MEVAN WIJEWARDENA

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RESEARCH OVERVIEW

I am driven by exploring how mathematics help us develop analytical tools to solve impactful real-world problems. My interests lie at the intersection of statistical machine learning, communication theory, and information theory. In particular, I am interested in exploiting my expertise and passion in mathematics for developing theoretical tools for understanding deep learning from a statistical point of view, enabling efficient and trustworthy data transmission, and exploring the implications and applications of information theory in machine learning.

EDUCATION

University of Moratuwa, Mortuwa, Sri Lanka Nov. 2016 - Aug. 2021
BSc Engineering Honours Degree specialized in Electronic and Telecommunication Engineering
First Class Honors with a CGPA 4.06 out of 4.2 (Ranked **5** out of **101**)
Dean's List Placements - Semesters **1, 2, 3, 4, 7, 8**

University of Auckland, New Zealand Jun. 2019 - Dec. 2019
Visiting Student
Augmented Human Lab
Worked on two research projects (MAGHair and AiSee) in Human Computer Interaction

Maliyadeva College, Kurunegala, Sri Lanka Feb. 2002 - Aug. 2015
GCE Advanced Level Examination
Z-score - 3.0383, District Rank - **2**, National Rank - **5** out of **32393**

ACADEMIC ACHIEVEMENTS

International

- International Mathematical Olympiad (IMO)
  - *Bronze Medals* 2012, 2013, 2014, 2016
  - *Participation* 2011
- International Mathematics Competition for University Students
  - *Bronze Medal* 2018
- International Mathematics Competition (IMC)
  - *Bronze Medals* 2012, 2013
  - *Participation* 2010

Asia/Asia Pacific

- Asia Pacific Mathematical Olympiad (APMO)
  - *Silver Medal* 2016
  - *Bronze Medals* 2014, 2015
- Asian Physics Olympiad (APhO)
  - *Participation* 2016

Sri Lanka

- Sri Lanka Mathematical Olympiad (SLMO)
  - *Gold Medals* 2012, 2013, 2014, 2016
  - *Bronze Medal* 2011

- Sri Lanka Physics Olympiad
  - *Gold Medal* 2015
- W.D.Gunarathne Memorial Gold Medallist 2012, 2014, 2016
  - Awarded to the best performer at the Sri Lanka Mathematical Olympiad.

WORK EXPERIENCE

University of Moratuwa, Moratuwa, Sri Lanka Jul. 2021 - Present
Lecturer
Department of Electronic and Telecommunication Engineering

- EN2040 - Random Signals and Processes - Teaching Assistant.
- EN2053 - Communication Systems and Networks - Teaching Assistant.
- EN2090 - Laboratory Practice - II - Conducting laboratory sessions for the Computer Organization section.
- EN2022 - Digital Electronics - Conducting laboratory sessions.

PUBLICATIONS

- **M. Wijewardena**, T. Samarasinghe, K. T. Hemachandra, S. Atapattu and J. S. Evans, *"Physical Layer Security for Intelligent Reflecting Surface Assisted Two–Way Communications,"* in IEEE Communications Letters, vol. 25, no. 7, pp. 2156-2160, July 2021.
- R. Boldu, **M. Wijewardena**, H. Zhang, and S. Nanayakkara, *"MAGHair: A Wearable System to Create Unique Tactile Feedback by Stimulating Only the Body Hair,"* in 22nd International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI '20), Oct. 2020.
- **M. Wijewardena**, S. Pathiranage, T. Nanyakkara, I. Rajapakshe, S. Charles and T. Samarasinghe, *"Sequence-to-short Sequence Learning with Attention Based Autoencoders for Non-Intrusive Load Monitoring"* in progress.

RESEARCH TALKS

- University of Moratuwa - ENTC Research Seminar Aug. 2021
  - The monthly online research seminar organized by the Department of Electronic and Telecommunication Engineering, University of Moratuwa.
  - Topic: Physical Layer Security for Intelligent Reflecting Surface Assisted Two-Way Communications.

PROJECTS

Non-Intrusive Real-Time Power Monitor Feb. 2020 - Jul. 2021

- A smart energy meter capable of inferring the appliance level power consumption given the aggregate power consumption of a household.
- Through this project, our group aimed at developing a low-cost system to reduce the household energy wastage by providing real-time feedback on appliance level power consumption.
- I developed the algorithm for the task. This included experimenting machine learning models such as additive factorial hidden Markov models and attention based neural networks.
- We achieved superior accuracy compared to several state-of-the-art algorithms, while improving the real-time performance and reducing the computational complexity.

Secrecy of an IRS Assisted Two-Way Communication System Feb. 2020 - Nov. 2021

- This is a project investigating the exploitation of an intelligent reflecting surface (IRS) to communicate securely in a two-way communication system consisting of an untrusted user.
- I developed a semi-definite programming based alternating optimization algorithm to maximize the sum-secrecy of the system.

- The proposed algorithm yielded gains reaching 120% compared to partially optimized schemes.

Secrecy of Multi-User Communications via Untrusted UAVs Mar. 2021 - Present

- This is a project investigating physical layer security (PLS) of an untrusted unmanned aerial vehicle (UAV) network, where a multitude of UAVs communicate in full-duplex (FD) mode.
- Currently, I am incorporating UAV path planning in order to improve the system secrecy performance.

MAGHair Jun. 2019 - Aug. 2019

- A wearable system to create unique tactile feedback by stimulating only the body hair using controlled magnetic fields.
- The long-term goal of this project is to develop a mechanism which is capable of providing notifications to people with visual and auditory impairments, through haptic sensations.
- I developed the algorithm to control the magnetic fields with minimum computational complexity and power consumption.
- Our team completed the working prototype which was able to generate smooth and distinguishable skin sensations.

Automated Shade Net Jan. 2019 - May 2019

- A shade net setup for orchid plantations, where humidity and temperature are measured and controlled automatically.
- our group focused on automating a shade net which is a low cost solution, since implementing green houses is costly and is unaffordable to most of the Sri Lankan orchid cultivators.
- I developed the algorithm for the temperature and humidity controlling mechanism.
- We completed the working prototype.

HACKATHON EXPERIENCE

International

- IEEExtreme Programming Competition
  - Team TeamNameUOM, World Rank - **52**, Country Rank - **1** 2020
  - Team TeamName, World Rank - **91**, Country Rank - **4** 2019
  - Team TeamName, World Rank - **127**, Country Rank - **2** 2017
- Google Code Jam
  - Qualified for round 2, World Rank - **2839**, Country Rank - **2** 2020
  - Qualified for round 2, World Rank - **1011**, Country Rank - **2** 2019
- Google Hash Code
  - Team TeamName, World Rank - **1879**, Country Rank - **5** 2021
  - Team TeamName_UOM, World Rank - **549**, Country Rank - **3** 2020
  - Team TeamName, World Rank - **1655**, Country Rank - **2** 2019

Sri Lanka

- ACES Coders
  - An algorithmic programming competition organized by the Faculty of Engineering, University of Peradeniya.
  - Team TeamName, **Runners Up** 2020
- MoraXtreme
  - An algorithmic programming competition organized by the Computer Society - IEEE University of Moratuwa Student Branch.
  - Team TeamName, **Champions** 2017
- HackStat

- A Data Science Hackathon organized by the Stat Circle of University of Colombo.
- Team TeamName, **Second Runners Up** 2018

SCHOLARSHIPS

- Mahapola Scholarship for Undergraduates awarded by the Government of Sri Lanka. 2016 - 2021

PAPER REVIEWING

- IEEE EMBS International Student Conference, Moratuwa (Reviewer ID - R015). 2021

SERVICES AND LEADERSHIP

Mathematics Society of University of Moratuwa, Sri Lanka 2018 - 2019

- President (2018/19).
- Organized M-Talks (monthly research talks on mathematics).
- Conducted the mathematics stall of Innovatus 2018, a science exhibition organized by S. Thomas' College, Mount Lavinia, Sri Lanka.

Electronic Club (E-Club), University of Moratuwa, Sri Lanka 2016 - 2021

- Electronic Club is the official student body of the Department of Electronic and Telecommunication Engineering of University of Moratuwa.
- Sri Lanka Robotics Challenge (SLRC)
  - SLRC is the annual robotics challenge organized by the E-Club.
  - The competition is held under two categories, school and undergraduate.
  - Conducted robotics workshops for the school category of SLRC 2018.
- uMora
  - uMora is the annual online mathematics competition organized by the E-Club.
  - The competition is held under three categories, middle school, high school and undergraduate and is open to all the students from Sri Lanka.
  - I was a problem setter for all three categories in uMora 2020.
- Expose
  - Expose is an exhibition organized by the E-Club, to demonstrate the projects done in the Department of Electronic and Telecommunication Engineering, University of Moratuwa.
  - Conducted the digital signal processing stall for Expose 2019.

Computer Society - IEEE University of Moratuwa Student Branch 2017 - 2021

- MoraXtreme
  - MoraXtreme is the annual algorithmic programming competition organized by the Computer Society - IEEE University of Moratuwa Student Branch.
  - The competition is open to all the undergraduate students in Sri Lanka.
  - I conducted an algorithmic programming workshop for the participants of MoraXtreme 2021 and was a problem setter in MoraXtreme 2019.

OUTREACH

Rotaract Club of University of Moratuwa (Rotaract Mora) 2016-2020

- Member.
- Grama Prabodhaya
  - A community service project initiated by Rotaract Mora to develop a selected rural village in Sri Lanka.

- I conducted English workshops for selected rural schools for Grama Prabodhaya 2017.

Engineering Faculty Students Union, University of Moratuwa 2016-2021

- Member.
- Soyuru Sathkaraya
  - A community service project initiated by Engineering Faculty Students Union, University of Moratuwa.
  - I conducted Mathematics workshops for selected rural schools for Soyuru Sathkaraya 2018.