Akila Karunanayake

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Interests

Robotics(perception, mapping)	Computer Vision	Edge Computing

Education

University of Peradeniya   **Nov. 2018 – Sep. 2024**
First-Class Honors in B.Sc. Engineering(Hons.) Computer Engineering   *GPA 3.85/4.00*

Research Experience

Human Skeleton based Action Recognition   **Oct 2024 – Present**
University of Peradeniya, Sri Lanka
- Using pose estimation heatmaps with attention to accurately predict group activities
- Supervision: Prof. Roshan Godaliyadda

Uncertainty-guided Knowledge Distillation for Stereo Matching   **Dec 2023 – Sep 2024**
HESL, Nanyang Technological University, Singapore
- Construction of a lightweight and accurate stereo matching deep learning network
- Supervision: Prof. Lam Siew Kei and Dr. Wu Meiqing.
- Implemented and tested the knowledge distillation framework, carried out experiments to reach optimum results and, paper writing. Paper is under review.

Configurable Neuromorphic NoC Architecture for Spiking Neural Networks   **May 2023 – Dec 2023**
University of Peradeniya, Sri Lanka
- Design and implementation of a RISCV-based neuromorphic hardware on FPGA for Spiking Neural Networks.
- Supervision: Prof. Roshan Ragel and Dr. Isuru Nawinne.
- Implemented a RISC-V based Network on Chip architecture to support SNNs and tested implementation using a FPGA
- Github : https://github.com/cepdnaclk/e17-4yp-Neuromorphic-NoC-Architecture-for-SNNs

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.
- Research done as part of A*STAR SIPGA Award. Supervision: Dr. Lawrence Chen and Dr. Saurab Verma.
- Tested novel implementations to match observed key points to recorded key points as 2D images, evaluated performance between graph and image matching, improved OpenCV functions to perform on sparse data, and parallelized to run on GPU using OpenCL

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.
- Supervision: Prof. Lam Siew Kei and Dr. Wu Meiqing.
- Implemented the self-improving framework using Python and C++ and tested the implementation to verify they are inline with the published results
- Github : https://github.com/Akilax0/Pseudo-RGB-D-for-Self-Improving-Monocular-SLAM-and-Depth-Prediction

Work Experience

Department of Computer Engineering   **March 2020 – Present**
Volunteer Developer, Maintainer and Instructor (Teaching Assistant)
- Development and maintenance of the following department sites.
  * https://projects.ce.pdn.ac.lk/ongoing-projects/
- Project coordinator for 40+ undergraduates working on different development projects.
- Setup and Maintenance of servers at the Department.
- Casual instructor for Computer Architecture (CO224) and Computer Systems Engineering (CO326).
- Instructor for Image Processing (CO543), Data Structures and Algorithms (CO322), Advanced Communication Networks (CO513), Computer Communication Networks (CO323) .

STERNX (Startup) | 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 relevant site .

Projects

Autonomous Landmine Detector | *C++, Python, AWS, Selenium*   **Jun 2022**
- Developed an autonomous bot controlled by an ESP32 to scan a given area for landmines using electromagnetic 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

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**
- Created a tool to analyze the performance of an image processing algorithm used to detect deformities in an industrial molding machine.
- Dashboard and API were 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, and 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 behavior using Icarus Verilog and input and output signals were observed using GTKWave.
- Tested behavior 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 innovator 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**

Technical Skills

Languages	C, C++, Verilog HDL, Python, Java, HTML/CSS, JavaScript
Developer Tools	ESP-IDF, Quartus, GTKWave, AWS, Android Studio
Technologies/Frameworks	Linux, Git, Pytorch, OpenCV, Tensorflow, Keras, Jekyll

Extracurricular

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- 2022**
Group focused on improving university's digital presence

Swarm Robotics group **2021- Present**
Documentation and project supervision