

SAMURDHI KARUNARATNE

Curriculum Vitae

📍 Los Angeles, California

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🌐 <http://samurdhi.me> [Personal Website]
🎓 <https://scholar.google.com/citations?user=LG2fSzEAAAAJ>
🌐 <https://linkedin.com/in/samurdhilbk>
🏠 <https://hackerrank.com/samurdhilbk>
🔄 <https://github.com/samurdhilbk>

EDUCATION

▮ **M.S. in Electrical and Computer Engineering** 2019 September-2021 June

University of California, Los Angeles
Program GPA (current): 3.93/4.00

▮ **B.Sc. in Computer Engineering** 2015-2019

University of Peradeniya, Sri Lanka
GPA: 4.00/4.00 (top of the class)

▮ **G.C.E. Advanced Level (Mathematics, Physics and Chemistry)** 2013

Ranked in the **Top 20** overall in Sri Lanka (out of 27768)

RESEARCH EXPERIENCE

▮ **Cognitive Reconfigurable Embedded Systems Lab (CORES), UCLA** Sept. 2019 - present
Graduate researcher (M.S./Ph.D. Program) Supervisor: Danijela Cabric

- Developing open-set deep learning techniques to differentiate unauthorized RF transmitters from a set of known transmitters. Captured & created datasets from IQ traces containing >300,000 WiFi packets.
- Studying vulnerabilities of deep learning-based wireless authentication systems to adversarial attacks through reinforcement learning techniques that assume zero knowledge about the system, along with possible techniques to improve robustness against such attacks
- Developing generative deep learning techniques to generate signal samples from a set of authorized transmitters and unknown transmitters outside that set (outliers)
- Using information retrieval-inspired techniques (locality sensitive hashing, approximate nearest neighbor search) to accelerate the dynamic changes of the authorized set of transmitters

▮ **Department of Computer Engineering, University of Peradeniya** May 2018 - February 2019
Undergraduate research project Supervisor: Asitha Bandaranayake

- Produced a framework for context-aware optimization of wireless networks with respect to throughput-sensitive and delay-sensitive users using knowledge-based Q-learning techniques

▮ **Nokia Bell Labs, Belgium** November 2017 - April 2018
Research intern Supervisor: Haris Gacarin

- Produced original algorithms for detecting oscillation effects in routing, and joint channel and location optimization in Wireless Mesh Networks based on knowledge-enhanced Q-learning.
- Hands-on experience in developing simulations for testing multi-AP Wi-Fi networks using ns-3.
- Studied different artificial intelligence techniques applied on wireless networks with respect to solving both functional design problems (eg. routing, channel allocation) and network management problems (eg. anomaly detection).

PUBLICATIONS

<https://scholar.google.com/citations?user=LG2fSzEAAAAJ>

[Submitted] Open Set RF Fingerprinting using Generative Outlier Augmentation

Karunaratne, S., Hanna S., and Cabric, D.

IEEE Globecom 2021

[Accepted] Penetrating RF Fingerprinting-based Authentication with a Generative Adversarial Attack

Karunaratne, S., Krijestorac, E. and Cabric, D.

IEEE International Comm. Conference (ICC) 2021

Open Set Wireless Transmitter Authorization: Deep Learning Approaches and Dataset Considerations

Hanna S., Karunaratne, S. and Cabric, D.

IEEE Trans. on Cognitive Comm. & Networking 2020

Deep Learning Approaches for Open Set Wireless Transmitter Authorization

Hanna S., Karunaratne, S. and Cabric, D.

IEEE SPAWC 2020 May 2020

Self-optimization of Wireless Systems with Knowledge Management: An Artificial Intelligence Approach

Gacanin, H., Perenda, E., Karunaratne, S. and Atawia, R.

IEEE Transactions on Vehicular Technology Oct. 2019

An Overview of Machine Learning Applications in Wireless Mesh Networks

Karunaratne, S. and Gacanin, H.

IEEE Communications Magazine April 2019

Artificial Intelligence Driven Optimization of Channel and Location in Wireless Networks

Karunaratne, S., Atawia, R., Perenda, E. and Gacanin, H.

2018 IEEE GLOBECOM Workshops Dec. 2018

PROJECTS

Schedule a Ride with Uber: An Algorithmic Perspective [Link to Writeup]

2020

UCLA course project (Using Python, igraph, cvxopt). Individual contribution.

- Analyzing the Uber "Schedule a Ride" option from a graph algorithms and optimization perspective
- Concepts utilized: DAG, multi-modal distributions, minimum vertex-disjoint path cover, min-cost flow

Jayamagul.lk

2018-2019

Solo venture (Using HTML, PHP, MySQL, Java, Javascript)

- A short-lived Sri Lankan online matchmaking platform with an accompanying Android app

SimSwatch

2017

Embedded systems project. Team of 3. (Using C++, Java)

- An ultra low cost smartwatch which works with Android/iOS
- Wrote the code for the communication between the watch and the smartphone using Bluetooth

Acceleration of Face Detection using GPGPUs. Solo project.

2016

Using C++, CUDA, OpenCV

- Developing a parallelized real-time face detection algorithm that runs on CUDA enabled GPGPUs

Toolshed

2016

Database systems project. Solo project. (Using HTML, PHP, MySQL)

- Web-based online learning platform based on collaborative learning.

SiRA – Simple Reply Automation

2015

*Won award for Best Software at ACES Hackathon 2016 and Finalist at Yarl Geek Hackathon 2016
Using Java. Team of 3.*

- Android app with capabilities for smart automated text replies.
- Wrote the code for handling automatic replies.

SELECTED HONORS & AWARDS

UCLA Electrical and Computer Engineering Departmental Fellowship	2019
<i>University of California, Los Angeles</i>	
Silver medal at the 45th International Physics Olympiad (IPhO)	2014
First (and currently, only) Sri Lankan student to place in the top 50 (and top 100)	<i>Astana, Kazakhstan</i>
Silver medal at the 15th Asian Physics Olympiad (APhO)	2014
First (and currently, only) Sri Lankan student to win a silver medal (or better)	<i>Singapore</i>
Industrial and Financial Systems (IFS) Gold Medal for the Best Performance in Computer Engineering	2019
Highest GPA among Comp. Eng. majors (Commencement Award)	<i>University of Peradeniya, Sri Lanka</i>
Bartholomeusz Prize for Engineering Mathematics (two times)	2015, 2016
Awarded annually for first and second year students	<i>University of Peradeniya, Sri Lanka</i>
Gold Medal and Winner of the Sri Lankan Physics Olympiad	2013
Recorded a perfect score	<i>Institute of Physics, Sri Lanka</i>
1st Country Rank at IEEEExtreme 10.0, 62nd Globally (with Team biteCode)	2016
Worldwide competitive programming contest	<i>IEEE</i>
High Distinction Award at the Sri Lankan Mathematics Competition	2011
<i>Sri Lanka Olympiad Mathematics Foundation</i>	
Champions at ACES Coders v6.0 (with Team biteCode)	2016
Sri Lanka's biggest competitive programming competition	<i>University of Peradeniya, Sri Lanka</i>
Invited to study physics at the National University of Singapore (NUS)	2014
In recognition of performance at APhO 2014	<i>National University of Singapore</i>
All Sri Lanka Rank 20 at the G.C.E Advanced Level Examination in Physical Science Stream	2013
Out of 27768 students, nationwide entrance exam for state engineering universities	
Mahapola Higher Education Merit Scholarship	2013
<i>Government of Sri Lanka</i>	

SKILLS

Programming Languages

C++ Java C Python MATLAB Bash C# Haskell

Simulation Software

ns-3 Simulink Wireless InSite

ML tools

Tensorflow Keras PyTorch Scikit-learn Pandas

Big data

Hadoop Dask

Web

HTML CSS JavaScript JQuery PHP MySQL

Mobile App Programming

Android

Version Control

Git Mercurial

Graphics / Video

Photoshop After Effects CoreIDRAW Illustrator

Hardware-oriented Programming

Arduino Verilog HDL

Documents

LaTeX Microsoft Office

COURSES TAKEN (SELECTED)

▮ Graduate (UCLA)

- Digital Image Processing
- Detection & Estimation in Communication
- Convex Optimization
- Large-Scale Data Mining
- Large Scale Social and Complex Networks: Design and Algorithms
- Neural Networks & Deep Learning
- Stochastic Processes
- Reinforcement Learning Theory & Applications

▮ Undergraduate (University of Peradeniya)

- Electronic Devices & Circuits
- Computer Architecture
- Signal Processing
- Embedded Systems
- Machine Learning & Data Mining
- Database Systems
- Data Structures & Algorithms
- Operating Systems
- Computer Communication Networks
- Computer & Network Security
- Software Engineering

TEACHING & MENTORSHIP

- Teaching Assistant - ECE 230A Detection and Estimation in Communication** 2021 Winter
TA for graduate course UCLA
- Daily Lab Supervisor - UCLA Summer Undergraduate Research Program** 2020 Summer
Mentored project on generating, capturing and processing wireless signals with varying properties for deep learning-based classification UCLA

PATENTS (PENDING)

- Optimizing a Wireless Network that Comprises Range Extenders**
Karunaratne, S. and Gacanin, H. EPO App. Number: **EP20181741372**
- Optimizing a Wi-Fi Network Comprising Multiple Range Extenders and Associated Devices**
Karunaratne, S. and Gacanin, H. EPO App. Number: **EP20181834755**

ACADEMIC SERVICE

Peer-Review **IEEE Internet of Things Journal**

LANGUAGES

English Sinhala^(native) Tamil
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