Akila Karunanayake

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Interests

- Embedded Systems
- Computer Architecture
- Machine Automation
- Computer Vision

Education

University of Peradeniya **Nov. 2018 – Present**
Undergraduate in B.Sc. Engineering(Hons.) Computer Engineering *GPA 3.80/4.00*

Trinity College Kandy **Jan. 2004 – August 2017**
G.C.E. Advanced Level Examination *District Rank - 59, National Rank - 831*

Research Experience

Configurable Neuromorphic NoC Architecture for Spiking Neural Networks **May 2023 – present**
University of Peradeniya, Sri Lanka

- Designed and implemented RISCV based neuromorphic hardware on FPGA for Spiking Neural Networks.
- Configurability comes from choosing NoC parameters and the neuron model to be used between Izhikevich and LIF.
- Used Verilog HDL for the implementation and Terasic Altera DE2-115 FPGA for testing.

Low Cost LIDAR global localization **April 2023 – September 2023**
*Robotics and Autonomous Systems, I2R, A*STAR, Singapore*

- Researched into low-cost LIDAR global localization of mobile robots.
- Implemented image and graph based matching approaches for localization with LTA, Singapore data.
- Research done as part of A*STAR SIPGA Award.
- Supervision: Dr. Lawrence Chen and Dr. Saurab Verma.

Psuedo RGBD ORBSLAM2 **Dec 2022 – May 2023**
HESL, Nanyang Technological University, Singapore

- Code implementation of Pseudo RGB-D for Self-Improving Monocular SLAM and Depth Prediction by L.Tiwari et al.
- Used existing works of Monodepth2 and ORBSLAM2 for the self improving implementation.
- Supervision: Prof. Lam Siew Kai and Dr. Wu Meiqing.

Work Experience

STERNX | https://www.sternxengineering.com/ **May 2020 – Jan 2022**
Junior Software Engineer

- Developed front end for the company depicting the services and blog posts of the employees.
- Utilized Javascript frameworks, HTML, CSS to allow updates on external sites to be displayed on the relevent site .

Department of Computer Engineering **Spring 2020 – Present**
Volunteer Developer and Maintainer

- Development and maintainance of the following department sites.
  - https://projects.ce.pdn.ac.lk/ongoing-projects/
- Project Cordinator for 40+ undergraduates working on different development projects.

Projects

Autonomous Landmine Detector | *C++, Python, AWS, Selenium* **Jun 2021 - Jun 2022**

- Developed an autonomous bot controlled by an ESP32 to scan a given area for landmines using electro-magnetic methods and display results on a webapp.
- Created a back-end using AWS services to store parameters used in each turn and its results.
- Technologies: ESPIDF, MQTT, I2C, SPI .
- Github : https://github.com/cepdnaclk/e17-3yp-Landmine-Detector
- Autonomous Path Planning
  - Implementation of path finding algorithms for autonomous navigation.
  - Github: https://github.com/Akilax0/Autonomous-Path-Planning

Smart Building | *Automation, IoT* **Oct 2022**

- Project lead for a group of 60 undergraduates.
- Design and prototype implementation of the system.
- Technologies: MQTT, NodeRED, Docker, Arduino.
- Github : https://github.com/cepdnaclk/e17-co326-Smart-Building

Analysis Tool for Industrial Images | *OpenCV , Automation* **Feb 2022 - Present**

- Created a tool to analyze performance of an image processing algorithm used to detect deformities in an industrial molding machine.
- Dashboard and API was created to visualize the results.
- Technologies: OpenCV, React, ExpressJS, WebSocket.
- Github : https://github.com/cepdnaclk/e17-co328-Analysis-Tool-for-Industrial-Images

Compiler for Cool Language | *COOL, C++* **Feb 2022**

- The combination of a lexer, parser, semantic analyser, and code generator that can be used to compile programs written in Cool programming language.
- Github : https://github.com/Akilax0/assignments

Vehicle Number Plate Analyzer | *Image Processing, OCR* **Feb 2022**

- Created Tool to analyze CCTV captured images and recognize number plates of vehicles.
- Classical image processing techniques were used to remove noise and scale the raw images such as super resolution, histogram analysis, Fourier domain analysis.
- Optical character recognition used to extract information from the resulting images.
- Report: https://drive.google.com/file/d/14ejy8Z_6T3mxUF3Oj9dBymhuGgTtWvGL/view?usp=sharing

8-bit processor | *Verilog, ARM assembly* **October 2020**

- Designed 8-bit ALU with a register file for memory using Verilog.
- Simulated processor behaviour using Icarus Verilog and input and output signals were observed using GTKWave.
- Tested behaviour using ARM assembly code.
- Github : https://github.com/Akilax0/FPGA_CO503/tree/main/CO224

Image Processing techniques to detect damaged fruit | *Python, OpenCV* **November 2019**

- Image Filtering with OpenCV was used to create an algorithm to detect the deformities of fruit .
- Created application using python to continuously monitor given set of images .

Competitions

1st place at ACES Coders (of 120+ teams) **2022**
12 hour competitive programming competition for university undergraduates in Sri Lanka.

1st place at Code Squad v3.0 (150+ teams) **2022**
6 hour competitive programming competition for university undergraduates in Sri Lanka.

1st and 2nd Runner up of MoraXtreme 6.0 and 7.0 respectively (of 200+ teams) **Oct.2021/22**
12 hour competitive programming competition for university undergraduates in Sri Lanka.

185th and 142nd world rank of IEEEXtreme 15.0 and 16.0 respectively **Oct.2021/22**
24 hour competitive programming competition for university undergraduates worldwide.(out of 6000+ teams)

5th place at IESL UIY **2021**
Undergraduate innnovator of the Year competition organized by IESL for undergraduates of Sri Lanka

Jaffna Coders Competitive Programming Competition **2019**
Entered the Final 20 teams out of 100+ teams

Top 20 country rank of Google Code Jam, ACES Coders **2019-2022**

Certificates and Courses

Classical Cryptosystems and Core Concepts — University of Colarado System **May.2020**

Introduction to CyberSecurity Tools & Cyber Attacks— IBM **May.2020**

Technical Skills

Languages	C++,C,Verilog HDL,Python,Java, HTML/CSS, JavaScript
Developer Tools	ESP-IDF, Quartus, AWS, Android Studio
Technologies/Frameworks	Linux, GitHub, Jekyll

Extracurricular

Server Maintenance of Department of Computer Engineering **2022 - present**

Setup and Maintenannce of servers at the Department

Teaching Git & Github Fundamentals with Hackers' Club for all undergraduates **2021**

Workshop to introduce basic developer skills

- Slides: https://drive.google.com/drive/folders/18zGvksfkHTUNqcctLs4e_blR5jXdUOgL?usp=sharing

Member of the Web Consultation team of University of Peradeniya **2021- Present**

Group focused on improving university's digital presence

Swarm Robotics group **2021- Present**

Documentation of the exisiting project

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