

Zainul Hussain

Final-Year Electrical and Electronic Engineering Undergraduate

Galle, Sri Lanka

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Personal Profile

Final-Year Electrical and Electronic Engineering undergraduate at the University of Peradeniya focusing on Embedded Systems, FPGA-Based Digital Design, and Power Electronics. Aspires to become an Embedded Systems Engineer, developing efficient, reliable, and innovative hardware-software solutions for real-world applications.

Education

University of Peradeniya

Feb 2022 – Present

BSc. Eng (Hons) in Electrical and Electronic Engineering – CGPA: 3.395 / 4.00

Vidyaloka College Galle

Feb 2012 – Oct 2020

G.C.E. Advanced Level (Physical Science) – 3A

Projects

Pulse-Based Diagnosis System for Disease Prediction (Research Project) *Aug 2025 – Present*
Biomedical Engineering

- Developed a multi-sensor data acquisition system comprising multiple devices (ECG, PCG, pulse, and respiratory) to predict cardiovascular risk at an early stage.
- Designed a low-cost wearable respiratory effort monitoring device using three MPU6050 IMUs mounted on an elastic chest belt and a 3D-printed enclosure for the controller circuit.
- Implemented ESP32 firmware (ESP-IDF) to collect accelerometer data at 100 Hz and transmit it via USB serial.
- Processed linear accelerometer data using Python to extract and visualize the breathing pattern.
- Project Portfolio: [Research Project Portfolio](#)

ESP32-Based Early Flood Warning and Risk Monitoring System

Aug 2025 – Nov 2025

Embedded Systems and IoT Design

- Developed an ESP32-based flood early warning system using ultrasonic sensors and ESP-NOW protocol for real-time water-level monitoring.
- Implemented risk assessment with threshold-based alerts and a live web dashboard.
- Developed custom PCBs with power management for low-cost deployment.
- Source code: github.com/zainul511/Flood-Risk-Monitoring-Assessment-System

MCU-Based Data Logger PCB Design

Feb 2024 – May 2024

PCB Design

- Designed a compact 4-layer PCB for an MCU-based data logger (ATmega328P-AU).
- Integrated dual 1 Mbit I²C EEPROMs and DS1337 RTC for reliable, timestamped data logging.
- Optimized for field-deployable sensor applications.
- Source files: github.com/zainul511/MCU-Data-Logger

FPGA-Based Image Edge Detector

FPGA

Feb 2026 – Present

- Developed a Sobel Edge Detection filter in Verilog for FPGA-based image edge detection.
- Validated the behavioral simulation results using an OpenCV-based Python program with the same input image.

Line-Following Robot Based on Combinational Logic Circuits

Digital Logic Circuits

Oct 2023 – Jan 2024

- Designed and implemented a line-following robot using only combinational logic gates (AND, OR, NOT).
- Derived motor control logic using truth tables and Karnaugh maps based on IR sensor inputs.
- Generated control signals to drive an L298N H-bridge motor driver for real-time directional control.

Arduino-Based Humidity Measurement and Control System

Embedded Systems

Oct 2023 – Jan 2024

- Developed a humidity monitoring system for agricultural applications using Arduino UNO and DHT11 sensor.
- Implemented threshold-based control logic to switch LEDs On/Off based on measured humidity levels.

Skills

Software & Tools: C, C++, Python, Vivado, Verilog, GNU Octave, ESP-IDF, Arduino

Design, Simulation & Modelling: PCB Design (KiCad), Power Electronics Simulation (PLECS), 3D Modelling (Fusion 360)

Hardware & Prototyping: Soldering, Basic Hardware Debugging

Languages: Sinhala (Native), English (Fluent), Tamil (Conversational)

Professional Memberships

- Student Member, Institution of Engineers Sri Lanka (IESL)
Membership No.: S-32100

References

Dr. Ruwan Ranaweera

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Dr. Isuru Dasanayake

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