Nadun Deshitha Bandara

nadundeshitha828@gmail.com +94 76 620 37 44 nadundeshitha nadundeshitha
No. 557/1, Bodiya Road, Peellewela, Buttala, Sri Lanka

Profile

I am a second-year Biomedical Engineering undergraduate at the Department of Electronic and Telecommunication Engineering, University of Moratuwa, Sri Lanka.

I am focusing on bridging the gap between physiological signal processing and robust hardware realization. My expertise lies in developing embedded solutions that combine machine learning with hands-on fabrication, including custom PCB design and 3D modeling, to create high-accuracy biomedical and assistive devices.

Interest Areas: Biomedical Device Design and Manufacturing, Printed Circuit Board (PCB) Design, Microcontroller Programming, Machine Learning, Deep Learning, Embedded Machine Learning, and Human-Computer Interaction.

Education

University of Moratuwa *March 2024 – Present*
B.Sc. Engineering Honors in Biomedical Engineering
Department of Electronic and Telecommunication Engineering

- **Current CGPA:** 3.73/4.00
- **Coursework:**
  - *Biomedical & Hardware:* Modelling and Analysis of Physiological Systems, Biomedical Device Design, Anatomy and Physiology for Engineers, Electronic Design Realization
  - *Systems, Control & Electronics:* Signals and Systems, Electronic Control Systems, Robot Design and Competition, Electronic Circuit Design
  - *Applied Mathematics:* Linear Algebra, Differential Equations, Calculus, Numerical Methods, Probability and Statistics

Bandarawela Central College *Jan 2014 – Feb 2023*
G.C.E. Advanced Level 2022 (2023) - Physical Science Stream

- 3As - Z-score 2.1668
- **Coursework:** Mathematics, Physics, Chemistry

G.C.E. Ordinary Level 2019

- 9As

Projects

HemoSense - Low-Cost Postpartum Hemorrhage Monitoring Device *July 2025 – Present*

- Designed a non-invasive biomedical device for early PPH detection, utilizing a capacitive absorbent pad to convert capacitance changes into measurable frequency signals.
- Developed firmware for real-time blood volume estimation, integrating machine learning algorithms to enhance predictive accuracy, alongside an informative display, local alarms, and an IoT architecture for critical caregiver notifications.
- Curated a custom dataset through simulated blood tests and calibration curves to train and validate the machine learning models, optimizing the device architecture for clinical safety, cost constraints, and FDA/CE regulatory pathways.

Heart Disease Risk Prediction System *Mar 2026 – Present*

- Developing a machine learning pipeline in Python to predict heart disease risk, focusing on robust data preprocessing techniques such as feature scaling and categorical encoding of clinical data.
- Training and evaluating predictive models using Scikit-learn to optimize diagnostic reliability based on accuracy, precision, and F1-scores.
- Designing a responsive web application using Flask and Bootstrap to eventually integrate the backend ML model, aiming to provide real-time risk assessments based on user-input health parameters.

Autonomous Mobile Robot Design (1st Place - EN2533 Competition) *Sept 2025 – Dec 2025*

- Designed the mechanical and hardware architecture for an autonomous mobile robot, optimizing the placement of motors, sensors, and modular power systems to ensure stability and rapid debugging.
- Engineered and modeled the robot chassis, enclosure, and complex actuation mechanisms (ball-grabbing and shooting) using SolidWorks to meet strict precision and competition constraints.
- Executed the physical hardware assembly and iterative testing to achieve consistent, reliable operation, **securing 1st place** in the competition by successfully completing all assigned tasks.

Wearable Fall Detection and Emergency Alert System *Jan 2025 – Jul 2025*

- Engineered a wearable assistive device for elderly safety, designing the complete hardware architecture including circuit simulation, custom PCB layout, and an ergonomic 3D-printed enclosure.
- Integrated an IMU, barometer, and HR/SpO2 sensors with an ESP32 microcontroller, developing algorithms to process human movement and physiological data for real-time fall detection and pre-fall prediction.
- Developed a companion web interface and mobile IoT alert system, achieving emergency notifications within 10 seconds, continuous vital monitoring, and a highly efficient 24+ hour battery life.

Smart Autonomous Floor Mopping Robot (SAFMR) *Feb 2026 – Present*

- Designing an autonomous indoor mopping robot featuring a dual-stage mechanical cleaning system with a front wiper and a controlled rear water-dispensing pump.
- Engineering a custom PCB to integrate the microcontroller, motor drivers, and a multi-sensor array (cliff, obstacle, encoders, bumper) for robust autonomous navigation and coverage.
- Modeling a compact mechanical chassis and protective enclosure to efficiently house the electronic payload, removable water tank, and power distribution system.

Analog Electronic Stethoscope *Mar 2026 – Present*

- Designing a fully analog biomedical device to capture, amplify, and filter low-amplitude physiological heart and lung sounds using a condenser microphone.
- Engineering a multi-stage analog signal conditioning circuit, combining a low-noise pre-amplifier and a 20–600 Hz band-pass filter to isolate critical physiological frequencies from environmental noise.
- Implementing a Class AB power amplifier to drive audio output with minimal distortion, validating the entire analog architecture through circuit simulation and physical hardware testing.

Analog Voltmeter Design and Implementation *Sept 2025 – Dec 2025*

- Designed a multi-range analog voltmeter, utilizing LTspice to simulate and verify input protection, signal buffering, low-pass filtering, and voltage-to-current conversion stages.
- Engineered a custom PCB with a strict focus on noise minimization and proper grounding, and modeled a safe, ergonomic hardware enclosure.
- Validated measurement accuracy through rigorous breadboard testing and analog meter calibration and authored a comprehensive technical datasheet documenting system specifications and safety protocols.

Switch Mode Variable Bench Power Supply (30V, 5A) *Jan 2026*

- Designed and assembled a switch-mode variable bench power supply that offers superior energy efficiency (80-95%), lighter weight, and a smaller footprint compared to traditional linear supplies.
- Implemented comprehensive hardware safety mechanisms including adjustable current limiting, short-circuit defense, and over-voltage protection to safeguard sensitive prototypes during testing and debugging.
- Engineered and fabricated a custom ergonomic enclosure, optimizing the physical interface for user accessibility, efficient thermal management, and modular component integration.

4-bit Adder-Subtractor Circuit (with Custom 5V Regulator) *Dec 2023 – Jan 2024*

- Designed and implemented a 4-bit adder-subtractor circuit using digital logic gates, enabling fundamental arithmetic and comparison operations.
- Engineered and integrated a custom 5V voltage regulator to ensure stable power delivery and protection for the sensitive digital logic components.
- Employed Karnaugh maps for logic minimization and utilized Logisim for thorough simulation and verification prior to physical hardware realization.

Work Experience

Freelance Graphic Designer *2018 – 2020*
Fiverr and Upwork Inc.

- Designed professional flyers, banners, book covers, logos, and NFT artwork for clients worldwide.
- Utilized Adobe Illustrator and Photoshop to ensure high-quality and visually appealing designs.
- Specialized in branding, visual storytelling, and layout design to create impactful marketing materials.
- Collaborated with clients to bring their vision to life with unique and customized graphic solutions.

Professional Video Editor *2019 – 2024*
Fiverr

- Specialized in high-quality video editing, motion graphics, and animation using Adobe Premiere Pro and After Effects.
- Crafted engaging and visually compelling content for professional creators, educational institutions, and healthcare organizations.
- Enhanced brand storytelling through advanced editing techniques, dynamic transitions, and polished visual effects.
- Collaborated with clients to produce tailored video solutions that met industry standards and creative objectives.

Certifications

Machine Learning Specialization *Ongoing*
Stanford University & DeepLearning.AI

- Comprehensive training in supervised learning, including linear regression, logistic regression, and neural network architectures.
- Gaining expertise in advanced learning algorithms, decision trees, and ensemble methods for complex data classification.
- Implementing unsupervised learning techniques, recommender systems, and reinforcement learning models.

Deep Learning Specialization *Ongoing*
DeepLearning.AI

- Building and training deep neural networks, focusing on hyperparameter tuning, regularization, and optimization.
- Mastering the structure of machine learning projects and strategies for reducing error in complex AI systems.

- Specializing in Convolutional Neural Networks (CNNs) for computer vision and Sequence Models for time-series data.

Extra-Curricular Activities & Volunteer Experience

IEEE Engineering in Medicine and Biology Society - University of Moratuwa
Graphics Designer — *Sept 2025 – Present*

Brainstorm 2026 - Sri Lanka's Premier Biomedical Engineering Competition
Lead – Web, PR and Design — *Dec 2025 – Present*

Leo Club of University of Moratuwa
Organizing Committee Member of Me and Nature Project — *Nov 2025*

Brainstorm 2025 - Sri Lanka's Premier Biomedical Engineering Competition
Organizing Committee Member — *Feb 2025 – Jul 2025*

Sri Lankan Robotics Challenge (SLRC) 2025
Organizing Committee Member — *Feb 2025 – Apr 2025*

Skills Summary

Languages: English (professional proficiency), Sinhala (native proficiency)

Programming Languages: Python, C++, Matlab, JAVA

Frameworks: PyTorch, TensorFlow, NumPy, Scikit-learn

Software:

- PCB designing - Altium Designer, EasyEDA
- Enclosure designing - Solidworks, Autodesk Fusion
- Electronic circuit design and simulation - Proteus, LTspice
- Robotics - Webots, Arduino
- Graphic Designing - Adobe Photoshop, Adobe Illustrator
- Video Editing - Adobe Premiere Pro, Adobe After Effects
- Documentation - Microsoft Office Suite, LaTeX, Markdown

Hardware: STMicroelectronics STM32, Espressif ESP32, Atmel, Raspberry Pi, PIC