

# Kanishka Gunawardana

Department of Computer Engineering, University of Peradeniya, Sri Lanka

✉ +94 76-2152049 | 📩 [kanishkagunawardhana@gmail.com](mailto:kanishkagunawardhana@gmail.com) | 🖼 [LinkedIn](#) | 🐾 [GitHub](#) | 🎓 [Google Scholar](#)

## Profile

Top-ranked Computer Engineering graduate with strong interests in Computer Architecture, Embedded Systems, and Neuromorphic Computing, complemented by experience in Intelligent Systems. Dedicated to leveraging hardware-software co-design to solve real-world challenges, with demonstrated leadership, research excellence, and a collaborative mindset.

## Education

### University Of Peradeniya

*Undergraduate in B.Sc. Engineering(Hons.) Computer Engineering*

Nov. 2021 – Aug. 2025

**GPA: 4.0/4.0, Rank: 1/486**

### Dharmaraja College Kandy

*G.C.E. Advanced Level Examination*

Nov. 2006 – Aug. 2019

**Z-score: 2.5661**

National Rank - **149/19508**, District Rank - **11/1189**

## Experience

### Temporary Instructor

Aug. 2025 – Present

*Department of Computer Engineering, University of Peradeniya*

Instructed courses in computer architecture, digital design and embedded systems, including labs and evaluations.

Conducting neuromorphic accelerator research with the [PeraMorphIQ Neuromorphic Research Group](#) and mentored project teams at the [ESCAL Lab](#) on on-chip learning, memory power optimizations, and system architecture.

### Software Engineering Intern

Jul. 2024 – Dec. 2024

*WSO2 LLC, Colombo, Sri Lanka*

Developed Ballerina integrations, including the [OpenAI Finetunes Connector](#). Worked on [ISO20022-to-SwiftMT](#) message conversion using Ballerina for financial message interoperability, along with SaaS-based app design and development.

## Publications

### Optimized Multi-Processor System-on-Chip (MPSoC) Design for Low-Resource JPEG Encoding

*K.H. Gunawardana et al. — ICAC 2024 (Colombo). DOI:10.1109/ICAC64487.2024.10851123.*

- Implemented an FPGA MPSoC JPEG encoder on Cyclone IV using Nios II/e cores; introduced lightweight custom hardware instructions and custom FIFO queues to offload compute-critical stages and reduce processor stalls.
- Achieved 2.8× throughput improvement; superscalar options were evaluated but deprioritised.

## Undergraduate Research Thesis

### SNAP-V: A RISC-V SoC with Configurable Neuromorphic Acceleration for Small-Scale Spiking Neural Networks (Final Year Thesis) | 📄

Nov. 2024 – Jul. 2025

- Designed and developed a dual-core RISC-V System-on-Chip integrating a configurable neuromorphic accelerator with over 1k LIF neurons organized into parallel clusters interconnected through a hierarchical Network-on-Chip (H-NoC), enabling efficient spike-based computation for small-scale SNNs in low-power edge applications.
- Validated the SoC on MNIST using Synopsys (VCS/PrimePower) and Xilinx Vivado, achieving 96.69% accuracy (within an average 2.62% of baseline) and state-of-the-art energy efficiency of 1.39 pJ/synaptic operation.
- Supervision: Dr. Isuru Nawinne, Prof. Roshan G. Ragel
- Technology: **RISC-V, Chisel, Chipyard, Verilog-HDL, Synopsys VCS/PrimePower, Vivado**

## Selected Projects

### RV32IM Pipeline Processor | Group | 🐾

Dec. 2024 – Jul. 2025

- Implemented a 5-stage pipelined RISC-V RV32IM processor with in-order hazard handling, explored AXI-based memory integration for SoC compatibility, performed RTL power and static timing analysis (0.197 mW, 142 MHz), automated the analysis via a GitHub Actions CI/CD workflow, and prototyped the design on a Virtex-7 FPGA.
- Technology: **Verilog HDL, Synopsys DC, VCS, RTLA, PrimePower, GTKWave, GitHub**

## **Impact Tracking System for Athletes (3YP) | Group** |

Nov. 2023 – Mar. 2024

- Developed a real-time head impact monitoring system for contact sports using wearable devices and desktop dashboards, facilitating prompt concussion identification, post-session data transmission, and comprehensive analytics for player safety and informed decision-making.
- Contributions: Led hardware and firmware design and development of wearable devices, developed the centralized hub and local communication, contributed to backend API, and deployed the system on AWS EC2.
- Technologies: **ESP32, Raspberry Pi, MQTT, Python, Express.js, MongoDB, AWS**

## **Field-Based Approach for Quantifying Plant Leaf Color | Group** |

Aug. 2023 – Nov. 2023

- Developed a mobile application with a backend that utilizes Image Processing and Computer Vision to objectively quantify plant leaf colour by analyzing information extracted from captured leaf images.
- Contributions: Developed the backend API for image analysis using FastAPI and contributed to image preprocessing, including image segmentation with a Mask R-CNN model fine-tuned for leaf segmentation.
- Technology: **Python, OpenCV, Pytorch, FastAPI**

## **8-bit Single-cycle Processor** |

Mar. 2023 – Jun 2023

- Designed and implemented an 8-bit single-cycle processor architecture in Verilog HDL with instruction and data caches, featuring a memory unit and a MIPS-inspired ISA supporting arithmetic, logic, and control operations.
- Developed a comprehensive testbench for verification and waveform analysis using GTKWave tool.
- Technology: **Verilog-HDL, GTKWave**

## Achievements

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### **SLIoT Challenge 2023 | Sri Lankan Biggest IOT Competition** | Team: IMPAX

Mar. 2024

- 1st runners-up (Out of 100+ Teams) | Organized by UOM in collaboration with SLT-MOBITEL and IESL

### **MoraXtream 8.0 | 12 hour algorithmic programming competition** | Team: Five4Five

Nov. 2023

- National Rank - 4 (Out of 400+ Teams) | Organized by the IEEE Student Branch of the University of Moratuwa

### **IEEEExtreme 17.0 | 24 hour algorithmic programming competition** | Team: Five4Five

Nov. 2023

- Global Rank - 374 (Out of 16500+ participants), National Rank - 24 (Out of 330 Teams)

### **ACES Coders v10.0 | 12 hour algorithmic programming competition** | Team: Five4Five

Oct. 2023

- National Rank - 12 (Out of 350+ participants) | Organized by the ACES

## Selected Certificates

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### **Machine Learning Specialization** - Stanford University & DeepLearning.AI (Coursera)

Sep. 2023

- Supervised Machine Learning: Regression and Classification
- Unsupervised Learning, Recommenders, Reinforcement Learning
- Advanced Learning Algorithms

## Technical Skills

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**Languages:** Python, C/C++, Java, JavaScript, TypeScript, SQL, Verilog HDL, ARM assembly, Ballerina.

**Frameworks:** Arduino, Express.js, Spring Boot, FastAPI, Node.js, React.js.

**Libraries:** OpenCV, NumPy, Pandas, Matplotlib, PyTorch, TensorFlow.

**Developer Tools:** Git, Docker, AWS, Quartus II, Nios II, GTKWave, Vivado.

**EDA & Verification:** Synopsys Design Compiler, VCS, PrimeTime, PrimePower.

## Extra-Curricular Activities

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### **Volunteering Project Nenathambara** - University of Peradeniya

Sep. 2023 - Jul. 2024

### **Head of Web Development** - Robotics Society, University of Peradeniya

Sep. 2023 - Aug. 2024

### **Executive Committee Member** - Robotics Society, University of Peradeniya

Dec. 2022 - Sep. 2023

### **Member of Rotaract Club** of University of Peradeniya

Dec. 2021 - Dec. 2023

## References

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### **Dr. Isuru Nawinne** | [isurunawinne@eng.pdn.ac.lk](mailto:isurunawinne@eng.pdn.ac.lk)

Senior Lecturer, Department of Computer Engineering, Faculty of Engineering, University of Peradeniya, Sri Lanka.

### **Prof. Roshan G. Ragel** | [roshanr@eng.pdn.ac.lk](mailto:roshanr@eng.pdn.ac.lk)

Professor, Department of Computer Engineering, Faculty of Engineering, University of Peradeniya, Sri Lanka.