

# Harshana Weligampola

RESEARCH ASSISTANT · I2LAB

Purdue University, USA.

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## Interests

Computational Imaging | Optics | Machine learning | Artificial Intelligence | Physics

## Education

### PhD, Electrical and Computer Engineering

2022 - present

PURDUE UNIVERSITY

USA

- GPA: 3.94

### BSc, Computer Engineering

2015 - 2020

UNIVERSITY OF PERADENIYA

Sri Lanka

- GPA: 3.95

## Skills

**Simulation**, Zemax OpticStudio

**Programming Languages**, Python, C, Java, C++, MATLAB

**Deep Learning Frameworks**, Tensorflow, Keras, PyTorch

**Hardware-oriented Programming**, Arduino, Verilog HDL, Assembly

## Research Experience

### Purdue University

West Lafayette, USA.

ADVISORS: PROF. STANLEY CHAN, PROF. QI GUO

Aug. 2022 - Present

- **Project:** MetaZoom; Compact high-zoom metasurface system.
- Techniques: Phase retrieval, Zernike phase, CNNs, Ray-Tracing.
- Analyze the output of an optical system designed with a metasurface on a set of refractive optics to achieve high zoom on miniature devices. Create a post-processing pipeline to mitigate the aberrations.

### University of Peradeniya

Kandy, Sri Lanka.

ADVISORS: PROF. JANAKA EKANAYAKE, DR. ROSHAN GODALIYADDA

Apr. 2021 - July, 2022

- **Project:** Artificial Intelligence framework for threat assessment and containment for COVID-19 and future epidemics.
- Developed a tool to simulate the realistic movement of a large population and impose dynamics of disease spreading to identify the vulnerable population and critical areas that spread diseases.

### Sri Lanka Technological Campus

Padukka, Sri Lanka

ADVISORS: PROF. VIJITHA HERATH, DR. ROSHAN GODALIYADDA, DR. DHAMMIKA ELKADUWE

Aug. 2020 - Apr. 2021

- **Project:** Computer vision for low light images.
- Techniques: CNNs, GANs, one class classifiers, signal processing
- Characterizing the properties of low light images. Enhance images obtained in low-light environments. Decomposing an image into intrinsic constituents using a single image.

### Undergraduate research student

Kandy, Sri Lanka

ADVISORS: DR. ROSHAN GODALIYADDA, PROF. VIJITHA HERATH, PROF. ROSHAN RAGEL

Sep. 2019 - July. 2020

- **Project:** Foreground estimation in dynamic background conditions
- Techniques: Gaussian mixture models, adaptive filtering, unsupervised learning, hierarchical algorithms for use cases.
- Video processing research project to identify foreground objects in a video.

- **Project:** Study on Deep Learning for Latency Constraint Applications in Wireless Systems
- Find the effectiveness of using deep learning approaches when using under time-constrained communication applications.

## Mini-Projects

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- 2020 **Image segmentation**, using Random Markov Fields.
- 2018 **BCI**, Mapping the EEG signals from Visual Cortex to what a person sees.
- 2018 **Autonomous maze-solving robot**, Implemented the algorithm for solving a maze using Arduino
- 2017 **CPU**, Implementation of the ALU, registers, cache, and RAM using the behavioral model of verilog HDL
- 2017 **ALU**, An implementation of the complete ALU and registers using the gate model of verilog HDL
- 2017 **Assembly Image Processing**, Basic image manipulation software in ARM assembly
- 2016 **Speaker identification software**, using basic signal processing techniques

## Selected Publications

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**Harshana Weligampola**, Gihan Jayatilaka, Suren Sritharan, Parakrama Ekanayake, Roshan Ragel, Vijitha Herath, Roshan Godaliyadda. "An optical physics inspired CNN approach for intrinsic image decomposition", Accepted for IEEE International Conference on Image Processing (IEEE ICIP), 2021 [PDF](#)

Umar Marikkar\*, **Harshana Weligampola\***, Rumali Perera, Jameel Hassan, Suren Sritharan, Gihan Jayatilaka, et. al. "A generalized forecasting solution to enable future insights of COVID-19 at sub-national level resolutions", Accepted for IEEE International Conference on Industrial and Information Systems (ICIIS), 2021 [PDF](#)

Suren Sritharan, **Harshana Weligampola**, Haris Gačanin. "A Study on Deep Learning for Latency Constraint Applications in Beyond 5G Wireless Systems", Accepted for IEEE Access, 2020 [PDF](#)

**Harshana Weligampola**, Gihan Jayatilaka, Suren Sritharan, Roshan Godaliyadda, Parakrama Ekanayake, Roshan Ragel, Vijitha Herath. "A Retinex Based GAN Pipeline to Utilize Paired and Unpaired Datasets for Enhancing Low Light Images". Accepted for Moratuwa Engineering Research Conference (MERCon), 2020 [PDF](#)

## Awards & Honors

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- 2022 **Ross Fellowship**, Purdue University
- 2020 **Prof. E.F.Bartholomeusz Endowment award**, for best mathematical thesis project of the Faculty of Engineering, University of Peradeniya  
**Nominated for best thesis**, Escape 2020 – Thesis project symposium of the Department of Computer Engineering
- 2019 **2nd Country Rank and 64th World Rank**, IEEEExtreme 13.0 (out of 3000+ teams)  
**Winner**, StatHack 2.0 – nationwide inter university statistical data analysis competition
- 2018 **2nd Country Rank and 79th World Rank**, IEEEExtreme 12.0 (out of 3000+ teams)  
**National rank 4**, Sri Lanka Robotics Competition (Inter university robotics competition)  
**Runners up**, Dialog NB-IOT Hackathon (Invitational undergrad and professional dev hackathon)  
**Runners up**, BrainStorm: Sri Lanka's The Premier Biomedical Competition  
**Champions**, SLIIT Codefest: Emerging Innovator nationwide open competition  
**Champions**, IEEE Region 10 Humanitarian Technology Conference (Asia / Australia region)  
**Champions**, ACES Coders v7.0
- 2017 **1st Country Rank and 116th World Rank**, IEEEExtreme 11.0 (out of 3000+ teams)  
**Best Idea**, ACES Hackathon
- 2016 **1st Country Rank and 62nd World Rank**, IEEEExtreme 10.0 (out of 3000+ teams)  
**Champions**, ACES Coders v6.0
- 2015 **Bronze Medal**, International Physics Olympiad, Mumbai, India.  
**Member National Team**, Asian Physics Olympiad, Hangzhou, China.  
**Mahapola merit scholarship**, for performance in GCE Advanced Level examination

- 2014 **National rank 28**, GCE Advanced level examination (out of 60,000+)  
**National rank 1, Gold Medal**, Sri Lanka Physics Olympiad (out of 500+)
- 2011 **9A for 9 subjects**, GCE Ordinary level examination

## Outreach & Professional Development

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### SERVICE AND OUTREACH

- 2022 **Elsevier Digital Signal Processing**, Reviewer  
 2021 **IEEE Access**, Reviewer  
 2019 **Aces Coders**, Problem Setter

### WORKSHOPS / TRAINING PROGRAMS ATTENDED

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|-----------|--|---------------------------------|
| 2018      | <b>Hackadev National Social Innovation camp</b> , United Nations Development Project and Malaysian Global Innovation and Creativity Center | <i>Colombo</i>                  |
| 2017      | <b>Joint Indo-Sri Lanka workshop on big data analytics</b> , IEEE International Conference on Information Systems                          | <i>University of Peradeniya</i> |
| 2014-2015 | <b>Sri Lanka National Physics Olympiad Team training</b> , Department of Physics   | <i>University of Colombo</i>    |

## References

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Available upon request