

# Gihan Chanaka Jayatilaka

Research Intern @ Futurewei Technologies, CA, USA  
Computer Science PhD Student @ University of Maryland

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## Interests

Algorithms

Computer vision / Machine learning

## Research experience

**2022 May-2022 Aug** Research intern, [Futurewei Technologies](#), California, USA

**2020 Aug – 2021 Jul** Research Assistant, [Faculty of Engineering, University of Peradeniya](#), SL.  
(Computer vision for (a) [low light images](#) (b) [action against COVID-19](#))

**2019 Feb – 2019 Jul** Research Assistant (Intern) at [Living Analytic Research Center, School of Information Systems, Singapore Management University](#).  
(Machine learning aided screen – camera communication)

## Education

**2021 Fall-Now**

PhD in Computer Science  
University of Maryland, College Park, USA.

**2015-2020**

BSc in Computer Engineering (**First Class Honors**)  
Faculty (School) of Engineering, University of Peradeniya, SL  
[with an emphasis on Mathematics: 30 credits]  
*Thesis: “Dark Arts”:*  
*Algorithms for enhancement and interpretation of low light images* [[PDF](#)]

**Publications** [[gihan.me/publications/](http://gihan.me/publications/) | [scholar.google.com/citations?user=ZsJpIO8AAAAJ](https://scholar.google.com/citations?user=ZsJpIO8AAAAJ)]

[J] Journal paper

[C] Conference paper

[P] Preprints

**2021 [P]** **Gihan Jayatilaka\***, Jameel Hassan\*, Suren Sritharan\*, Janith Senanayaka, Harshana Weligampola, Roshan Godaliyadda, Parakrama Ekanayake, Vijitha Herath, Janaka Ekanayake. *“Holistic Interpretation of Public Scenes Using Computer Vision and Temporal Graphs to Identify Social Distancing Violations”*  
[[PDF](#)]

**2021 [C]** Vu Tran, **Gihan Jayatilaka**, Ashwin Ashok, Archan Misra. *“DeepLight: Robust & Unobtrusive Real-time Screen-Camera Communication for Real-World Displays”*  
20th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2021). -- **Best artifact award.**  
[[PDF](#), [PDF \(paywalled\)](#), [Presentation PDF](#), [Code](#), [DOI](#)]

**2021 [C]** Harshana Weligampola, **Gihan Jayatilaka**, Suren Sritharan et. al. *“An optical physics inspired CNN approach for intrinsic image decomposition”*  
2021 IEEE International Conference on Image Processing (ICIP 2021)  
[[PDF](#), [PDF \(paywalled\)](#), [Presentation PDF](#), [DOI](#)]

**2021 [C]** Jameel Hassan, Suren Sritharan, **Gihan Jayatilaka**, et. al. *“Hands off: A Handshake Interaction Detection and Localization Model for COVID-19 Threat Control”*  
2021 IEEE Conference on Industrial and Information Systems (ICIIS 2021)  
[[PDF](#), [PDF \(paywalled\)](#), [DOI](#), [Presentation PDF](#)]

- 2021 [P] 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” [[PDF](#)]
- 2020 [P] **Gihan Jayatilaka\***, Jameel Hassan\* et. al. “Use of Artificial Intelligence on spatio-temporal data to generate insights during COVID-19 pandemic: A Review.” [[PDF](#)]
- 2020 [C] **Gihan Jayatilaka\***, Harshana Weligampola\*, Suren Sritharan\*, Dhammika Elkaduwe, Roshan Godaliyadda, Parakrama Ekanayake, Vijitha Herath, Nalin Harischandra [Abstract] “Generalizing of Foreground Estimation Algorithms in Dynamic Background” [[Abstract PDF](#), [Presentation PDF](#)]
- 2020 [C] Harshana Weligampola, **Gihan Jayatilaka**, Suren Sritharan, Roshan Goldaliyadda, Parakrama Ekanayeka, Roshan Ragel, Vijitha Herath. , "A Retinex based GAN Pipeline to Utilize Paired and Unpaired Datasets for Enhancing Low Light Images". 2020 Moratuwa Engineering Research Conference (MERCON 2020) [[PDF](#), [PDF \(paywalled\)](#), [DOI](#), [Presentation PDF](#)]
- 2019 [J] H Gamaarachchi, CW Lam, **G Jayatilaka**, H Samarakoon, JT Simpson, MA Smith, Sri Parameswaran. “GPU Accelerated Adaptive Banded Event Alignment for Rapid Comparative Nanopore Signal Analysis” BMC Bioinformatics 21, 343 (2020). [[PDF](#), [HTML](#), [DOI](#)]
- 2019 [C] **G.C. Jayatilaka\***, H.S. Weligampola\*, S. Sritharan\*, P. Pathmanathan, R. Ragel, I. Nawinne. “Non-intrusive Infant Sleep Apnea Detection”. International Conference for Industrial and Information Systems 2019. [[PDF](#), [PDF \(paywalled\)](#), [DOI](#)]
- 2019 [J] S.S.P. Vithana, E.M.M.B. Ekanayake, E.M.H.E.B. Ekanayake, A.R.M.A.N. Rathnayake, **G.C. Jayatilaka**, H.M.V.R. Herath, G.M.R.I. Godaliyadda and M.P.B. Ekanayake, “Adaptive hierarchical clustering for hyperspectral image classification: Umbrella Clustering”, J. Spectral Imaging 8, a11 (2019). [[PDF](#), [DOI](#)]

### Achievements

[C] Competitive programming  
[R] Robotics

[A] Algorithmic computing  
[E] Examination

[D] Development

- 2021 [A] ACM/IEEE International Conference on Information Processing in Sensor Networks **IPSN 2021 Best artifact award.**
- 2021 [ ] University of Maryland, College Park : Dean’s Fellowship.
- 2020 [A] Prof. E.F.Bartholomeusz Endowment award for best mathematical thesis project of the Faculty of Engineering, University of Peradeniya (413 students).
- 2020 [A] Escape 2020 – Thesis project symposium of the Department of Computer Engineering (60 students), University of Peradeniya. Nominated for best thesis.
- 2019 [E] **Huawei Seeds for the Future:** Selected to top 10 CS/IT undergraduates of the country in terms of academic merit to participate in the program.
- 2019 [A] StatHack 2.0 – nationwide inter university statistical data analysis competition (90 teams) organized by Dept. of Statistics, University of Colombo. Winners
- 2019 [C] **IEEEExtreme 12.0:** (World wide algorithmic programming competition : 4300 teams) National Runners up, World Rank 67.
- 2019 [A] Dialog Axiata Datathon – first data science hackathon in SL on smart city planing (for students and data science professionals). Best data engineer award.
- 2018 [C] ACES Coders v7.0 (National level inter university algorithmic programming competition: 120 competing teams) Champions.
- 2018 [C] ACES pre coders v7.0 (Intra university): Champions.

- 2018 [C] **Google Code Jam** (24,000 student and professional participants)  
Qualification round : Perfect score, Best performance in SL, World Rank 298.
- 2018 [C] **IEEEExtreme 12.0:** (World wide algorithmic programming competition : 4000 teams)  
National Runners up, World Rank 79.
- 2018 [A] **IEEE Region 10 Humanitarian Technology Conference** (Asia / Australia region)  
Humanitarian Technology Products Competition for grad/undergrad students.  
Champions. Project: Infant sleep apnea detection system.
- 2018 [A] SLIIT Codefest: Emerging Innovator nationwide open competition:  
Champions – Gold award. Project: Infant sleep apnea detection system.
- 2018 [A] BrainStorm: Sri Lanka's The Premier Biomedical Competition in Sri Lanka.  
Runners up – Silver medal. Project: Infant sleep apnea detection system.
- 2018 [A] Dialog NB-IOT Hackathon (Invitational undergrad and professional dev hackathon)  
Project : Infant sleep apnea detection system: Runners up.
- 2018 [A] United Nations' Social Innovation Challenge: Shortlisted for national innovation  
camp and to the per-incubation program (Top 14 out of 700+ teams)
- 2018 [R] Sri Lanka Robotics Competition (Inter university robotics competition)  
Project Galvans : National rank 4.
- 2017 [C] **IEEEExtreme 11.0:** National Champions, World Rank 124.
- 2017 [A] ACES Hackathon 2017: (Intra university hackathon)  
Project: Expert miner: Software section winners, Best idea of the competition.
- 2016 [C] **IEEEExtreme 10.0:** National Champions, World Rank 62.
- 2016 [C] ACES Coders v6.0 Champions.
- 2016 [C] ACES pre coders v6.0 (Intra university): Champions.
- 2016 [D] ACES Hackathon 2016:  
Project Motify: Software section winners, Most popular idea of the competition.
- 2016 [E] HDTS Scholarship award in recognition of 2014 GCE AL performances.
- 2015 [E] Mahapola merit scholarship for performance in GCE Advanced Level examination
- 2015 [E] Member of the SL national team for International Physics Olympiad.
- 2015 [E] Member of the SL national team for Asian Physics Olympiad.
- 2015 [E] Sri Lanka Mathematics Olympiad: National rank 25, High distinction.
- 2014 [E] GCE Advanced level examination. Mathematics A, Physics A, Chemistry A.  
z score 2.55 , National rank 86 (30,000+ students).
- 2014 [E] Sri Lanka Physics Olympiad: National rank 8, Silver Medal.
- 2014 [E] Sri Lanka Mathematics Olympiad: High distinction.
- 2013 [E] Star Quest - Astronomical quiz competition: National rank 4.
- 2013 [E] National Chemistry Quiz (iChem, SL): National rank 2, High distinction.
- 2013 [E] Sri Lanka Mathematics Olympiad: National rank 35, High distinction.
- 2011 [E] GCE Ordinary level examination: 9A for 9 subjects.
- 2010 [E] International Assessment for schools: (held by UNSW)  
Highest score in the region (South Asia and Middle East) for Science, and  
highest score in SL for Mathematics and Computing.
- 2009 [E] International Assessment for schools: Highest score in the region for Science.
- 2007 [E] International Assessment for schools: Highest score in SL for Mathematics.
- 2006 [E] International Assessment for schools: Highest score in SL for Mathematics.

### Skills

Programming languages	Java, C, Python
Numerical computing packages	MATLAB, Octave, Numpy, Tensorflow
Scientific computing	Scikit, Keras
Other programming	ARM Assembly, Verilog HDL, Arduino C
Miscellaneous	Linux (Bash shell), Latex, git

### Selected Projects [Code and reports @ [gihan.me/projects/](http://gihan.me/projects/)]

2020 **Use of Computer Vision to monitor COVID-19 safety guidelines**

**[Research]** Developing computer vision enabled pipelines to assess CCTV footage to detect social distancing violations, risky behavior and unsafe zones.  
**[Video Processing]** *Technologies: Python, Tensorflow, OpenCV*  
*Techniques: CNNs, Tracking, Fuzzy logic, Statistics*  
*Contribution: Proposing, algorithm development, testing, paper writing.*

**2019 -20** **Dark Arts: Low light image processing algorithm development**  
**[Research]** Characterizing the properties of low light images, developing Neural network pipelines to (1) enhance the lighting condition of images and (2) detect objects on low light images (3) physics based image interpretation.  
**[Image Processing]** *Technologies: Python, Keras, OpenCV*  
*Techniques: CNNs, GANs, one class classifiers, signal processing.*  
*Contribution: Proposing, algorithm development, testing, paper writing.*

**2019** **Deeplight : screen to camera communication**  
**[Research]** A video processing pipeline inspired by computer vision deep learning architectures to enable screen to camera visible light communication.  
**[Video Processing]** *Technologies: Python, Tensorflow, OpenCV*  
*Techniques: Deep neural networks, signal processing, error correction codes*  
*Contribution: Algorithm development, evaluation, paper writing.*

**2018** **Infant Sleep Apnea detection**  
**[Research]** A portable video processing device that can detect sleep apnea condition in infants.  
**[Video Processing]** *Technologies: Python, numpy, scipy, OpenCV, Raspberry Pi, Keras*  
*Techniques: Deep neural networks, Edge detection, subspace filtering, sensor fusion.*  
*Contribution: Proposing, algorithm development, testing, report writing, paper writing*

**2017** **Foreground estimation in dynamic background conditions**  
**[Research]** Video processing research project.  
**[Video processing]** *Technologies: MATLAB, python, numpy*  
*Techniques: Statistical / probabilistic models (Gaussian/ other mixture models), adaptive filtering, unsupervised learning, hierarchical algorithms for use-cases.*  
*Contribution: Proposing, algorithm implementation, development, reporting.*

**2018** **Novel finite element based structural analysis algorithm improvement**  
**[Numerical computing]** Attempting to improve the time and space efficiency of a new structural analysis algorithm based on finite element technique.  
*Technologies: MATLAB, Python, C, Cuda C*

**2017-18** **Hyper Spectral Imagery**  
**[Research]** Developing automated HSI pixel classification algorithms using spectral pattern recognition for limited training data. Developing automated spatio spectral pattern recognition algorithms to classify HSI pixels for remote sensing.  
*Technologies: MATLAB, python, numpy, scipy*  
*Techniques: Existing and novel feature extraction, supervised, unsupervised and hybrid learning algorithms (e.g. variants of manifold embedding).*  
*Contribution: Algorithm development, implementation and testing.*

**Mini Projects** [Code and reports @ [gihan.me/projects/](https://gihan.me/projects/)]

**2020 Image segmentation:** using random walks.

**2020 Harmonic analysis :** Find harmonics of musical instruments.

**2018 BCI :** Mapping the EEG signals from Visual Cortex to what a person is seeing.

- 2017 **CPU:** An implementation of the ALU, registers, program memory, cache and RAM using the behavioural model of verilog HDL.
- 2017 **ALU:** An implementation of the complete ALU and registers using the gate model of verilog HDL.
- 2017 **Basic Image Manipulation:** Basic image manipulation app in ARM assembly.
- 2017 **Fractals:** Multi threaded application for fractal visualization in JAVA.
- 2017 **Auction Server:** Multi threaded socket server for stock auctions in JAVA.
- 2016 **Motify:** A basic desktop notification software for moodle e learning system.
- 2016 **Speaker identification software:** with basic signal processing techniques.
- 2016 **Optical musical instrument:** A music instrument with basic optical data transfer techniques.

### Workshops / Training programs attended

- 2019 “Huawei seeds for the future 2019” two week study in China about Huawei technologies – telecommunication infrastructure, 5G, cloud etc:
- 2018 Hackadev National Social Innovation camp organized by United Nations Development Project and Malaysian Global Innovation & Creativity Center.
- 2017 Joint Indo-Sri Lanka workshop on big data analytics at 2017 IEEE International Conference on Information Systems.
- 2014-2015 Sri Lanka National Physics Olympiad Team training at University of Colombo, Department of Physics.

### Teaching Experience

- 2021-22 Graduate TA for CMSC 351 Algorithms ([2021 Fall](#), [2022 Spring](#)).
- 2021 Volunteer organizer of [Neural Networks Reading Group](#) for CO542 course.
- 2020 Casual instructor for Computer Architecture and Digital Logic courses of the Faculty of Engineering, University of Peradeniya.
- 2019 Volunteer instructor for GP106 Computing course labs for the freshman class (E17) of the Faculty of Engineering, University of Peradeniya.
- 2018 Volunteer instructor for GP106 Computing course labs for (E16)

### Volunteering/Speaking/Reviewing

- 2021 Student reviewer, CS MS/PhD admissions, University of Maryland 2022 Fall.
- 2021 Reviewer, [ICARC](#)
- 2019-21 Scientific Committee, National Informatics Olympiad, Sri Lanka.
- 2021 Invited speaker at “[Introduction to competitive algorithmic programming](#)” @ IEEE Student Branch of University of Vocational Technology, Sri Lanka.
- 2020 Web chair, [Wearsys 2020](#): 6th ACM Workshop on wearable systems and applications
- 2018 Instructor at “computational thinking” session series for algorithmic programming competition enthusiasts of University of Peradeniya.
- 2018 “Gold chasers” Sri Lanka iPhO (International physics olympiad) team support program, Rrotract club, University of Moratuwa.
- 2017 Speaker at “Intro to competitive programming” webinar for IEEE Student branch University of Wollongong.
- 2017 Instructor at Weekly “Interactive coding sessions” for freshman class of University of Peradeniya.

### Other Publications

- 2021 Roshan Ragel, Isuru Nawinne, Udaree Kanewela, **Gihan Jayatilaka**, Dhanushki Mapitigama. *"A Handbook for Online Proctored Examinations"*. 2021. [[PDF](#)]

## **References**

Prof. [Roshan Ragel](#)

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University of Peradeniya.

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Georgia State University.

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Singapore Management University.

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University of Peradeniya.

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