Kithmini Herath

Research Interests

Machine Learning   Computational Biology   Biological Imaging

Education

University of Moratuwa   Moratuwa, Sri Lanka
B.Sc.(Hons.) Electronic and Telecommunication Engineering   *2017 - 2022*
   GPA - 4.01/4.20 (First Class)

Research Experience

Jul 2022 – Present	**Post Baccalaureate Fellow** at **Harvard University**, USA

- Research in the field of computational imaging at the Wadduwage Lab:
  - Developing microscopy techniques through the differentiable microscopy framework
  - Developing label-free techniques for voltage imaging of neurons
- Research in the field of computational biology at the So Lab:
  - Designing differentiable algorithms for non-sequential protein structure alignment

Oct 2020 – Mar 2021	**Visiting Researcher (Student)** at **University of Sydney**, Australia

- Conducted signal processing, data analysis of Mechanomyography (MMG) signals and developed a realtime gesture prediction model for a personalized MMG sensor wearable
- Designed circuits and programmed firmware for simultaneous haptic stimulation of electrodes in tactile interfaces

Apr 2020 – May 2022	**Undergraduate Researcher** at **University of Moratuwa**, Sri Lanka

- Implemented a differentiable optical-electronic framework for phase imaging
- Conducted feature extraction of simultaneously recorded PCG and ECG signals and developed a machine learning algorithm to classify abnormal and normal heart sounds

Publications

[1] H. Arguello, J. Bacca, H. Kariyawasam, E. Vargas, M. Marquez, R. Hettiarachchi, H. Garcia, **K. Herath**, U. Haputhanthri, B. S. Ahluwalia, P. So, D. N. Wadduwage, C. U. S. Edussooriya, "Deep Optical Coding Design in Computational Imaging". To appear in *IEEE Signal Processing Magazine Special Issue on Physics-Driven Machine Learning for Computational Imaging, Jan 2023.* [link]

[2] S. S. Lin, N. M. Gamage, **K. Herath** and A. Withana "MyoSpring: 3D Printing Mechanomyographic Sensors for Subtle Finger Gesture Recognition," *International Conference on Tangible Embedded and Embodied Interaction (TEI)*, 2022, Article 15, pp.1-13, doi:10.1145/3490149.3501321 [Published]

[3] R. Hettiarachchi, U. Haputhanthri, **K. Herath**, H. Kariyawasam, S. Munasinghe, K. Wickramasinghe, D. Samarasinghe, A. C. De Silva and C. U. S. Edussooriya, "A Novel Transfer Learning Based Approach for Screening Pre-existing Heart Diseases using Synchronized ECG Signals and Heart Sounds," *IEEE International Symposium on Circuits and Systems (ISCAS)*, 2021, pp. 1-5, doi: 10.1109/ISCAS51556.2021.9401093. [Published]

Preprints:

[1] **K. Herath** , U. Haputhanthri*, R. Hettiarachchi*, H. Kariyawasam*, R. N. Ahmad, A. Ahmad, B. S. Ahluwalia, C. U. S. Edussooriya and D. Wadduwage, "Differentiable Microscopy Designs an All Optical Quantitative Phase Microscope" [Under Review][link]

[2] U. Haputhanthri, **K. Herath** R. Hettiarachchi, H. Kariyawasam, A. Ahmad, B. S. Ahluwalia, C. U. S. Edussooriya and D. Wadduwage, "From Hours to Seconds: Towards 100x Faster Quantitative Phase Imaging via Differentiable Microscopy"[link]

Pending Patents

[1] **K. Herath**⋆ , U. Haputhanthri⋆, R. Hettiarachchi⋆, H. Kariyawasam⋆, A. Ahmad, B. S. Ahluwalia, C. U. S. Edussooriya and D. Wadduwage, "Provisional Application - Harvard Ref. No. HU 8932 - F&L Ref. 098930-0366 "Differentiable Microscopy Designs an All-Optical Quantitative Phase Microscope".

Conference Presentations

[1] "Presented work on Realtime Configuration of Intelligent Reflecting Surfaces", Signal Processing Cup 2021 Finals at IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) - Jun, 2021 - (Virtual) [link]

[2] "Presented work on INTELLISCOPE: A Low-Cost AI-Powered Stethoscope for Cardiovascular Disease Management in Resource-Constrained Environments", IEEE International Symposium on Circuits and Systems (ISCAS) - COVID-19 Special SDC - Oct, 2020 - (Virtual) [Link].

[3] "Presented work on Realtime Sign Language Translation to Speech", Annual Meeting of IEEE Industry Applications Society (IAS) - Oct, 2020 - (Virtual) [Link].

Other Projects

Realtime Sign Language Translation to Speech Using a Deep Neural Network (DNN)   Jul 2019 – Dec 2019
Self-initiated Project

Designed a system to capture Electromyography (EMG) signals from both arms for real-time classification of American Sign Language gestures and convert it to speech and text using a Deep Neural Network. A DE10-Nano Field Programmable Gate Array (FPGA) board is used for high performance inferencing of the machine learning model. *For more info:* GitHub

Honors, Awards, and Competitions

Scholar - 2022 Princeton Pathways to Graduate School program	2022
Winner - IEEE Signal Processing Cup organized by ICASSP	2021
First Runner Up - CASS COVID-19 Special Student Design Competition organized by IEEE CAS	2020
Second Runner Up - IEEE IAS CMD Humanitarian Contest organized by IEEE IAS	2020
Winner - Intellihack organized by IEEE Student Chapter University of Colombo School of Computing	2019
Asia Pacific Region Iron Award - InnovateFPGA organized by Intel and Terasic	2019
DipLCM in Performance (Standard) - Honors — UWLQ Level 4 Diploma in Music Performance	
- Pianoforte Performance - London College of Music Examinations (Credential ID - 600/0639/0)	2017
Visakha Vidyalaya Susan George Pulimood Educational Trust Scholarship -	
For the best all round performance in academic & extra-curricular activities in high school	2017
Winner - Junior Nationals Squash Championship Girls Under 12 Novices	2010

Skills

Programming:	C, Python, MATLAB, SciLab
Technical Skills:	PyTorch, Tensorflow, Scikit-learn, OpenCV, Latex, Git
Other Skills:	Collaboration, Leadership, Communication, Time Management

Volunteer Experience/ Leadership

Secretary - IEEE Signal Processing Society Student Branch Chapter, University of Moratuwa	2020/2021
Volunteer - Rotaract Club and Electronic Club, University of Moratuwa	2017/2020
Junior Prefect - high school	2012/2013
Girl Guide - Sri Lanka Girl Guides Association	2009/2013
Player - Squash Pool in high school	2008/2013

References available upon request.