

# 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 IECON 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 <b>grant worth USD 3000</b> 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

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