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 constitutes 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.

Nokia Bell Labs *Antwerp, Belgium*

Advisor: Prof. Haris Gačanin *Feb. 2019 - Aug. 2019*

- **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

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

Yuanrui Chen,**Harshana Weligampola**, Abhiram Gnanasambandam, G.M. Dilshan Godaliyadda, Hamid Rahim Sheikh, Stanley H. Chan, Qi Guo. "MetaZoom: Compact Refractive Metasurface Computational Telephoto Camera," Under review, CVPR, 2025

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

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**, IEEEXtreme 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**, IEEEXtreme 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**, IEEEXtreme 11.0 (out of 3000+ teams)
Best Idea, ACES Hackathon

2016 **1st Country Rank and 62nd World Rank**, IEEEXtreme 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

Service and Outreach

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

Workshops / Training programs attended

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

References

Available upon request