Kanishka Gunawardana

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Profile

I am an enthusiastic final-year Computer Engineering undergraduate with a fervent interest in Computer Architecture, Embedded Systems, Neuromorphic Computing and Computer Vision. Driven by a passion for leveraging cutting-edge technology to tackle complex challenges and create impactful solutions, with strong leadership skills and a collaborative team spirit.

Education

University Of Peradeniya — Nov. 2021 – Present
Undergraduate in B.Sc. Engineering(Hons.) Computer Engineering — *Current GPA: 4.0/4.0*
Field Rank: **1/90**

Dharmaraja College Kandy — Nov. 2006 – Aug. 2019
G.C.E. Advanced Level Examination — *Z-score: 2.5661*
National Rank - **149/19508**, District Rank - **11/1189**

Publications

Optimized Multi-Processor System-on-Chip (MPSoC) Design for Low-Resource JPEG Encoding
K.H. Gunawardana, R.A.J.C. Adhikari, I. Nawinne

- Presents an optimized MPSoC architecture for low-resource JPEG encoding using a pipelined approach on Nios II/e processors with Cyclone IV FPGA, employing custom instruction blocks, FIFO queues, and superscalar pipelines for enhanced efficiency.
- Presented at: 6th International Conference on Advancements in Computing.
- Status: Accepted and presented. Publication in conference proceedings pending.

Experience

Software Engineering Intern — Jul. 2024 – Dec. 2024
WSO2 LLC, Colombo, Sri Lanka
Developed integrations for the Ballerina language, including the OpenAI Finetunes Connector. Worked on ISO20022-to-Swift MT message conversion using Ballerina DataMapper, focusing on transforming financial messages for seamless interoperability.

Undergraduate Teaching Assistant — Jun. 2022 – Present
Department of Computer Engineering, University of Peradeniya
GP106: Computing, CO222: Programming Methodology, CO300: Third Year Project - Supervised lab sessions on Python and C programming. Assisted in quizzes, lab materials, and course projects while advising and mentoring third-year student projects.

Project Nenathambara — Sep. 2023 – Jul. 2024
Department of Computer Engineering, University of Peradeniya
Led University of Peradeniya's outreach program for Project Nenathambara, organizing workshops on Arduino and robotics for underprivileged students in Sri Lankan schools.

Selected Projects

Configurable Neuromorphic NoC Architecture for SSN (FYP) | *Group*   Nov. 2024 – Present
- Designing and implementing a RISC-V-based neuromorphic hardware architecture on FPGA for Spiking Neural Networks (SNNs), optimized for high-speed and low-power applications with synchronous communication and memory distribution to reduce bottlenecks and improve performance.
- Supervision: Dr. Isuru Nawinne
- Technology: **RISC-V, Verilog-HDL, FPGA, Cyclone IV, Altera Quartus**

Design and Implementation of a RISC-V Pipelined CPU | *Individual*   Dec. 2024 – Present
- Designing and implementing a CPU supporting the RV32IM RISC-V instruction set architecture with a 5-stage pipelined design, focusing on high efficiency and accurate instruction execution.
- Technology: **Verilog HDL, Icarus Verilog, GTKWave**

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: Designed and developed wearable device hardware and firmware, established the centralized hub and local area network, contributed to backend API development, and handled deployment on AWS infrastructure.
- Technology: **Arduino, 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 using FastAPI and contributed to image preprocessing, including segmentation using deep learning techniques (Mask R-CNN), to accurately quantify plant leaf color.
- Techniques: Image Segmentation using Mask R-CNN, Colour Extraction, K-mean Clustering
- Technology: **Python, OpenCV, Pytorch, FastAPI, Flutter**

Obstacle Robot Swarm for Swarm Robotic Project | *Group* | 🎧 🌐   Feb. 2024 – Present
- Leading the development and firmware update of obstacle robots with collision avoidance algorithms for the swarm robotics platform.
- Integrating obstacle robots with the existing swarm platform, enabling studies of dynamic obstacle scenarios.
- Technology: **Arduino, Python, Java, MQTT, OpenCV**

8-bit Single-cycle Processor | *Group* | 🎧   Mar. 2023 – Jun 2023
- Designed and implemented an 8-bit single-cycle processor architecture in Verilog HDL to emulate a MIPS inspired ISA, enabling functionality for arithmetic, logic, data transfer, and control flow operations.
- Built a comprehensive testbench for verification, ensuring processor functionality and timing constraints.
- Technology: **Verilog-HDL, GTKWave**

Digital Reporting Platform for Technical Visits | *Group* | 🎧 🌐   May. 2024 – Present
- Developing web and mobile applications for documenting technical service visits with real-time reporting, approval workflows, and comprehensive analytics. The mobile app is utilized by technicians, while the web app is accessed by administrators to enhance task management and oversight.
- Contributions: Optimizing the technician selection process for specific tasks using user-provided data.
- Techniques: Natural Language Processing, Clustering and Searching
- Technology: **Python, TensorFlow**

Achievements

SLIot Challenge 2023 | *Sri Lankan Biggest IOT Competition | Team: IMPAX* Mar. 2024
- 1st runners-up(Out of 100+ Teams) | *Organized by University of Moratuwa 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*

IEEEXtreme 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 Association of Computer Engineering Students of the University of Peradeniya*

ACES PreCoders v10.0 | *6 hour algorithmic programming competition | Team: Five4Five* Sep. 2023
- University Rank - 2(Out of 50+ Teams)

ACES Hackathon 2023 | *An inter-university hackathon organized by the ACES | Team: LearnLink* Sep. 2023
- LearnLink - An innovative online marketplace for buying and selling books

Selected Certificates

Machine Learning Specialization - Stanford University & DeepLearning.AI(Coursera) Sep. 2023
- Supervised Machine Learning: Regression and Classification
- Unsupervised Learning, Recommenders, Reinforcement Learning
- Advanced Learning Algorithms

Engineering Drawing and 3D Modelling using AutoCAD - TecView Insitute Mar. 2021

Technical Skills

Languages: Python, C/C++, Java, SQL, JavaScript, Verilog HDL, ARM assembly
Frameworks: Arduino, Express.js, Spring Boot, FastAPI
Libraries: OpenCV, NumPy, Matplotlib, Pandas, Pytorch, TensorFlow
Developer Tools: Git, Docker, Quartus, GTKWave, AWS

Extra-Curricular Activities

Head of Web Development - Robotics Society - University of Peradeniya Sep. 2023 - Present
Executive Committee Member - Robotics Society - University of Peradeniya Dec. 2022 - Sep. 2023
Member of Rotaract Club of University of Peradeniya Dec. 2021 - Present

References

Prof. Roshan G. Ragel | *roshanr@eng.pdn.ac.lk*

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

Dr. Isuru Nawinne | *isurunawinne@eng.pdn.ac.lk*

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