Dilshara Herath

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INTRODUCTION

A self-motivated and passionate individual with a strong desire to explore and research in **machine learning, signal & image processing, computer vision, biomedical engineering** and their **applications**. Seeking to contribute to innovative projects and research initiatives to tackle global challenges and push the boundaries of AI technology.

EDUCATION

BSc. (Hons.) in Electrical and Information Engineering , University of Ruhuna — May 2020 – March 2025

- **GPA: 3.79/4.00 (First-Class Honours) | Rank: 3/75 (Dept.) |** Transcript
- The complete degree program was conducted and assessed in **English medium** and accredited by the **Washington Accord**.

Trinity College Kandy, Grade 1-13 — Jan 2005 – Aug 2018

- G.C.E. Advanced Level Examination: Combined Mathematics, Chemistry, Physics (AAB)
- Ranked top 0.59 % in the country

TEST SCORES

IELTS (03rd November, 2025) | **Overall Band Score: 7.5** | Test Report — May 2020 – March 2025

PUBLICATIONS

J=Journal, C=Conference

[J 1] ELF Radio Sensing and AI-Perception of Micro-UAS Without Radar Emissions (Under Review)
IEEE Transactions on Aerospace and Electronic Systems (IF - 4.4)
Dilshara Herath, Supun Ganegoda, Sudeepa Ranasinghe, Chatura Seneviratne, Soumyajit Mandal, Hiruni Silva and Arjuna Madanayake
Contribution: Conceptualization, Methodology, Formal analysis, Software & Hardware, Validation, Writing–Original Draft, Review & Editing.

[C 1] GAN-Driven Signal Denoising and Enhancement for Robust Drone Motor Detection
IEEE IECON 2025, Madrid, Spain | DOI | Presentation
Dilshara Herath, Chinthaka Abeyrathne, Supun Ganegoda, Chatura Seneviratne, Harindra S. Mavikumbure
Contribution: Conceptualization, Methodology, Formal analysis, Software, Validation, Writing–Original Draft, Review & Editing.

[C 2] Unveiling Misalignment Fault Severities: A Novel SCD-CNN Framework for Rotating Machinery
MERCon 2025, 11th international conference, University of Moratuwa | DOI | Presentation
Dilshara Herath, Chinthaka Abeyrathne, Chamindu Adithya, Chatura Seneviratne
Contribution: Conceptualization, Methodology, Formal analysis, Software, Validation, Writing–Original Draft, Review & Editing.

[C 3] AI-Enabled RF-Sensing for Radar Detection of Body-Worn IEDs
IEEE SoutheastCon 2024, Atlanta, Georgia, USA | DOI | Presentation
Kumudu Senarathne, Ashan Hatharasinghe, Wathsala Seram, Dilshara Herath, Chatura Seneviratne, and Arjuna Madanayake
Contribution: Validation, Writing–Original Draft, Review & Editing.

[C 4] FlowSegModel: Advancing Perception in Autonomous Driving Through Weather-Resilient Segmentation
ICIIS 2025, International Conference on Industrial and Information Systems (*Accepted*)
Dilshara Herath, Oshada Rathnayake, Thiwanka Alahakoon, Sanjula Senadeera, Roshan Godaliyadda, and Parakrama Ekanayake

Contribution: Conceptualization, Methodology, Formal analysis, Software & Validation, Writing–Original Draft

AI Enabled Detection of Body-Worn Improvised Explosive Devices
Abstract Acceptance at USF Artificial Intelligence + X Symposium organized by University of South Florida.
Contribution: Research Poster

RESEARCH EXPERIENCE

Research Assistant and Project Coordinator March 2025 – Present
Multidisciplinary AI Research Centre (MARC), University of Peradeniya

- Developing algorithms on computer vision for solar irradiance forecasting using optical flow and state of the art image processing techniques.
- Agent based modeling for human-animal interaction and mathematical evaluation on moving patterns - Brownian motion, Markov process, Bimodelity

ACHIEVEMENTS

IEEE IES Generative AI Challenge 2025 | View July 2025

- **Global Winners** from 305 projects from 28 countries.
- Travel **grant worth USD 3000** to attend the conference in person in Madrid, Spain.

National Winners: IEEE Innovations Sri Lanka Competition | View Dec 2024

- Final year project "Micro-UAS Detection Using ELF and Machine Learning", emerged as the Top in the Island among 30 teams from all the provinces.

Provincial Winners (Southern): IEEE Innovations Sri Lanka Competition | View Oct 2024

- Presented the final year project on Drone detection, emerged top in the Southern Province and selected to the all island competition.

National 2nd Runner-up: Undergraduate Thesis Project Competition | View Oct 2024

- Presented the final year project on drone detection as a poster presentation for the competition organized by the IEEE Signal Processing Society Chapter Sri Lanka, in collaboration with the Center for Telecommunication Research (CTR), SLTC Research University.

Best Paper Award Nominee at the MERCon 2025 Aug 2025

SELECTED PROJECTS

1.Computer Vision based Solar Irradiance Forecasting March 2025 - Present

- Developed a hybrid deep learning pipeline for 20-minute ahead solar irradiance forecasting (GHI/DNI), integrating Vision Transformers for 5-minute sequences of fish-eye all-sky images and Time Series Transformers for 30-minute meteorological data (GHI, DNI, DHI, temperature, pressure, solar position). Multi-step regression via feature concatenation and multilayer perceptron fusion.
- Implemented fish-eye image undistortion using cosine-weighted hemispheric sampling to preserve angular accuracy in hemispherical views.
- Applied advanced cloud detection techniques, including UcloudNet segmentation, red-to-blue ratio thresholding, and hybrid algorithms for robust binary mask generation.
- Conducted comparative analysis of distortion correction and segmentation methods to optimize input quality for very short-term forecasting under variable cloud conditions.
- **Contribution**: Developing the complete DL pipeline, image undistortion, training and testing the dataset.

2.Agent Based Modeling for Human-Animal Behavior and Interaction March 2025 - Present

- Developed Python-based agent-based modeling pipeline for elephant GPS telemetry analysis, processing raw latitude/longitude data for coordinate projection to local flat-earth meters.
- Designed and fitted Levy walk model using maximum likelihood estimation (MLE) on filtered step lengths.
- Implemented Correlated Random Walk (CRW) framework with von Mises-distributed turning angles and exponential step lengths, resolved array broadcasting error in turning angle computation with modular

wrapping.

- Conducted sex-specific CRW comparison, generated comparative visualizations of real and simulated trajectories across Brownian, L'evy, and CRW models to evaluate behavioral fit, enabling model selection for ecological inference in savanna elephant movement.
- Applied movement ecology best practices including zero-step filtering, seasonal context analysis (wet/dry transitions).
- **Contribution**: Developing motion models-CRW and Levy walk, comparing model performance

3.Extremely Low Frequency (ELF) based Sensing and AI/ML-based Identification of Micro-UAS - Final Year Project | Poster | Youtube — Jan 2024 – Oct 2024

- Designed and fabricated custom antennas to passively capture extremely low frequency magnetic signatures from drone motors.
- Engineered a high-gain, low-noise analog frontend PCB in Altium Designer, featuring multi-stage amplification and Butterworth low-pass filters for precise signal conditioning and noise suppression.
- Implemented real-time digital signal processing on TMS320F28379D microcontroller using MATLAB Simulink and Code Composer Studio; performed frequency-domain feature extraction and cyclostationary analysis to compute Spectral Correlation Density (SCD) functions, enabling robust detection of periodic motor signals amid environmental noise.
- Developed advanced machine learning pipeline: Collected and preprocessed SCD images from three drone models (handmade faculty drone, DJI Phantom 4 Pro, DJI Mini 3 Pro); augmented dataset for variability; customized VGG16 CNN architecture with transfer learning, batch normalization, and dropout for binary (drone/no-drone) and multi-class classification.
- Integrated DSP-ML workflow into a real-time detection system with user interface; demonstrated high specificity in time-domain, frequency-domain, and SCD pattern differentiation, outperforming conventional methods in passive, covert operation for security applications.
- **Contribution**: PCB design using Altium, signal processing implementation using python and MATLAB, developing the machine learning pipeline, deep learning model architectures through transfer learning, and vision transformers.

4.GAN-Driven Signal Denoising and Enhancement | Slides — March 2025 - June 2025

- Extension of the final year project
- Developed a novel GAN-based framework for denoising extremely low-frequency (ELF) electromagnetic signals emitted by BLDC drone motors, addressing environmental noise degradation for enhanced drone detection and motor health monitoring.
- Improved the drone detection system (+24% over baseline) built by integrating GAN model to the previously built machine learning pipeline for drone detection.
- **Contribution**: Implementing GAN-based framework, integrating GAN model into the main drone detection pipeline, training and validation.

5.Leveraging Spectral Correlation Density Imaging with Deep Learning for Intelligent Fault Detection in Rotating Machinery | Slides — Jan 2025 - April 2025

- Developed a SCD-CNN framework for detecting and classifying shaft misalignment fault severities (Healthy, 0.1 mm, 0.3 mm, $\geq$0.5 mm) in rotating machinery using vibration data from two bearing housings (A and B) under varying loads (0 Nm, 2 Nm, 4 Nm).
- Implemented signal processing pipeline: Utilizing vibration signals, computed Spectral Correlation Function (SCF) via FFT Accumulation Method (FAM). Evaluated three transfer learning CNN models (VGG19, DenseNet121, InceptionResNetV2) with custom top layers.
- Future work: Collaboration with Lakdhanavi Power Plant, Sri Lanka to acquire industrial vibration data from operational rotating machinery. This data will be used to retrain and fine-tune the SCD-CNN models, for enhanced reliability under practical conditions, including variable speeds, loads, and environmental noise, thereby bridging the gap between benchmark datasets and field deployment.
- **Contribution**: Implementing SCD-CNN pipeline, training and validation.

6.AI-Enabled RF-Sensing for Radar Detection of Body-Worn IEDs | Poster — Jan 2023 - Nov 2023

- Developed an RF-sensing radar system for standoff detection of body-worn improvised explosive devices (IEDs),

integrating full-wave electromagnetic simulations with deep learning classification.

- Conducted extensive RCS (Radar Cross Section) characterizations using CST Studio Suite software, modeling basic IED components (iron balls, copper wires, metal plates), metallic/non-metallic grids, randomized ball arrangements, and human soft-tissue models with/without IEDs across frequency ranges of 1 MHz–50 GHz.
- **Contribution**: Improving the CNN architecture, Preparing the manuscript.

7.Deep Drowsiness Detection Using YOLOv5, PyTorch, and Python | Project Oct 2024 - Dec 2024

- Developed a vision-based driver drowsiness detection system utilizing seven YOLO variants (v5s, v9c, v9t, v10n, v10l, v11n, v11l) for real-time, non-intrusive monitoring of facial cues indicating fatigue.
- Performed manual bounding-box labeling, generating YOLO-format annotations with normalized coordinates for face regions, applied data augmentations to enhance model robustness against real-world variations.
- Implemented classical Eye Aspect Ratio (EAR)-based drowsiness detection. Fine-tuned YOLO models on Google Colab with NVIDIA Tesla T4 GPU using pretrained COCO weights.
- **Contribution**: Developing the ML-pipeline, Fine tuning, training YOLO variants.

8.1Smart Biomedical System for Chronic Diseases Monitoring | Slides Aug 2025 - Present

- Focusing on ECG signal datasets to enhance algorithm performance and detection accuracy.
- **Contribution**: Co-Supervisor for Undergraduate Research Project

8.2Clinical Decision Support Systems: Brain Tumor Segmentation Aug 2025 - Present

- Image and compute vision based brain tumor segmentation approaches and best practices in the clinical setting.
- **Contribution**: Co-Supervisor for Undergraduate Research Project

TEACHING EXPERIENCE

EE4301 - Communication Systems 1, Laboratory Practicals Jan 2023 – Oct 2024
EE2201 - Fundamentals of Electronics, Laboratory Practicals Jan 2023 – Oct 2024

INDUSTRIAL EXPERIENCE

Machine Learning Engineer, Intern, Ansell Lanka Nov 2024 – Feb 2025

- Designed a machine vision system to the HGBU (Healthcare Glove manufacturing) lines to automate inspection processes.
- Working with Halcon and Python to integrate machine vision capabilities to the manufacturing lines.
- Using various image processing techniques to enhance the fault detection

Cybersecurity Engineer Intern, Sri Lanka Telecom Mobitel Oct 2023 – Jan 2024

- Traffic monitoring and congestion control using Cacti Software in Linux Servers under the section IP Network Operations.
- Performed penetration testing and ethical hacking using Kali Linux tools such as NMap, MobSF.
- Network security monitoring through the SOC (Security Operations Center) using software; IBM QRadar, Darktrace, Microsoft Defender Endpoint.

VOLUNTEERING EXPERIENCE

Multidisciplinary AI Research Centre (MARC), University of Peradeniya Mar 2025 – Present

- Conducting workshops on AI for learning and research for high school students and undergraduate students at Ampara and Vavuniya districts.
- Contribution to the workshops at the Science Faculty, University of Peradeniya and Pre-Engineering workshop.
- Handling the media team of MARC.

Volunteer of the IEEE Student branch 2022-2023

- Organized university events organized by IEEE student branch of University of Ruhuna.

EXTRACURRICULAR ACTIVITIES

Captain of the Engineering Faculty Soccer team 2023-2024

- Played for the University Soccer team
- Held the Vice-Captain for the year 2022 and won the Inter-Faculty Football championship.

Soccer Team - Trinity College 2011-2016

- Played for under 13, 15, 17, and 18 for the college soccer team
- Obtaining 3rd place - Central province soccer tournament
- Participation to All Island Soccer Championship 2015 held in Jaffna.

President - Telecommunication and Networking Circle Faculty of Engineering 2024

- Organized an Introduction to Cloud platform workshop.
- Working with the Career Fair Organization team for making partnerships.

Organizing Committee Vice President for Partnership Development for the national project NATCON 2022 for AIESEC Sri Lanka 2022

- Raised the biggest partnership with Rs.350,000 for the conference with Stax LLC, a global strategy consulting firm.

Leadership positions in AIESEC in the University of Ruhuna 2021-2022

- Team Leader for the Information Management team under the division Product Marketing and IM.
- Team leader for International Relations under the section Outgoing global Talent/Teaching.
- Organizing Committee Vice president for External Relations for the project Youth Space organized by AIESEC in University of Ruhuna. Was able to raise the biggest partnership with AOD Colombo (Academy Of Design).

Gaveshakayo Hiking club of University of Ruhuna 2021-2024

- Editor of the Gaveshakayo hiking club of university of Ruhuna.

REFERENCES

Prof. Roshan Godaliyadda

Professor,
Department of Electrical and Electronic Engineering,
University of Peradeniya, Sri Lanka.
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Relationship: Project Supervisor

Dr. Chatura Seneviratne

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Relationship: Project Supervisor, Academic Advisor

Prof. Janaka Ekanayake

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Relationship: Project Supervisor, Coordinator

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