

BUDDHI WIJENAYAKE

Research Assistant - Multidisciplinary AI Research Centre, University of Peradeniya

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HIGHLIGHTS

- **Top competitive programmer:** Two-time national champion at IEEEExtreme 17.0–18.0.
- **STEM Olympiad achiever:** Multiple national and international medals in Mathematics, Physics, Chemistry, and Astronomy Olympiads.
- **First Class graduate & prize winner:** B.Sc. Eng. (Hons.) in Electrical and Electronic Engineering, GPA 3.85/4.00; Manamperi Award and Prof. W. P. Jayasekara Prize for best undergraduate research.
- **Emerging researcher:** Co-author of three journal manuscripts and several conference papers; **Research Assistant** at MARC in remote sensing and trustworthy AI.
- **Open-source & outreach:** Active [GitHub](#) and [YouTube](#) presence with research code and tutorials in programming, control, and AI.

PERSONAL INFORMATION

- **Full name:** Warnasooriya Mudiyanseelage Buddhi Saumya Kumara Wijenayake
- **Date of Birth:** 29/11/2000

EDUCATION

- **Bachelor of Science of Engineering Honours (B. Sc. Engineering)** 2021 - 2025
Specialized in Electrical and Electronic Engineering Peradeniya, Sri Lanka
Faculty of Engineering, University of Peradeniya
 - **GPA: 3.85/4.00** | [Academic Record](#)
 - Graduated with **First Class Honors**
 - Complete degree program was conducted and assessed in **English Medium** and accredited by the **Washington Accord**.
- **G. C. E Advanced Level Examination (University Entrance Examination)** Aug 2019
3 Distinction (A) passes for Combined Mathematics, Physics, and Chemistry Kandy, Sri Lanka
Top 0.8% in Kandy District, Top 0.5% in Sri Lanka out of 19000+ candidates
Z-Score: 2.6473 | [Result Sheet](#)
- **G. C. E. Ordinary Level Examination** Dec 2016
9 Distinction (A) passes | [Result Sheet](#) Kandy, Sri Lanka

PUBLICATIONS

Peer Reviewed Journals

- [J.1] **Buddhi Wijenayake**, Athulya Ratnayake, Praveen Sumanasekara, Roshan Godaliyadda, Parakrama Ekanayake, Vijitha Herath, Nichula Wasalathilaka, **Mamba-FCS: Joint Spatio-Frequency Feature Fusion, Change-Guided Attention, and SeK Loss for Enhanced Semantic Change Detection in Remote Sensing**, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Archive DOI: [10.48550/arXiv.2508.08232](https://doi.org/10.48550/arXiv.2508.08232) (Accepted to Publication)

Journals Under Review

- [J.2] Tharaka Fonseka[†], **Buddhi Wijenayake**[†], Athulya Ratnayake, Inosha Alwis, Supun Manathunge, Roshan Godaliyadda, Vijitha Herath, Parakrama Ekanayake, Isuru Pamuditha, Samath Dharmaratne, **Devising PopStat: A Metric to Assess Mortality Dynamics within Demographic Transition**, IEEE Transactions on Computational Social Systems. | Archive Doi: [10.48550/arXiv.2501.11514](https://doi.org/10.48550/arXiv.2501.11514).

- [J.3] Praveen Sumanasekara, Athulya Ratnayake, **Buddhi Wijenayake**, Keshawa Rathnayake, Roshan Godaliyadda, Vijitha Herath, Parakrama Ekanayake, **Preprocessing Algorithm Leveraging Geometric Modeling for Scale Correction in Hyperspectral Images for Improved Unmixing Performance**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Archive DOI: [10.48550/arXiv.2508.08431](https://doi.org/10.48550/arXiv.2508.08431).

International Conferences

- [C.1] Athulya Ratnayake, **Buddhi Wijenayake**, Praveen Sumanasekara, Roshan Godaliyadda, Vijitha Herath, Parakrama Ekanayake, **Enhanced SCanNet with CBAM and Dice Loss for Semantic Change Detection**, in Proceedings of the Moratuwa Engineering Research Conference (MERCon), University of Moratuwa, Sri Lanka, Aug. 2025 (11th Int. Conf.).
- [C.2] **Buddhi Wijenayake**, Athulya Ratnayake, Praveen Sumanasekara, Nichula Wasalathilaka, Mathivathanan Piratheepan, Roshan Godaliyadda, Mervyn Ekanayake, Vijitha Herath. (2025). **Precision Spatio-Temporal Feature Fusion for Robust Remote Sensing Change Detection**. Accepted at ICIIS 2025. Archive DOI: [10.48550/arXiv.2507.11523](https://doi.org/10.48550/arXiv.2507.11523).
- [C.3] **Buddhi Wijenayake**, Athulya Ratnayake, Lelumi Edirisinghe, U. Wijeratne, Tharaka Fonseka, Roshan Godaliyadda, Samath Dharmaratne, Parakrama Ekanayake, Vijitha Herath, Inosha Alwis, Supun Manathunga, **PoPStat-COVID19: Leveraging Population Pyramids to Quantify Demographic Vulnerability to COVID-19**, Accepted to Proceedings of the International Conference on Advances in ICT for Emerging Regions (ICTer), Colombo, Sri Lanka, Nov. 2025 (25th Int. Conf.).
- [C.4] **Buddhi Wijenayake**, Athulya Ratnayake, Tharaka Fonseka, Inosha Alwis, Supun Manathunge, Roshan Godaliyadda, Vijitha Herath, Parakrama Ekanayake, Samath Dharmaratne, **Demographic Insights into Disease Patterns: An Interactive Visualization Approach**, Proceedings of Peradeniya University International Research Symposium and Exposition (iPURSE) 2025, Sri Lanka, Vol. 26, 28-29 Aug. 2025

POSTER/ORAL PRESENTATIONS

1. **Demographic Insights into Disease Patterns: An Interactive Visualization Approach**, Proceedings of Peradeniya University International Research Symposium and Exposition (iPURSE) 2025, Sri Lanka. | Oral Presentation | [Presentation](#)
2. **Machine Learning for Satellite Images** — Engineering Exhibition 2025 by the University of Peradeniya (EngEx 25), Faculty of Engineering, University of Peradeniya (Sept 23–27, 2025) | [Poster](#) | [LinkedIn Post](#).
3. **PoPStat-COVID19: Leveraging Population Pyramids to Quantify Demographic Vulnerability to COVID-19**, 25th International Conference on Advances in ICT for Emerging Regions, in Colombo, Sri Lanka | Poster Presentation

HONORS AND AWARDS

International Programming Contests

- **IEEEExtreme 17.0 – Ranked 1st in Sri Lanka, 65th Globally (Team Insomniacs)**
24-hour global programming competition | [Award](#) | [Certificate](#) Oct 2023
- **IEEEExtreme 18.0 – Ranked 1st in Sri Lanka, 66th Globally (Team Insomniacs)**
24-hour global programming competition | [Award](#) | [Certificate](#) Oct 2024

Research & Academic Awards

- **Merit Award for the best undergraduate research engineering project carried out at a faculty of engineering in a Sri Lankan university - Manamperi Award**
Sri Lanka Association for the Advancement of Science | [Certificate](#) Nov 2025
- **Prof. W.P. Jayasekara Prize – Best undergraduate research project in the Department of Electrical and Electronic Engineering, University of Peradeniya**
University of Peradeniya Nov 2025





National & International Olympiad Awards






- **HKIMO – Silver Medal (Heat Round)**
Hong Kong International Mathematics Olympiad | [Award](#) | [Certificate and Medal](#) June 2019
- **Sri Lanka Mathematics Olympiad – Bronze Medal**
Sri Lanka Olympiad Mathematics Foundation (SLOMF) | [Award](#) | [Certificate and Medal](#) 2019
- **Chemistry Olympiad Sri Lanka – Merit Award, Ranked 4th in Sri Lanka**
Institute of Chemistry Ceylon (ICChem) | [Award](#) | [Certificate](#) May 2019
- **Chemistry Olympiad Sri Lanka – Finalist**
Institute of Chemistry Ceylon (ICChem) | [Award](#) | [Certificate](#) Feb 2020
- **Sri Lankan Physics Olympiad – Bronze Medal**
Institute of Physics Sri Lanka | [Award](#) | [Certificate](#) Nov 2019
- **Sri Lankan Astronomy and Astrophysics Olympiad – Merit Award**
Institute of Physics Sri Lanka | [Award](#) | [Certificate](#) Nov 2018

Undergraduate Competition & Hackathon Awards

- **IEEE Electronic Design Competition – Ranked 3rd in Sri Lanka**
Electronic Circuit Design Competition Sept 2023
- **IESL ROBOGAMES – 1st Runners-Up (University Category)**
Institute of Engineers Sri Lanka | [Certificate](#) Dec 2022
- **Sri Lanka Robotics Challenge – University Category Finalist**
Electronic Club, University of Moratuwa | [Certificate](#) March 2023
- **RealHack 5.0 – 2nd Runners-Up**
National Hackathon | [Certificate](#) Apr 2024
- **Coders 11.0 – Overall Champions (Team Insomniacs)**
National 12-hour programming competition | [Award](#) | [Certificate](#) Oct 2024
- **Coders 10.0 – Second Runners Up (Team Insomniacs)**
National 12-hour programming competition | [Award](#) Oct 2024
- **CYPHER 2.0 – 2nd Runners-Up**
National Hackathon | [Certificate](#) March 2024
- **MoraXtreme 2023 – Overall Champions (Team Insomniacs)**
National 12-hour programming competition Oct 2023

SELECTED PROJECTS

- **Understanding the Correlation between Population Demographics and Mortality Causes through Quantifying the Population Pyramid (Ongoing - Research Project)**
Tools: Python, pandas | March 2023–present | 
 - Initiated in the 2nd year of undergraduate study to quantify how population-pyramid shape relates to cause-specific mortality.
 - Designed two novel metrics: **PoPDivergence**, a scalar representation of complex demographic structure, and **PoPStat**, a statistic linking pyramid shape to mortality patterns.
 - Building an algorithm to reconstruct noisy/incomplete mortality records using PoPDivergence.
 - Supervised by Prof. Roshan Godaliyadda, Prof. Samath Dharmaratne, Prof. Parakrama Ekanayake, and Prof. Vijitha Herath.
- **Satellite Image-based Remote Sensing for Change Detection and Landscape Mapping (Ongoing - Research Project)**
Tools: Python, PyTorch | March 2024–present |  |  | 
 - Final Year Project: improve semantic change detection by combining spatial and frequency-domain cues.

- Developed a novel Mamba-based architecture to jointly model spatial and frequency information, exploring wavelets for further gains.
- Supervised by Prof. Roshan Godaliyadda, Prof. Parakrama Ekanayake, and Prof. Vijitha Herath.
- **Entropy-Based Hallucination Detection in Large Language Models (Ongoing - Research Project)**
Tools: Python, PyTorch | Aug 2025–present | 
- Cluster LLM responses using spectral clustering to reveal response modes.
- Propose an entropy-based detector that flags likely hallucinations from cluster distributions.
- Supervised by Prof. Roshan Godaliyadda, Prof. Parakrama Ekanayake, and Prof. Ranga Kalugampitiya
- **PythonLibrary — proptables: Thermodynamic Properties Library (Ongoing - Passion Project)**
Tools: Python, pandas, PyPI | 2022–present | 
- Developed a lightweight Python library to retrieve thermodynamic properties for R134a and water.
- Packaged and published on PyPI for easy installation (pip install proptables).
- Designed for use in engineering calculations and research workflows.
- **Calm Quest — Counselor Student Management System (UG)**
Tools: TypeScript, React, Emotion Detection | 2023 |  | 
- Developed a web platform to manage counselor–student interactions and monitor student well-being via emotion detection.
- Designed user-friendly interfaces and stress-management features.
- Awarded 3rd Place — ACES Hackathon 2023 (Smart Solutions for Healthcare).
- **Image Codec Lab — Toolkit for Image/Video Compression (UG)**
Tools: Python, OpenCV | 2023 | 
- Implemented DCT-based encoding, Huffman coding, and adaptive quantization modules.
- Built an end-to-end pipeline to explore bitrate–quality trade-offs and optimize compression parameters.

EXPERIENCE

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- **Research Assistant** Nov 2025 - Present
Multidisciplinary AI Research Centre, University of Peradeniya Peradeniya, Sri Lanka
 - Working on hallucination mechanisms in large language models.
 - Working on remote sensing imagery and semantic change detection.
 - Supervisors: Prof. Parakrama Ekanayake, Prof. Roshan Godaliyadda, and Prof. Ranga Kalugampitiya
 - **Teaching Assistant** Aug 2025 - Nov 2025
Department of Electrical and Electronic Engineering, University of Peradeniya Peradeniya, Sri Lanka
 - Designed and evaluated lab sessions, tutorials, and quizzes for Artificial Intelligence, Machine Learning, and Embedded Systems.
 - **Volunteer Teaching Assistant** March 2024 - July 2024
Department of Computer Engineering, University of Peradeniya Peradeniya, Sri Lanka
 - Designed and evaluated lab sessions in Introduction to Programming and Networking for Electrical Engineering (CO: 253).
 - **Embedded System Engineer- Intern** July 2024 - November 2024
SwartUp (PVT) Limited Remote
 - Development of software for a Smart Home system using the **Zephyr RTOS**.
 - Designed and implemented both hardware and embedded software for a Smart City sensor node.
 - **Electronic Engineer- Intern** July 2023 - October 2023
Vega Innovations (PVT) Limited Colombo, Sri Lanka
 - Designed and developed a custom Meter for measuring Electrical Conductivity and pH levels, including hardware design and embedded software development.

SKILLS

- **Programming Languages:** Python, C, C++, R, JavaScript, MATLAB
- **Web Technologies:** React, Node.js, HTML5, CSS3, TypeScript,
- **Data Science & Machine Learning:** TensorFlow, PyTorch, scikit-learn, NumPy, pandas, Matplotlib, Seaborn, Jupyter, OpenCV, Hugging Face Transformers
- **Version Control:** Git, GitHub
- **Operating Systems:** Linux, Raspbian

EXTRA CURRICULAR

Workshops and Presentations

- A Journey to AI - Involved in a workshop for approximately 500 school children and teachers in Sri Lanka. Introduced concepts of Artificial Intelligence (AI) and shared insights from research projects.
- Path to IEEEExtreme - Conducted inspirational sessions for undergraduate students in Sri Lanka, to motivate them in participating at IEEEExtreme.
- Future Makers Arduino Workshop series for Inventors - Conducted a workshop on PID controllers for undergraduate students at the Faculty of Engineering, University of Peradeniya.
- The Winning Strategy - Conducted a Lecture series on Dynamic Programming to university students.

Volunteer Tutor

- Provided tutoring in Linear Algebra, Programming in Python, C, and C++, Signals and Systems, Control Systems for Undergraduate Students and Advanced Level Combined Mathematics, for School Students
- Find Posted Videos on 

Societies

- Chairperson of the Microwave Theory and Techniques Society of University of Peradeniya (2024/2025)

[See my Extracurricular Record at School](#)

REFERENCES

1. **Prof. G. M. Roshan Godaliyadda, Ph.D. (National University of Singapore), B.Sc.Eng. (Peradeniya, Sri Lanka), SMIEEE, AMIESL**
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University of Peradeniya, Peradeniya, Sri Lanka.
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2. **Prof. M. Parakrama. B. Ekanayake, Ph.D. (Texas Tech University), B.Sc.Eng. (Peradeniya, Sri Lanka)**
Professor, Department of Electrical and Electronic Engineering
University of Peradeniya, Peradeniya, Sri Lanka.
Email: mpb.ekanayake@ee.pdn.ac.lk
Google Scholar: [Profile](#).
3. **Prof. H. M. V. R. (Vijitha) Herath, Ph.D. (University of Paderborn, Germany), M.Sc. (University of Miami, USA), B.Sc.Eng. (Peradeniya, Sri Lanka), SMIEEE, AMIESL**
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