H. DASUN MADHAVA PREMATHILAKA

Webpage hpremat1@jh.edu / Profiles Github

I work in the intersection of computational anatomy and geometric data analysis, specifically in diffeomorphic frameworks and image varifold-based representations for cross-modality data mapping.

Research Interests: Computational Anatomy, Diffeomorphic Shape Analysis, Image Varifolds, Cross-modality Data Mapping

EDUCATION

Johns Hopkins University, USA Aug 2024 - Present
Ph.D. in Biomedical Engineering GPA: 4.0/4.0
Advisor: Michael I. Miller

University of Moratuwa, Sri Lanka Dec 2018 - July 2023
B.Sc. Eng. in Biomedical Engineering (First Class Honors) GPA: 4.06/4.2
Class Rank: **1** (Gold Medal) Dean's List in all Semesters: 1,2,3,4,5,6,7,8

Royal College, Colombo 07, Sri Lanka Jan 2009 - Dec 2017
G.C.E. Advanced Level (Physical Science Stream) 4As / Z-score - 2.4170
(Top 0.15% out of ∼35000, Nationwide university entrance examination)

EXPERIENCE

Graduate Research/ Teaching Assistant Aug 2024 - Present
Center for Imaging Science, Johns Hopkins University USA

Graduate Research Intern Nov 2023 - Apr 2024
Computer Vision and Pattern Discovery for Bioimages Group, Bioinformatics Institute, A*STAR Singapore

Visiting Instructor July 2023 - Nov 2023
Department of Electronic and Telecommunication Engineering, University of Moratuwa (UoM) Sri Lanka

Research Intern in Biomedical Engineering Jan 2022 - July 2022
Effective Solutions (Pvt) Ltd Sri Lanka

GRADUATE RESEARCH AND PUBLICATIONS

SynTrack: Nano-scale Synapse Tracking Aug 2024 - Present

- Formulated synapse tracking as a MAP estimation problem, with a fully-connected spatio-temporal graph to handle long-term occlusions.
- Shashwat Kumar*, Gabrielle I. Coste*, **Dasun Prematthilaka**, Richard L. Huganir, Austin R. Graves, Adam S. Charles, and Michael I. Miller. Uncertainty-Gated Min-Cost Flows for In Vivo NanoScale Synaptic Plasticity Tracking. *Preprint, 2025*.

OTHER RESEARCH PROJECTS AND PUBLICATIONS

Deep Geometric Framework to Predict Antibody-Antigen Binding Affinity Nov 2022 - July 2023
Undergraduate Thesis, Collaboration with Aravinda Munasingha, Pfizer Inc., USA

- Proposed a deep geometric network that shares information between structure and sequence-based models via cross-attention to predict antibody–antigen binding affinity.
- Nuwan Bandara, **Dasun Prematthilaka**, Sachini Chandanayake, Sahan Hettiarachchi, Vithurshan Varenthirarajah, Aravinda Munasinghe, Kaushalya Madhawa, and Subodha Charles. Deep geometric framework to predict antibody–antigen binding affinity. *Journal of Structural Biology, Volume 217, Issue 4, December 2025*.

Parallel Deep Learning Model for Generalized Synthetic Image Detection July 2022 - Sep 2022
Research Competition - IEEE Video & Image Processing Cup 2022 (VIPCUP 2022)

· Evaluated the potential of feature-fused parallel deep learning models for detecting synthetic images, as a part of VIPCUP 2022.

Parasitic Egg Detection and Classification in Microscopic Images Jan 2022 - July 2022
Research Competition - ICIP 2022 Grand Challenge

· Nuwan Bandara, Sachini Chandanayake, **Dasun Prematilake**, Chalani Ekanayake. Rethinking Object Detection in terms of Classification and Localization through Parallel Deep Learning Models. *Preprint, 2022*.

Undergraduate Course Projects/ Simulations Repository

UNDERGRADUATE AWARDS

Gold Medal for the highest overall academic performance in the Biomedical Engineering Stream, University of Moratuwa, Sri Lanka Dec 2023

5th Place at the IEEE Video and Image Processing Cup (Open Competition), Organized by the University of Naples Federico II and NVIDIA Sep 2022

1st Runners-up of the SPARK Challenge 2021/22, Organized by the University of Moratuwa, Sri Lanka July 2022

1st Runners-up of the 3rd International Energy and Electricity Market Business Decision Simulation Competition, Organized by Batangas State University, Philippines Nov 2021

Mahapola Merit Scholarship for Engineering Undergraduates, awarded by the Government of Sri Lanka for the students who excelled at the university entrance examinations Dec 2017

OTHER NOTABLE ACHIEVEMENTS

Cameron Samarasinghe Memorial Prize, Awarded by Royal College, Sri Lanka for the best performance in Combined Mathematics Sep 2017

Sir Edward Denham Memorial Prize, Awarded by Royal College, Sri Lanka for the best performance in Mathematics June 2016

Bronze Medal at the 1st National Astronomy Olympiad (Junior), Organized by the Institute of Physics, Sri Lanka Nov 2011

Best Mathematical Talent, Awarded by Sri Lanka Olympiad Mathematics Foundation Jan 2010

Participation at the 6th International Mathematics and Science Olympiad, Indonesia Nov 2009

Silver Medal (Island 2nd) at the National Mathematics and Science Olympiad, Sri Lanka Oct 2009

TEACHING EXPERIENCE

Graduate Teaching Assistant

· **EN.580.631** Introduction to Computational Medicine: Imaging, Johns Hopkins University, USA Fall 2025

Visiting Instructor/ Teaching Assistant

· **BM4151** Biosignal Processing, UoM, Sri Lanka Fall 2023
· **EN4553** Machine Vision, UoM, Sri Lanka Fall 2023
· **BM3122** Medical Imaging, UoM, Sri Lanka Fall 2023
· **EN3160** Image Processing and Machine Vision, UoM, Sri Lanka Fall 2023
· **EN3551** Digital Signal Processing, UoM, Sri Lanka Fall 2023

· **BM2012** Anatomy and Physiology for Engineers, UoM, Sri Lanka Fall 2023

SKILLS

Programming: Python, MATLAB
Libraries & Frameworks: Numpy, PyTorch, scikit-learn, TensorFlow, pandas, OpenCV, PyG
Software & Tools: LaTeX, Git, MultiSim, LTSpice, Altium
Languages: English (IELTS Academic 8.5/9), Sinhala (Native)

MOOCs

· TensorFlow Advanced Techniques : 4-Course Specialization (on Coursera) Mar 2022
· MATLAB Programming for Engineers and Scientists Specialization (on Coursera) Nov 2020
· DeepLearning.AI Tensorflow Developer : 4-Course Professional Certificate (on Coursera) Sep 2020
· AI for Medical Diagnosis (on Coursera) Sep 2020
· Anatomy : 4-Course Specialization (on Coursera) Aug 2020
· Deep Learning : 5-Course Specialization (on Coursera) June 2020
· Machine Learning (on Coursera) June 2020

VOLUNTEER EXPERIENCE / LEADERSHIP

Vice President - Mathematics Society, University of Moratuwa Sep 2020 - Aug 2021
· Organized forums, intra-campus competitions, weekly quizzes and monthly tech talks.

Examiner/ Laboratory Instructor/ Translator - Sasip Institute, Sri Lanka Oct 2017 - Sep 2018
· Worked at the Sasip-Assignment-Centre which conducts mock examinations and provides laboratory facilities to conduct Physics practicals for G.C.E. Advanced Level students.

**References available upon request*