Prabath Wijethilaka

Electronic and Telecommunication Engineering
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SUMMARY

I am Prabath Wijethilaka, a Final Year undergraduate student in Electronic and Telecommunication Engineering at the University of Moratuwa, skilled in digital electronics and communications.

Interest Areas

I have a strong interest in FPGA Hardware Accelerated Systems, Computer Architecture, Embedded Systems, AI & ML, Full Stack Developing, Entrepreneurship, Sports and Outdoor Activities.

EDUCATION

• **BSc (Hons) Electronic and Telecommunication Engineering** *2022 - Present*
University of Moratuwa CGPA/Percentage: 3.69/4.0

• **GCE Advanced Level Examinations** *2012-2020*
Dharmaraja College - Kandy Physical Science Stream
– Z score - 2.5258
– District Rank - 13, Island Rank - 134

EXPERIENCE

•**Hardware Accelerated Systems Engineer - Internship** *On-site*
London Stock Exchange Group Dec 2024 – June 2025

I contributed to the verification of high-performance FPGA-based networking systems. I developed a UVM-driven Ethernet packet capture and replay tool capable of injecting .pcap files to reliably reproduce real production failures. I also migrated the full testbench architecture from nanosecond to femtosecond precision, resolving critical timing alignment issues in the TCP Offload Engine pipeline. Additionally, I explored Linux kernel driver operation for configuring the Xilinx Alveo U50 data-center FPGA and integrated Model Checking principles into the verification methodology to strengthen functional correctness and coverage.

RECOMMENDATIONS

"Prabath demonstrated outstanding self-learning skills, quickly adapting to our existing codebase with minimal intervention and significantly improved the test bench's running time. I highly recommend Prabath to any organization. He would be an invaluable asset to any forward-thinking organization"

— **Nuwantha Silva, Assoc. Tech Lead (FPGA), London Stock Exchange Group**
(LinkedIn Recommendation) *View full recommendation on LinkedIn*

CONFERENCES & WORKSHOPS

– **DVCon India 2025 – Design and Verification Conference** *Radisson Blu, Marathahalli, Bangalore*
Runners-up – Design Contest September 10–11, 2025

∗ Awarded **1st Runners-up** at the DVCon India 2025 Design Contest organized by CDAC Trivandrum - Link.
∗ Designed a custom accelerator for the **VEGA AT1051 SoC** and built a framework capable of running the **full Qwen3 inference pipeline on bare metal**, demonstrating strong hardware–software co-design skills while competing against top university and industry teams in a rigorous verification challenge.

– **LEAD CS 8.0 – Leadership Development Program** *Hotel Ramrich, Ja-Ela*
AIESEC Society – University of Moratuwa March 2022

PROJECTS

– **SLMs on Edge - 1st Runners-Up | DVCon India 2025 – Design and Verification Conference** *Repository*
FPGA Accelerator for Qwen3 SLM Inference Jan 2025 – Sep 2025

∗ Designed a complete hardware software co-design framework enabling **Qwen3 SLM/LLM inference on the VEGA AT1051 RISC-V SoC**, reducing latency from minutes to seconds through FPGA-accelerated GEMM offloading.
∗ Built a full bare-metal runtime capable of executing the entire Qwen3 pipeline, including custom memory allocation, tiling schedule generation, AXI-based data movement, and CPU–FPGA synchronization for deterministic sequential inference.
∗ Developed a lightweight systolic array accelerator featuring **INT8 GEMM**, 16×16 tiled architecture, double buffering, AXI4/AXI-Lite integration, and optimized DMA dataflow - delivering high-throughput GEMM execution on edge hardware.

– **Hardware accelerator for a Vision Transformer-based malware detection system** *Report*
Accelerating ViT-based malware detection on edge devices with VEGA AS1061 Processor, based on RISC-V ISA. Jan 2024

* This project aims to deploy a ViT-based malware detection system on an edge device equipped with the VEGA AS1061 Processor
* Stage 1 focuses on proposing a novel acceleration IP to enhance the ViT model's inference performance on the VEGA Processor, ensuring effective malware detection in real-world scenarios.

– **CNN Accelerator RTL Implementation** *Ongoing*
High-Performance INT8 CNN Accelerator for Zynq-7020 FPGA Aug 2025 – Present

* Designed and implemented a high-performance CNN accelerator IP core for the Xilinx **Zynq-7020** , featuring a **14×14 INT8 processing-element array** delivering **31.36 GOP/s at 80 MHz**.
* Developed a custom **32-bit ISA**, hierarchical memory system (PE register files + global buffers), and **AXI4 DMA** integration for seamless ARM–FPGA communication.

–**RV32I Processor Design and Implementation on FPGA**
RV32I Single Cycle and Pipeline Core Jul 2024 – Jan 2025

* **Single-Cycle Core:** Developed a fully verified 32-bit RV32I single-cycle CPU in SystemVerilog with full instruction support and FPGA-ready architecture. - Check Repository
* **Pipelined Core:** Implemented a 5-stage pipelined RV32I CPU with hazard detection, forwarding, stall control, and branch prediction, achieving full RV32I functional verification. - Check Repository
* SystemVerilog, Vivado design flow, RISC-V architecture, pipeline control logic, and hardware verification.

– **EcoWatt – Smart Inverter Monitoring & Control System** *Ongoing*
ESP32-Based IoT Platform for Solar Inverter Telemetry Aug 2025 – Present

* Developed an ESP32-powered IoT system for real-time solar inverter monitoring using **Modbus RTU polling** and an adaptive compression pipeline achieving **96% data size reduction**.
* Implemented encrypted telemetry uploads to a Flask backend with reliable remote command execution and a **secure FOTA pipeline** using **RSA-2048 signature verification** and **AES-encrypted firmware delivery**.

– **TransX – Transformer Maintenance Full-Stack Web Platform** *Ongoing*
AI-Powered Thermal Inspection & Maintenance System Jul 2025 – Present

* Developed a full-stack transformer maintenance platform integrating **YOLOv8 thermal anomaly detection**, canvas-based annotation tools, and a complete inspection workflow for end-to-end transformer health assessment.
* Built using a microservice architecture with **React, Spring Boot, Flask, and MySQL**, enabling automated reporting, real-time collaboration, and scalable transformer data management.

– **Serial Bus Design** *Ongoing*
Custom RTL Bus Interconnect with Arbitration & Split Transactions Aug 2025 – Present

* Developing a custom RTL serial bus featuring a **fixed-priority arbiter** (Master0 > Master1), **range-based address decoder**, and parameterized master/slave interface modules.
* Implemented **split-transaction handling** with full verification using module-level and top-level testbenches (**Verilator** + **Vivado**), and FPGA-ready synthesis flows for both **Vivado and Quartus**.

– **Full-Stack Solution Development with Modular OOP Design** *Jan 2024 - May 2024*
Developed a web application as a submodule within a main project. Repository

* Integrating backend functionalities with frontend components to assembly line operations.
* Spring boot, Java, MongoDB, React, Postman, Rest API

– **Project Hydrolink - Champions | SLIoT Challenge 2023** *2023 - Present*
A Complete IoT Device Revolutionizing Water Tank Management www.hydrolink.lk

* A complete IoT device revolutionizing water tank management.
* Arduino IDE, ESP Microcontroller, Google Firebase, Flutter, SolidWorks, Altium

– **High-Performance Trading System in C++** *Repository*
Flower Exchange Order Matching Engine Aug 2024 – Nov 2024

* Developed a high-performance **C++ order matching engine** implementing price–time priority, in-memory order books, and full order validation across multiple instruments.
* Designed the C++ backend architecture including matching logic, execution state handling, and CSV-based batch processing with test coverage.

– **Steer-Safe - Championship | IEEE Circuit Challenge 2024 and 1st Runners-Up | Brainstorm 2024** *Repository*
Drowsiness Detection system Jun 2024 – Oct 2024

* Developed a lightweight, eyewear-integrated driver safety device using **embedded systems, Communication Protocols**, and low-power firmware for real-time drowsiness and attention monitoring.

– **Gazebo Robot Simulation** *May 2024*
Robot Simulation Project using ROS2 Humble and Gazebo Repository

* Map a room and navigate the robot from one location to another, avoiding obstacles along the way. Additionally, perform object tracking.
* Gazebo, Ros2, Ubuntu, OpenCV

– **Point-to-Point Communication Design project** *Aug 2023 - Dec 2023*
We implemented a secure and reliable point-to-point digital wireless communication system using SDR. Repository

* Our achievements include the successful transmission and reception of diverse data types, such as images, text, and real-time audio.
* Python, GNU radio, MATLAB

– **Industrial Portable Water Quality Measurement Device** *Jan 2024 - May 2024*
Developed an industrial portable water quality measuring device using sensor technologies and a Mobile app. Repository

* Capable of accurately measuring four key parameters: pH, Turbidity, Conductivity, and Temperature.
* Arduino-IDE, ESP-Microcontroller, Google Firebase, Flutter, SolidWorks, Altium

– **UART Communication System Implementation on FPGA using Verilog** *May 2024*
Implemented and tested a UART communication system on an FPGA using Verilog. Repository

* Utilized Quartus Lite for FPGA development and integrated Raspberry Pi for data input.
* Verilog-HDL, Quartus Lite, FPGA, Raspberry-pi, Python

– **Analog Portable Audio Amplifier** *Aug 2023 - Dec 2023*
We have designed a Portable Audio Amplifier using only analog components. Repository

* Our device is capable of amplifying audio input from any audio-generating device through three main sub-circuits: preamplifier, tone controller, and power amplifier. We've implemented the Baxandall passive tone controller.
* Simulink, Proteus, LT-Spice, Altium, Solidworks

– **Machine Learning Projects**
Repository

* DiabetesAI-Webproject
* SMS spam detector
* Stock prediction
* Breast Cancer Wisconsin Diagnostic Predictor
* Cardiovascular Disease Predictor

AWARDS

– **1st Runners-Up | DVCon India 2025 – International Design Contest** *2025*

* SLMs on Edge – A lightweight FPGA-based systolic array accelerator and bare-metal inference engine designed to run the full Qwen3 pipeline on the VEGA AT1051 RISC-V SoC.

– **Championship | SLIoT Challenge 2023 - All island IoT competition** *2023*

* Hydrolink - A Complete IoT Device Revolutionizing Water Tank Management

– **Championship | IEEE Sri Lanka Circuit Challenge 2024** *2024*

* Steer Safe by PulseX - A wearable device that utilizes machine learning and Electrooculography (EOG) signals to track a driver's state of awareness in real-time.

– **1st Runners-Up | Brainstorm 2024 - Healthcare innovation competition** *2024*

* Steer Safe - A wearable device that utilizes machine learning and Electrooculography (EOG) signals to track a driver's state of awareness in real-time

– **Stage 2 (Top 20) | DVCon India 2024 - International Design Contest** *2024*

* GateMasters - Design and implement a hardware accelerator for a Vision Transformer-based malware detection system on a VEGA Processor.

– **Finalist | HackX 2024 - Inter University Startup Challenge** *2024*

* Hydrolink - A Complete IoT Device Revolutionizing Water Tank Management.

– **Dean's List**

* Semester 2, 6

SPECIALIZATIONS AND CERTIFICATIONS

–**Function Acceleration on FPGA with Vitis**
Udemy

–**Linux Device Drivers**
LinkedIn Learning

–**High-Performance and Mission-Critical Software Development Using C++**
London Stock Exchange Group

– **Introduction to FPGA Design for Embedded Systems**
University of Colorado Boulder - Coursera

– **FPGA Softcore Processors and IP Acquisition**
University of Colorado Boulder - Coursera

– **Hardware Description Languages for FPGA Design**
University of Colorado Boulder - Coursera

– **Machine Learning Specialization**
Deeplearning.AI - Coursera

– **AAT Level 3 Completed**
Association of Accounting Technicians of Sri Lanka

– **Diploma in English**
Esoft Metro Campus - Sri Lanka

– **Diploma in IT**
Esoft Metro Campus - Sri Lanka

EXTRA-CURRICULAR AND VOLUNTEERING

– **Volunteer Developer – FloodSupport Sri Lanka - stats.floodsupport.org** *2025*
Community Disaster Relief Initiative – Sri Lanka

– **Judge Board – HackElite 2.0** *2025*
IEEE Sri Lanka Women in Engineering – University of Moratuwa

– **Conduct Knowledge Session: Advanced Biomedical Electronics & Computational Technologies** *2025*
IEEE EMBS Student Branch Chapter – University of Moratuwa

– **Conduct Knowledge Session: Raspberry Pi Web Services** *2025*
Pi Mora, SPARK Branch - University of Moratuwa

– **Head of Marketing** *Aug 2025 - Present*
Electronic Club - University of Moratuwa

– **Marketing Coordinator** *Sep 2024 - Aug 2025*
Electronic Club - University of Moratuwa

– **Social Media Sub-Coordinator** *Aug 2023 - Sep 2024*
Electronic Club - University of Moratuwa

– **Social Media Sub-Coordinator** *Aug 2023 - Sep 2024*
Electronic Club - University of Moratuwa

– **Department Batch Representative** *Jan 2024 - May 2025*
Department of Electronic and Telecommunication Engineering - University of Moratuwa

– **Finance Committee member** *Mar 2023 - Aug 2023*
IEEE Society University of Moratuwa - project "Mora Foresight 1.0"

– **Event Sub-Committee member** *July 2023 - Aug 2023*
EXMO - University of Moratuwa

– **Finance Committee member** *Aug 2022 - Dec 2022*
AIESEC Society University of Moratuwa - project "Rooted 1.0"

– **Junior Prefect** *Jan 2015 - Dec 2015*
Dharmaraja Collage - Kandy

– **President of Collage Hosteler's Society** *Jan 2017 - Dec 2017*
Dharmaraja Collage - Kandy

– **Volunteering in Sasnaka Sansada** *2021 - 2022*
Teaching experience with Volunteering in "Ganitha Saviya" Project

SPORTS AND ACTIVITIES

- **Sri Lanka University Games Championship 2023**
  University Baseball Team - University of Moratuwa
- **Participated STRIDIAN'23**
  Mora Hiking Club - University of Moratuwa
- **Captain of the college under 17 volleyball team**
  Dharmaraja College - Kandy
- **Obtained a 'Merit' for Hockey on Annual "Colors Nite".**
  Dharmaraja College - Kandy
- **Member of the college Baseball, and Hockey team**
  Dharmaraja College - Kandy

TECHNICAL SKILLS

- **Languages**: Java, C, C++, VHDL, Verilog, SystemVerilog, Python, SQL, React, JavaScript, Dart, HTML, CSS
- **Developer Tools**: Vivado, Vitis, Quartus, IntelliJ, MATLAB, Git, Altium Designer, SolidWorks, Android Studio, Gazebo, Docker, VS Code, Postman
- **Frameworks**: UVM, Spring Boot, Flutter, Arduino, Scikit-learn, ROS2
- **Cloud/Databases**: Firebase, Mongo DB, Microsoft Azure, MySQL
- **Operating Systems**:Ubuntu, Windows, RedHat , Raspbian
- **Soft Skills**: Problem-Solving, Team Leadership, Project Management, Teamwork, Public Speaking, Finance and Account management, Strategic Decision-Making, Digital Marketing, Teaching, Photography, Videography

REFERENCES

- **Ajith A. Pasqual,**
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