orthoses, incorporating simulation driven analysis, gait modeling, finite element analysis, and script-driven 3D design.

PROJECTS

Emotion & Context-Aware Digital Companion (Final-Year Project) (Ongoing)

- Building a wearable digital companion that combines low-latency emotion recognition with contextual awareness.
- Implementing motion-artifact removal for EEG and PPG to improve signal reliability.
- Developing emotion recognition models using BVP and EEG spectral features.
- Integrating personalized feedback based on emotional state and context.

ECG Arrhythmia Classification Using Adaptive Multi-Window STFT and CNN November 2025

- Built a deep-learning pipeline using multi resolution STFT features and a 2D CNN classifier.
- Improved arrhythmia detection accuracy through adaptive time frequency representation.

Experimental Study and Performance Analysis of Faster Vision Transformers (FasterViT) for Computer Vision Tasks December 2025

- Reproduced and evaluated the FasterViT architecture through benchmarking, fine-tuning, and comparison with CNNs and Swin Transformer across classification and detection tasks.
- Implemented experiments, ran throughput and accuracy evaluations, fine-tuned models on CIFAR-10, and proposed lightweight architectural improvements to enhance performance under limited hardware constraints.

CLRerNet - Improving Confidence of Lane Detection with LaneIoU November 2024

- Developing an advanced lane detection system using the LaneIoU method to improve the accuracy of lane confidence scores.
- This method significantly improves lane detection accuracy on challenging datasets, such as CULane and CurveLanes.

Liver Segmentation with U-Net and PyTorch October 2024

- Implemented liver segmentation using 3D U-Net with Monai and PyTorch.
- Used 3D Slicer and ITK-SNAP for data preparation and scan visualization.
- Trained and tested the model with custom scripts, evaluated using loss and Dice coefficient.

Brain Tumor Detection using SVC October 2024

- This project focuses on the detection of brain tumors using a Support Vector Classifier (SVC) model.

Transformer-Management-System November 2025

- Developing a full-stack web platform for transformer thermal inspections, including image management, AI-based anomaly detection, interactive annotation, and automated maintenance report generation.
- Designed the front-end interface for the system.

Smart Soldering Station July 2024

- The Smart Solder Station is a high-performance soldering solution equipped with both a soldering iron and a hot air gun. It features advanced PID temperature control and multiple operational modes, providing precise, efficient, and reliable soldering capabilities.
- Implementing AVR programming for the microcontroller in C, designing the enclosure, assisting in circuit design, testing, and conducting soldering tasks.

Design and Development of an Electronic Stethoscope December 2025

- Designed an electronic stethoscope using a microphone-based acoustic front end with Wi-Fi transmission to a web application for real-time waveform visualization, audio playback, and data storage.
- Led the complete hardware and mechanical design, including acoustic chestpiece design and resonance frequency calculations to optimize heart sound capture.

Insole System for Early Detection of Diabetic Foot Ulcers December 2023

- First bench model prototype.
- Conducted regulatory pathway analysis and IP analysis.

Modelling and Analysis of Physiological Systems June 2024

- Analysis of cardiac physiology.
- Branched Cylinders: Dendritic tree approximation.
- Hodgkin-Huxley equation.
- Investigate compartmental systems.
- Simulation of respiratory mechanism.

Biomedical Sleep Inducer July 2023

- A biomedical device enhancing sleep quality through non-invasive brain activity modulation, aimed at providing a portable, cost-effective solution for insomnia sufferers.
- Designed schematics and PCB layout to ensure reliable operation, and contributed to the assembly process for functional integration.

MediBox- IoT based Smart Medicine Storage System April 2024

The Smart MediBox is an IoT based device that manages medication schedules with reminders, environmental monitoring, and remote control via a web based dashboard, ensuring adherence and optimal storage conditions.

- PCB design.
- Dashboard design using Node-RED.
- Programming ESP32 microcontroller.

Five Band Equilizer December 2023

- Designed and implemented a five-band analog audio equalizer, including PCB layout, enclosure design, and circuitry with five filters, five amplifiers, and an adder to regulate and modify audio signals over five frequency ranges using only analog components.
- Designed enclosures and assisted in system integration, circuit design, and conducting soldering tasks.

UART Transceiver Implementation in FPGA May 2024

Implemented a UART transceiver using FPGA, enabling reliable serial communication for data transmission and reception.

- Used Verilog hardware description language (HDL) to design.

LEADERSHIP EXPERIENCE

IEEE Engineering in Medicine and Biology Society- University of Moratuwa
Head of External Relationship Aug 2023 - Aug 2024

Brainstorm 2024- Sri Lanka's Premier Biomedical Engineering Competition
Marketing Team Aug 2023 - Aug 2024

- As part of the marketing team for the Brainstorm competition, we consistently updated our audience throughout each stage of the event to maintain engagement and ensure participant involvement.

Rotaract Club of University of Moratuwa.
General Member. June 2022 - April 2023
Inducted Member. From April 2023
Co-chair. (Bit Rain) January 2023 - May 2023
Engaged as an organizing committee member for various projects.

- *Professional Development projects, Membership Development projects, Community Service projects.*
- Are You Ready - Company Coordination.
- Suwapetha - Event day Co-ordinator, Graphic Designer.
- Shalom - Volounteering (teaching)
- Rota Spark - Event day Co-ordinator, Graphic Designer.
- Resume Centre - Registration Table, HR Coordinating, Poster campaig, Event day Coordinator.
- Data Storm 4.0 - Graphic Designer.
- Induction Ceremony - Presentation Designing, Event day preparation

Catholic Students' Society - University of Moratuwa.
Vice President Communications. Aug 2023 - Aug 2024

Senior Prefect - Sirimavo Bandaranaike Vidyalaya, Colombo 07. January 2019 - January 2020

Junior Prefect - Sirimavo Bandaranaike Vidyalaya, Colombo 07. January 2015 - January 2016

SKILLS AND INTERESTS

Languages

- English (professional proficiency)
- Sinhala (native proficiency)

Programming Languages

- Python
- C++
- Matlab

Software

- PCB designing - Altium Designer
- 3D modeling and parametric design – SolidWorks, Blender, Rhino, Grasshopper
- Simulation and multiphysics modeling – COMSOL Multiphysics
- Electronic circuit design and simulation - LTspice
- FPGA programming - Quartus Prime
- Microcontroller programming - Arduino, Atmel studio
- Graphic Designing - Canva

Sports

- Taekwondo

Other

- Playing the piano

REFERENCES

Dr. Ranga Rodrigo
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