Malitha Gunawardhana

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Education

University of Auckland — Auckland, New Zealand
Doctor of Philosophy — *Dec. 2023 – Dec. 2026*

- Thesis:- AI-powered analysis to aid fibrosis-targeted therapy for atrial fibrillation
- Award:- Health Research Council Scholarship

University of Moratuwa — Moratuwa, Sri Lanka
B.Sc. Engineering Honours Degree Specialized in Bio-Medical Engineering — *Jan. 2017 – July 2021*

- GPA -3.56/4.2 with Dean's list placement in Semsester 7
- *Key Modules : Calculus, Linear Algebra, Statistics, 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

- AI for Medicine Specialization (Coursera)
- Deep learning Specialization by DeepLearning.AI (Coursera)
- TensorFlow Developer Specialization by DeepLearning.AI (Coursera)
- Data Science Career Track by 365 Data Science

Research Experience

PhD Student — Dec 2023 – Present
University of Auckland — *Auckland, New Zealand*

- Developing an AI-powered system to aid fibrosis-targeted therapy for atrial fibrillation
- Developed a novel deep learning based segmentation architecture to segment left atrial scars
- Teaching Assistant - ENGSCI 313

Research Engineer — Sep. 2022 – Present
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.
- Contribute to the development of novel machine learning algorithms for detection, classification, and segmentation of tumours
- Developed a novel method for using texture imaging in conjunction with advanced machine learning algorithms to enhance the precision and effectiveness of diagnostic procedures

Artificial Intelligence Research Assistant — Sep. 2022 – Sep. 2023
Mohamed bin Zayed University of Artificial Intelligence (MBZUAI) — *UAE*

- Led a team of two research assistants to develop a self-supervised learning benchmark for the spontaneous acquisition of infant-level perceptual understanding
- Proposed a new train-time technique for calibrating modern object detection methods. It features an auxiliary loss term. network calibration for object detection.
- Contributed to the development of the course materials for the modules Randomised Algorithms, Software Development Process, and Advanced Algorithms.

Research Engineer — June 2019 – Dec. 2019
Synergen Technology Labs (Pvt) Ltd — *Colombo, Sri Lanka*

- Developed algorithms to acquire physiological signals and obtained 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

- 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
- **M. Gunawardhana**, C. Navanjana, D. Fernando, N. Upeksha, A. de Silva, *"Evaluation of Noise Reduction Methods for Sentence Recognition by Sinhala Speaking Listeners"* in proceeding of ICIIS 2023

Professional Activities

Peer Reviewer: ISC 2021 Moratuwa - IEEE EMBS Conference
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

Work Experience

Machine Learning Engineer June 2022 – Nov. 2022
PromiseQ GmbH *Berlin, Germany*

- Improved the results of the current CCTV surveillance AI system using SOTA algorithms
- Utilize novel methods such as network calibration to improve the success rate by 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

Projects

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

- Developing a new deep learning-based segmentation architecture to segment left atrial scars from LGE-MRI images
- Using the developed segmentation model in clinical workflow
- Implementing a novel classification network for ECG signal classification

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

- Develop 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

- Worked on further developing a machine learning system that can automate predictive models for CCTV applications
- Implemented SOTA algorithms such as YoloR and network calibration to improve accuracy by reducing false alarms
- Wrote the first version of user guidelines about 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

- Developed algorithms to acquire physiological signals and obtained a numerical value for stress
- Developed our own dataset using stress inducing test with more than 15 participants.
- Trained a machine learning model to classify the type of stress as relaxation, cognitive stress, physical stress and emotional stress

Retina Multi Stages Formation/Deformation Detection | *Python* August 2022 - Sept. 2022

- Investigated a machine learning solution to detect the retina deformation and supporting the Diabetic Macular Edema (DME) identification
- Extracted the nerve fibre layer and coefficient of it's curve using vertical projection since it is the most significant of detecting DME.
- Those coefficients were used to train different models and the performance was evaluated using the various healthy and DME data, which achieves 85% F1 score.

Non-invasive blood glucose measurement | *Python, MATLAB* Aug. 2019 – Jan. 2020

- Developed a machine learning model to predict blood glucose levels using a non-invasive method.
- Bioimpedance, skin thickness, melanin level and heart rate were taken as the physiological parameters and real blood glucose level was used as the reference value

Technical Skills

Languages: Python, JavaScript, HTML/CSS
Frameworks: Node.js, Bootstrap
Developer Tools: Git, Google Cloud Platform, VS Code, PyCharm
Libraries: pandas, NumPy, Matplotlib, Pytorch, Tensorflow
Other: Linux, Latex. MS Office

Service and Leadership

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)
  - Conducting Robotics Workshops nationwide for school children

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)
  - All club services and fellowship activities are conducted under my guidance. (Won the Bronze award for "Fellowship under Specific Audience" category - Rotaract District Training Assembly 2022)
- Spirit of Service Award 2017,2018 and 2020

IESEC Colombo South 2017 – 2019

- Team Leader and Entity Coordinator – "World Largest Lesson"- Asia Pacific Conference 2018

Volunteer at Iron MAN 70.3 Colombo Global Triathlon 2018 and 2019