

# Kavinda Dilshara Herath

Research Assistant - Multidisciplinary AI Research Centre, University of Peradeniya

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🌐 Personal Website | 📖 Google Scholar

## RESEARCH INTERESTS

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My research interests are in **deep learning, signal and image processing, computer vision** and their **applications**.

## EDUCATION

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**Bachelor of the Science of Engineering Honours (B. Sc. Engineering)** May 2020 – March 2025

Electrical and Information Engineering, University of Ruhuna

- 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 | [Accreditation](#)

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

- G.C.E. Advanced Level Examination: Combined Mathematics, Chemistry, Physics (AAB)

## CURRENT APPOINTMENT

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**Research Assistant and Project Coordinator** March 2025 – Present

Multidisciplinary AI Research Centre, University of Peradeniya - [Website](#)

## TEST SCORES

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**IELTS** (03rd November, 2025) | **Overall Band Score: 7.5** | [Test Report](#)

## PUBLICATIONS

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J=Journal, C=Conference

- [J 1] ELF Passive Radio Sensing and AI-Perception of Micro-UAS (**Accepted**)  
**IEEE Sensors Journal (IF - 4.5, Q1)** | [Preprint](#)  
Dilshara Herath, Supun Ganegoda, Sudeepa Ranasinghe, Hiruni Silva, Chatura Seneviratne, Soumyajit Mandal and Arjuna Madanayake
- [C 1] GAN-Driven Signal Denoising and Enhancement for Robust Drone Motor Detection  
**IEEE IECN 2025, Madrid, Spain** | [DOI](#) | [Presentation](#)  
Dilshara Herath, Chinthaka Abeyrathne, Supun Ganegoda, Chatura Seneviratne, Harindra S. Mavikumbure
- [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
- [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
- [C 4] FlowSegModel: Advancing Perception in Autonomous Driving Through Weather-Resilient Segmentation | [Preprint](#)  
**ICIIS 2025, International Conference on Industrial and Information Systems** (**Accepted**)

Dilshara Herath, Oshada Rathnayake, Thiwanka Alahakoon, Sanjula Senadeera, Roshan Godaliyadda, and Parakrama Ekanayake

Detection of Body-Worn Improvised Explosive Devices | [Poster](#)

USF Artificial Intelligence + X Symposium organized by University of South Florida.

## ACHIEVEMENTS

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<b>International Winners: IEEE IES Generative AI Challenge 2025</b>   <a href="#">View</a>	July 2025
<ul style="list-style-type: none"><li>Winners from 305 projects from 28 countries all over the world.</li><li>Travel grant worth USD 3000 to attend the conference in person in Madrid, Spain.</li></ul>	
<b>National Winners: IEEE Innovations Sri Lanka Competition</b>   <a href="#">View</a>	Dec 2024
<ul style="list-style-type: none"><li>Final year project on drone detection, emerged top in the nation among 30 teams.</li></ul>	
<b>Provincial Winners: IEEE Innovations Sri Lanka Competition</b>   <a href="#">View</a>	Oct 2024
<ul style="list-style-type: none"><li>Final year project on drone detection, emerged top in the Southern Province.</li></ul>	
<b>2nd Runner-up: Undergraduate Thesis Project Competition</b>   <a href="#">View</a>	Oct 2024
<ul style="list-style-type: none"><li>Final year project on drone detection. Competition organized by the IEEE Signal Processing Society Chapter Sri Lanka, in collaboration with the SLTC Research University.</li></ul>	
<b>Best Paper Award Nominee - MERCon 2025</b>	Aug 2025
<ul style="list-style-type: none"><li>Track - Image Processing and Computer Vision</li></ul>	

## SELECTED PROJECTS

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<b>Computer Vision based Solar Irradiance Forecasting</b>   <a href="#">Project</a>	Aug 2025 - Present
<ul style="list-style-type: none"><li>Formulated a geometric rectification algorithm to mathematically transform hemispherical all-sky images, linearizing celestial coordinates to mitigate fisheye distortion and recover spatially consistent 3D cloud features.</li><li>Implemented a hybrid architecture—"SolarMamba" that utilizes Ladder Fusion to dynamically modulate hierarchical visual representations (MambaVision) with multi-scale temporal context (Pyramid TCN).</li><li>Implemented physics-informed data processing including circular masking, solar geometry calculation (zenith/azimuth), and clear-sky index normalization to constrain the deep learning optimization landscape with domain-specific physical boundaries.</li><li><b>Contribution:</b> Developing the complete DL pipeline, image undistortion, training and validation.</li></ul>	
<b>Optical-Flow Driven Semantic Segmentation for Autonomous Driving</b>   <a href="#">Preprint</a>	March - Aug, 2025
<ul style="list-style-type: none"><li>Fine-tuned optical flow (RAFT/SEA-RAFT), conducted ablation studies, and validated multi-metric performance across seven semantic classes.</li><li>Created a DeepLabV3-based semantic segmentation architecture fusing RGB and optical flow for robust perception under adverse weather.</li><li><b>Contribution:</b> Developing the FlowSegModel, training and validation.</li></ul>	
<b>Agent Based Modeling for Human-Animal Behavior</b>   <a href="#">Project</a>	March 2025 - Present
<ul style="list-style-type: none"><li>Built Python agent-based models for analyzing Elephant and Baboon telemetry; designed and compared CRW and Lévy walk using GPS data.</li><li>Conducted ecological fit evaluation with visualizations of actual vs. simulated trajectories and movement patterns.</li></ul>	

- **Contribution:** Developing motion models-CRW and Levy walk, comparing model performance

**Extremely Low Frequency (ELF) based Sensing and AI/ML-based Identification of Micro-UAS - Final Year Project | [Poster](#) | [YouTube](#)**

Jan – Oct, 2024

- Developed a drone detection system to identify drones at a safe distance for military purposes.
- Designed custom antennas and PCBs to capture extremely low frequency electromagnetic signatures from drone motors. Engineered DSP pipeline with MATLAB, implemented SCD feature extraction and advanced CNN architectures for real-time drone detection.
- **Contribution:** PCB design using Altium, signal processing pipeline (Python, MATLAB), Deep Learning pipeline.

**GAN-Driven Signal Denoising and Enhancement | [Slides](#)**

March - June, 2025

- Developed and integrated a GAN-based denoising framework to enhance ELF drone motor signals and detection accuracy in noisy settings.
- Elevated classification accuracy by 24% over baseline when deployed in ML pipeline.
- **Contribution:** Implementing GAN-based framework, integrating GAN model into the DL pipeline, training and validation.

**Leveraging Spectral Correlation Density Imaging with Deep Learning for Intelligent Fault Detection in Rotating Machinery | [Slides](#)**

Jan - April, 2025

- Created SCD-CNN pipeline to classify shaft misalignment faults using vibration data.
- Benchmarked multiple CNN architectures; preparing for power plant-scale validation and model re-training on industrial data.
- Future work: Collaboration with Lakdhanavi Power Plant, Sri Lanka to train and validate industrial vibration data from operational rotating machinery.
- **Contribution:** Implementing SCD-CNN pipeline, training and validation.

**AI-Enabled Radar Detection of Body-Worn IEDs | [Poster](#)**

Jan - 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.
- **Contribution:** Improving the CNN architecture, Preparing the manuscript.

## TECHNICAL STRENGTHS

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- **Programming Languages:** Python (Proficient), C++, MATLAB
- **Libraries & frameworks:** TensorFlow, PyTorch, Scikit-Learn, Keras, cv2, Scipy, MVTec Halcon
- **PCB Design :** Proteus, Altium
- **Other:** Git, Linux, Jupyter Notebook, AutoCAD, Draw.io
- **Soft Skills:** Communication, Teamwork and Collaboration

## TEACHING EXPERIENCE

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**Teaching Assistant, Laboratory Practicals | [Offer Letter](#)**

Jan 2024 – Oct 2024

- EE4301 - Communication Systems 1
- EE2201 - Fundamentals of Electronics

**Co-Supervisor, Undergraduate Research Projects**

Aug 2025 – Present

- EEG-based Smart Biomedical System for Chronic Diseases Monitoring

- Clinical Decision Support Systems: Brain Tumor Segmentation

## INDUSTRIAL EXPERIENCE

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- Machine Learning Engineer, Intern**, Ansell Lanka Nov 2024 – Feb 2025
- Designed a MVTEC HALCON and Python-based machine vision system for HGBU glove manufacturing lines to automate visual inspection.
  - Implemented and optimized image-processing pipelines to integrate machine vision into existing production lines, improving defect detection accuracy.
- Telecommunications Engineer, Intern**, Sri Lanka Telecom Mobitel Oct 2023 – Jan 2024
- Supported IP Network Operations with traffic monitoring, congestion control, penetration testing, and SOC-based security monitoring.

## VOLUNTEERING EXPERIENCE

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- 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. Handling the media team of MARC.
- Volunteer of the IEEE Student branch** 2022-2023

## EXTRACURRICULAR ACTIVITIES

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- Captain - Soccer team, Engineering Faculty** 2023-2024
- Member - Soccer Team, Trinity College Kandy** (age categories: 13 - 18) 2011-2016
- President - Telecommunication and Networking Circle** 2024
- Leadership Roles - AIESEC | Service Letter** 2021-2022
- Vice President - Partnership Development for the national project NATCON 2022 for AIESEC Sri Lanka
  - Vice President - External Relations - Project Youth Space organized by AIESEC in University of Ruhuna.
  - Team Leader - Information Management under the section Product Marketing and IM.
  - Team Leader - International Relations under the section Outgoing global Talent/Teaching.
- Editor - Gaveshakayo Hiking club of University of Ruhuna** 2021-2024

## REFERENCES

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### Dr. Chatura Seneviratne

Senior Lecturer,  
Department of Electrical and Information Engineering,  
University of Ruhuna, Sri Lanka.  
**Email:** chatura@eie.ruh.ac.lk  
**Relationship:** Project Supervisor, Academic Advisor

### Prof. Roshan Godaliyadda

Professor,  
Department of Electrical and Electronic Engineering,  
University of Peradeniya, Sri Lanka.  
**Email:** roshang@eng.pdn.ac.lk  
**Relationship:** Project Supervisor

### Prof. Parakrama Ekanayake

Professor,  
Department of Electrical and Electronic Engineering,  
University of Peradeniya, Sri Lanka.  
**Email:** mpb.ekanayake@ee.pdn.ac.lk  
**Relationship:** Project Supervisor