Malitha Gunawardhana

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Education

University of Auckland — Auckland, New Zealand

Doctor of Philosophy — *Dec. 2023 – Dec. 2026*

- Thesis:- Deep learning powered analysis to aid structure-targeted therapy for atrial fibrillation
- Award:- Health Research Council Scholarship
- Teaching Assistant - ENGSCI 313
- Member of the student council

University of Moratuwa — Moratuwa, Sri Lanka

B.Sc. Engineering Honours Degree Specialized in Bio-Medical Engineering — *Jan. 2017 – July 2021*

- Dean's list placement in Semester 7
- *Key Modules: Image Processing and Machine Vision, Neural Network and Fuzzy logics, Calculus, Linear Algebra, Differential Equations, Statistics, Graph Theory, Medical Imaging, Signal Processing.*

Spring and Summer Schools

- CCAIM AI and Machine Learning Summer School — *Sept. 2023*
- Deep Learning Medical Imaging School, Lyon - France — *April 2023*
- BCI & Neurotechnology Spring School 2023 — *April 2023*

MOOCs

- Oracle Cloud Infrastructure 2024 Generative AI Certified Professional
- Large Language Model Agents (UC Berkeley)
- Deep learning Specialization by DeepLearning.AI (Coursera)
- TensorFlow Developer Specialization by DeepLearning.AI (Coursera)
- Data Science Career Track by 365 Data Science
- Microsoft Certified Azure Fundamentals by MS Learn
- Programming with GoLang specialization by Coursera

Experience

Machine Learning Research Engineer — Sep. 2022 – Dec. 2024

Institute of Fundamental Technological Research Polish Academy of Science (IPPT-PAN) — *Warsaw, Poland*

- Working on the project 'INFOSTRATEG', a support system for diagnosing breast cancer lesions using ultrasound.
- Developed novel machine learning algorithms for detection, classification, and segmentation of tumors, achieving over 85% accuracy.

Artificial Intelligence Research Assistant — Sep. 2022 – Sep. 2023

Mohamed bin Zayed University of Artificial Intelligence (MBZUAI) — *Abu Dhabi, UAE*

- Led a team of two research assistants to develop a self-supervised learning benchmark for the spontaneous acquisition of infant-level perceptual understanding.
- Developed novel research methodologies in network calibration, self-supervised learning, semi-supervised learning, and video procedure planning, accepted at leading conferences including **CVPR**.
- Contributed to the development of several graduate-level course materials.

Machine Learning Engineer — May 2022 –Sep. 2023

Omdena

- Working with 50+ collaborators to build innovative, ethical, and efficient AI solutions to real-world problems in various use cases. Contributed as a volunteer to build innovative AI solutions.

Machine Learning Engineer — June 2022 – Nov. 2022

PromiseQ GmbH — *Berlin, Germany*

- Enhanced the performance of the current deep learning based CCTV surveillance system using state-of-the-art algorithms.
- Utilized novel methods such as network calibration to improve the success rate by 5%, reducing false alarms.

Full-Stack Software Engineer March 2021 – May 2022

Xeptagon (Pvt) Ltd) *Colombo, Sri Lanka*

- Led a team of two engineers in developing a domain drop-catching system, which improved the success rate up to more than 90%.
- Extracted audio features for the student learning management system which focus on identifying student's environment

Research Engineer June 2019 – Dec. 2019

Synergen Technology Labs (Pvt) Ltd *Colombo, Sri Lanka*

- Designed a wearable device to acquire physiological signals and developed algorithms to process the data, obtaining a numerical value for stress
- Trained a machine learning model to classify the type of stress as relaxed, cognitive stress, physical stress and emotional stress.

Publications

- **Malitha Gunawardhana**, Fangqiang Xu, Jichao Zhao *"How good nnU-Net for Segmenting Cardiac MRI: A Comprehensive Evaluation"* Journal - Under Review 2024
- **Malitha Gunawardhana**, Fangqiang Xu, Yun Gu, Jichao Zhao *"ResNet-based Convolutional Framework for Segmenting Left Atrial Scars and Cavities"* in STACOM-MICCAI 2024
- Fangqiang Xu, Wenxuan Tu, Fan Feng, **Malitha Gunawardhana**, Jiayuan Yang, Yun Gu, Jichao Zhao *"Dynamic Position Transformation and Boundary Refinement Network for Left Atrial Segmentation"* in MICCAI 2024
- **Malitha Gunawardhana***, Ishan Dave*, Limalka Sadith, Honglu Zhou, Liel David, Daniel Harari, Mubarak Shah, Muhammad Haris Khan, *"Unifying Video Self-Supervised Learning across Families of Tasks: A Survey"* Journal - Under Review 2024. *equal contribution
- **Malitha Gunawardhana**, Limalka Sadith, Liel David, Daniel Harai, Muhammad Haris Khan, *"How Effective are Self-Supervised Models for Contact Identification in Videos"* in International Workshop on Deep Learning for Human Activity Recognition-IJCAI 2024
- Chamuditha Jayanga Galappaththige, Sanoojan Baliah, **Malitha Gunawardhana**, Muhammad Haris Khan, *"Towards Generalizing to Unseen Domains with Few Labels"* in CVPR 2024
- Kumaranage Ravindu Yasas Nagasinghe, Honglu Zhou, **Malitha Gunawardhana**, Martin Renqiang Min, Daniel Harari, Muhammad Haris Khan, *"Why Not Use Your Textbook? Knowledge-Enhanced Procedure Planning of Instructional Videos"* in CVPR 2024
- Bimsara Pathiraja, **Malitha Gunawardhana**, Muhammad Haris Khan, *"Multiclass Confidence and Localization Calibration for Object Detection"* in CVPR 2023
- **Malitha Gunawardhana**, Chathuki Navanjana, Dinithi Fernando, Nipuna Upeksha, Anjula de Silva, *"Evaluation of Noise Reduction Methods for Sentence Recognition by Sinhala Speaking Listeners"* in ICIIS 2023

Projects

AI-powered analysis to aid fibrosis-targeted therapy for atrial fibrillation | *Python* Dec. 2023 – Dec. 2026

- Designing and implementing a novel deep learning architecture for segmenting left atrial scars from LGE-MRIs, enhancing the precision of atrial fibrillation therapies.
- Integrating the developed segmentation model into clinical workflows, validating catheter ablation areas to improve therapeutic outcomes in atrial fibrillation treatment.
- Implementing an innovative machine learning network for ECG signals classification, advancing diagnostic accuracy and patient care.

A support system for breast cancer lesion diagnosing | *Python* Dec. 2022 – Present

- Pioneered the integration of texture imaging techniques with cutting-edge machine learning algorithms, significantly boosting diagnostic precision in breast cancer detection through ultrasound.
- Enhanced the machine learning model's robustness by incorporating multi-modal imaging data, achieving over 85% accuracy in tumour detection, classification, and segmentation.
- Developed innovative algorithms to reduce false identifications and improve the classification between natural and ultrasound images, enhancing overall diagnostic accuracy and reliability.

Spontaneous acquisition of infant-level perceptual understanding | *Python* Sept. 2022 – Sep. 2023

- Developed computational models for the spontaneous acquisition of infant-level perceptual understanding from realistic data in an unsupervised manner.
- The AI system will be able to learn, with no external supervision, powerful visual representation
- Evaluated existing self-supervised learning models using various datasets to understand their performance on human contact and non-contact interactions

Developing machine learning applications for CCTV systems | *Python* June 2022 – Nov. 2022

- Improved the performance of the current artificial intelligence-based CCTV surveillance system using state-of-the-art algorithms
- Utilized novel methods such as network calibration to improve the success rate by 5%, reducing false alarms.
- Drafted the initial version of user guidelines for the system.

Dropcatching System | *Python, TypeScript, JavaScript, GoLang* March 2021 – May 2022

- Developed a state-of-the-art domain drop catcher for a European domain registrar which uses a data-driven intelligent approach to identify and catch the most valuable domains
- Utilize different methods, delivering create commands on exact domain drop time, and AI-based domain drop time predicting methods depending on the registry to achieve a higher success rate with less than 50ms latency.
- The algorithm achieved superior real-time performance compared to the state-of-the-art algorithms.

A wearable device for human stress detection | *Python, MATLAB* June 2019 – Dec. 2019

- Engineered algorithms for capturing physiological signals, successfully quantifying stress levels into a numerical format.
- Created a proprietary dataset through stress induction tests involving over 15 participants, designed to enhance model training and validation.
- Developed and trained a machine learning model capable of distinguishing between relaxation, cognitive, physical, and emotional stress.

Technical Skills

Domains: Deep Learning, Computer Vision, Large Language Models (LLMs), Video Analysis, Medical Imaging, Signal Processing
Languages: Python, GoLang, MATLAB, JavaScript, HTML/CSS
Developer Tools: Git, Google Cloud Platform, VS Code, PyCharm
Libraries: PyTorch, Tensorflow, Keras, Scikit learn
Other: Linux, Latex, MS Office

Professional Activities

Peer Reviewer: IEEE Transaction of Image Processing, WACV, ISC 2021 Moratuwa
Research and Community talks:

- *IEEE EMBS Student Branch Chapter- UoM (Jan. 2023)*: Utilising AI in healthcare projects.
- *IEEE Young Professional Sri Lanka (Dec. 2022)*: Applications of AI in Healthcare

Service and Leadership

Auckland Bioengineering Institute, University of Auckland 2023 – Present

- Member of the student council, snow sports club and tramping club

Department of Electronic and Telecommunication, University of Moratuwa (UoM) 2017 – 2021

- Department Representative (2017-2018)
  - Organizing the Sri Lankan Robotics Challenge (SLRC) in 2018 and 2019, the "Expose -2019" exhibition and the uMora 2020 - The annual online mathematics competition (A problem setter and an organizer for all three categories of the competition)

IEEE Engineering in Medicine and Biology Student Branch Chapter at UoM 2020 – 2021

- An **advisor and paper reviewer** for the ISC 2021 Moratuwa — IEEE EMBS Conference 2021.
- Council Member – 2020-21.

Rotaract Club of UoM and Rotaract Club of Alumni of UoM 2016 – present

- Vice President - Club Service (2022-2023)
- Club Service Director (2021-2022)
- Spirit of Service Award 2017,2018 and 2020