

# AKILA KARUNANAYAKE

Department of Computer Engineering, University of Peradeniya, Sri Lanka 20400

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## Interests

Robotics

Computer Architecture

Computer Vision

Embedded Systems

## Education

### University of Peradeniya

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

**Nov. 2018 – Present**

*GPA 3.80/4.00*

### Trinity College Kandy

*G.C.E. Advanced Level Examination*

**Jan. 2004 – August 2017**

*District Rank - 59/2784, National Rank - 831/32075*

## Research Experience

### Deep Learning Based Lightweight Stereo Matching Estimation

*HESL, Nanyang Technological University, Singapore*

**Dec 2023 – Present**

- Construction of a lightweight and accurate stereo matching deep learning network
- Supervision: Prof. Lam Siew Kei and Dr. Wu Meiqing.
- Github : <https://github.com/cepdnaclk/e18-4yp-DL-Based-Stereo-Matching-Estimation>

### Configurable Neuromorphic NoC Architecture for Spiking Neural Networks

*University of Peradeniya, Sri Lanka*

**May 2023 – Present**

- Design and implementation of a RISC-V-based neuromorphic hardware on FPGA for Spiking Neural Networks.
- Supervision: Prof. Roshan Ragel and Dr. Isuru Nawinne.
- Github : <https://github.com/cepdnaclk/e17-4yp-Neuromorphic-NoC-Architecture-for-SNNs>

### Low Cost LIDAR Global Localization

*Robotics and Autonomous Systems, I2R, A\*STAR, Singapore*

**April 2023 – September 2023**

- 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.

### Psuedo RGBD ORBSLAM2

*HESL, Nanyang Technological University, Singapore*

**Dec 2022 – May 2023**

- 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.
- Github : <https://github.com/Akilax0/Pseudo-RGB-D-for-Self-Improving-Monocular-SLAM-and-Depth-Prediction>

## Work Experience

### STERNX (Startup) | <https://www.sternxengineering.com/>

*Junior Software Engineer*

**May 2020 – Jan 2022**

- 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 .

### Department of Computer Engineering

*Volunteer Developer, Maintainer and Instructor*

**March 2020 – Present**

- 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).

## Projects

<b>Autonomous Landmine Detector</b>   <i>C++, Python, AWS, Selenium</i>	<b>Jun 2022</b>
<ul style="list-style-type: none"><li>Developed an autonomous bot controlled by an ESP32 to scan a given area for landmines using electromagnetic methods and display results on a webapp.</li><li>Created a back-end using AWS services to store parameters used in each turn and its results.</li><li>Technologies: ESPIDF, MQTT, I2C, SPI .</li><li>Github : <a href="https://github.com/cepdnack/e17-3yp-Landmine-Detector">https://github.com/cepdnack/e17-3yp-Landmine-Detector</a></li></ul>	
<b>Smart Building</b>   <i>Automation, IoT</i>	<b>Oct 2022</b>
<ul style="list-style-type: none"><li>Project lead for a group of 60 undergraduates.</li><li>Design and prototype implementation of the system.</li><li>Technologies: MQTT, NodeRED, Docker, Arduino.</li><li>Github : <a href="https://github.com/cepdnack/e17-co326-Smart-Building">https://github.com/cepdnack/e17-co326-Smart-Building</a></li></ul>	
<b>Analysis Tool for Industrial Images</b>   <i>OpenCV , Automation</i>	<b>Feb 2022</b>
<ul style="list-style-type: none"><li>Created a tool to analyze the performance of an image processing algorithm used to detect deformities in an industrial molding machine.</li><li>Dashboard and API were created to visualize the results.</li><li>Technologies: OpenCV, React, ExpressJS, WebSocket.</li><li>Github : <a href="https://github.com/cepdnack/e17-co328-Analysis-Tool-for-Industrial-Images">https://github.com/cepdnack/e17-co328-Analysis-Tool-for-Industrial-Images</a></li></ul>	
<b>Compiler for Cool Language</b>   <i>COOL, C++</i>	<b>Feb 2022</b>
<ul style="list-style-type: none"><li>The combination of a lexer, parser, semantic analyser, and code generator that can be used to compile programs written in Cool programming language.</li><li>Github : <a href="https://github.com/Akilax0/assignments">https://github.com/Akilax0/assignments</a></li></ul>	
<b>Vehicle Number Plate Analyzer</b>   <i>Image Processing, OCR</i>	<b>Feb 2022</b>
<ul style="list-style-type: none"><li>Created Tool to analyze CCTV captured images and recognize number plates of vehicles.</li><li>Classical image processing techniques were used to remove noise and scale the raw images such as super-resolution, histogram analysis, and Fourier domain analysis.</li><li>Optical character recognition used to extract information from the resulting images.</li><li>Report: <a href="https://drive.google.com/file/d/14ejy8Z_6T3mxUF3Oj9dBymhuGgTtWvGL/view?usp=sharing">https://drive.google.com/file/d/14ejy8Z_6T3mxUF3Oj9dBymhuGgTtWvGL/view?usp=sharing</a></li></ul>	
<b>8-bit processor</b>   <i>Verilog, ARM assembly</i>	<b>October 2020</b>
<ul style="list-style-type: none"><li>Designed 8-bit ALU with a register file for memory using Verilog.</li><li>Simulated processor behavior using Icarus Verilog and input and output signals were observed using GTKWave.</li><li>Tested behavior using ARM assembly code.</li><li>Github : <a href="https://github.com/Akilax0/FPGA_CO503/tree/main/CO224">https://github.com/Akilax0/FPGA_CO503/tree/main/CO224</a></li></ul>	
<b>Image Processing techniques to detect damaged fruit</b>   <i>Python, OpenCV</i>	<b>November 2019</b>
<ul style="list-style-type: none"><li>Image Filtering with OpenCV was used to create an algorithm to detect the deformities of fruit .</li><li>Created application using python to continuously monitor given set of images .</li></ul>	

## Competitions

<b>1st place at ACES Coders (of 120+ teams)</b>	<b>2022</b>
<i>12 hour competitive programming competition for university undergraduates in Sri Lanka.</i>	
<b>1st place at Code Squad v3.0 (150+ teams)</b>	<b>2022</b>
<i>6 hour competitive programming competition for university undergraduates in Sri Lanka.</i>	
<b>1st and 2nd Runner up of MoraXtreme 6.0 and 7.0 respectively (of 200+ teams)</b>	<b>Oct.2021/22</b>
<i>12 hour competitive programming competition for university undergraduates in Sri Lanka.</i>	
<b>185th and 142nd world rank of IEEE Xtreme 15.0 and 16.0 respectively</b>	<b>Oct.2021/22</b>
<i>24 hour competitive programming competition for university undergraduates worldwide.(out of 6000+ teams)</i>	
<b>5th place at IESL UIY</b>	<b>2021</b>
<i>Undergraduate innovator of the Year competition organized by IESL for undergraduates of Sri Lanka</i>	
<b>Jaffna Coders Competitive Programming Competition</b>	<b>2019</b>
<i>Entered the Final 20 teams out of 100+ teams</i>	
<b>Top 20 country rank of Google Code Jam, ACES Coders</b>	<b>2019-2022</b>

## 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

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<b>Teaching Git &amp; Github Fundamentals with Hackers' Club</b> for all undergraduates <i>Workshop to introduce basic developer skills</i> <ul style="list-style-type: none"><li>Slides: <a href="https://drive.google.com/drive/folders/18zGvksfkHTUNqcctLs4e_bIR5jXdUOgL?usp=sharing">https://drive.google.com/drive/folders/18zGvksfkHTUNqcctLs4e_bIR5jXdUOgL?usp=sharing</a></li></ul>	<b>2021</b>
<b>Member of the Web Consultation team of University of Peradeniya</b> <i>Group focused on improving university's digital presence</i>	<b>2021- 2022</b>
<b>Swarm Robotics group</b> <i>Documentation and project supervision</i>	<b>2021- Present</b>

## References

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

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

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*Senior Scientist, Institute for Infocomm Research, Agency for Science Technology and Research, Singapore*