

LAKNATH ASHWIN DE SILVA

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Biomedical Engineering Laboratory, University of Moratuwa
Bandaranayake Mawatha, Moratuwa 10400, Sri Lanka

RESEARCH INTERESTS

- machine learning
- signal processing
- computer vision
- information theory
- convex optimization
- computational neuroscience

EDUCATION

University of Moratuwa, Sri Lanka

Jan 2016 - Feb 2020

B.Sc Engineering (Hons) specialized in Biomedical Engineering

Department of Electronics and Telecommunication Engineering

First Class Honors with a GPA of 4.09 (Out of 4.20) - Included in Dean's Honors List in all 8 consecutive semesters

Class Rank : 1st among 117 students (Gold Medalist), Faculty Rank : 1st among 948 students

Richmond College, Galle, Sri Lanka

Aug 2014

G.C.E Advanced Level Examination

High Distinctions for Combined Mathematics, Chemistry, Physics and General English

District Rank : 1, National Rank : 10 (out of ~ 35, 000 candidates)

PUBLICATIONS

Preprints

- M. V. Perera*, **A. De Silva***. (2020). "A Joint Convolutional and Spatial Quad-Directional LSTM Network for Phase Unwrapping". *46th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Under Review. [\[paper\]](#)
- **A. De Silva***, M. V. Perera*, N. Wijethilake, S. Jayasinghe, N. Dayananda, and A.C. De Silva. (2020). "A Thickness Sensitive Vessel Extraction Framework for Retinal and Conjunctival Vascular Tortuosity Analysis". *Transactions on Biomedical Engineering*, Under Review. [\[paper\]](#)

Peer-Reviewed Conference Papers

- **A. De Silva***, M. V. Perera*, K. Wickramasinghe, A. M. Naim, T. D. Lalitharatne, S. L. Kappel. (2020). "Real-Time Hand Gesture Recognition Using Temporal Muscle Activation Maps of Multi-Channel sEMG Signals". In *Proceedings of 45th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 1299-1303. [\[paper\]](#)
- A. M. Naim, K. Wickramasinghe, **A. De Silva**, M. V. Perera, T. Dulantha Lalitharatne, and S. L. Kappel. (2020). "Low-Cost Active Dry-Contact Surface EMG Sensor for Bionic Arms". In *Proceedings of IEEE International Conference on Systems, Man and Cybernetics (SMC)*, [\[paper\]](#).

Theses

- **A. De Silva***, M. V. Perera*, K. Wickramasinghe*, A. M. Naim*. (2020). "Designing a Cost-Effective Dry Contact sEMG Sensor System for Controlling a Bionic Hand". *Undergraduate Graduation Project Report, University of Moratuwa*, Grade : 4.20/4.20. [\[thesis\]](#)

Note : * denotes joint lead authors.

RESEARCH EXPERIENCE

University of Moratuwa, Sri Lanka.

Feb 2020 - Present

Biomedical Engineering Laboratory, Dept. of Electronic & Telecom. Engineering

Graduate Researcher

Research Projects

- Developing a Graph Neural Network (GNN) based real-time hand gesture classification algorithm using forearm multi-channel sEMG signals. *objective*: Exploring the possibilities of employing GNNs to exploit the inter-channel correlations in multi-channel signals (Advisor : Dr. Chamira Edussooriya)[on-going]
- Developing deep learning methods for rodent behavior classification (Advisor : Dr. Ranga Rodrigo) [on-going]
- Developed a novel Vessel Extraction Framework featuring a Fully Convolutional Network paired with a Hessian based multi-scale vessel enhancement technique. This work addressed the lack of robust algorithms that can effectively segment conjunctival vessels from eye images. *objective*: Developing technology to facilitate large-scale patient screening for diabetes. (Advisors : Dr. Anjula De Silva, Dr. Nuwan Dayananda, Prof. Saroj Jayasinghe)

University of Moratuwa, Sri Lanka.

Feb 2019 - Feb 2020

Bionics Laboratory, Dept. of Mechanical Engineering

Undergraduate

Advisors : Dr. Simon Kappel, Dr. Thilina Lalitharatne

Final Year Project : *Designing a Cost-Effective Dry Contact sEMG Sensor System for Controlling a Bionic Hand*

- Designed and developed cost effective sEMG sensors and acquisition circuitry, formulated forearm sEMG pattern recognition algorithms to predict hand gestures, and interfaced the sensors and recognition algorithms with a bionic hand. *objective:* Developing technologies to address the increased demand for affordable arm prostheses.

Florey Institute of Neuroscience, Melbourne, Australia

Jun - Dec 2018

Ion Channels and Human Diseases Laboratory

Research Assistant

Advisors : Prof. Steven Petrou, Prof. Saman Halgamuge

Research Internship

- Developed MEALearn, a software that can process 64-channel Multi-Electrode Array (MEA) signals acquired from in-vitro neuronal networks, extract robust interpretable features, classify these networks based on the Sodium ion channel mutation they contain, and visualize the mutation-clusters in the latent feature space.
- Developed MEACON, a software aimed at determining whether the ion channel mutations cause changes to the connectivity patterns of in-vitro neuronal networks by modeling them as time varying graphs based on high density 120-channel MEA signals.

Center for Advanced Imaging, University of Queensland, Australia

Aug - Nov 2018

Barth Group

Research Assistant

Advisor : Dr. Steffen Bollmann

Summer Internship

- Formulated a joint convolutional and spatial quad-directional Long Short-Term Memory network architecture to unwrap the noisy wrapped phase images. *objective:* Developing deep learning methods to solve the phase unwrapping problem prevalent in Quantity Susceptibility Mapping using MRI.

Florey Institute of Neuroscience, Melbourne, Australia

Jun - Dec 2017

Ion Channels and Human Diseases Laboratory

Software Engineering Intern

Advisor : Prof. Steven Petrou, Ms. Claire Cuddy

Summer Internship

- Developed software to visualize MEA spike trains and perform time series analysis of MEA parameters

SELECTED AWARDS AND HONORS**Gold Medal sponsored by Technomedics International Pvt Ltd**

2020

- For the *highest* overall academic performance in the Biomedical Engineering Stream (University of Moratuwa)

National Finalist at the Migara Ranatunga Awards

2020

- Awarded by Institution of Engineers, Sri Lanka (IESL) for the *best* performance in the research internship

World Finalists at the IEEE ComSoc Student Competition

2019

- Ranked among *the top 15 in the world*, Received an Honorable Mention

Merit Award at SLAAS Awards

2020

- Awarded by Sri Lanka Association for the Advancement of Science for the *best undergraduate project of Sri Lanka*

National Finalists at the Sri Lankan IoT Challenge

2019

- Ranked among *the top 10 in the country*, Received an Honorable Mention

Runners-Up at the the National Inter-University Statistics Quiz Competition

2018

- Organized by University of Sri Jayawardenapura, Sri Lanka

Dialog Merit Scholarship for Engineering Undergraduates

2016

- Awarded by Dialog Axiata PLC for the students who excelled at the university entrance examinations

Mahapola Merit Scholarship for Engineering Undergraduates

2016

- Awarded by the Government of Sri Lanka for the students who excelled at the university entrance examinations

Darrel Medal

2014

- Awarded to the *most outstanding student* of Richmond College

TEACHING**Junior Lecturer**

- BM4111 - Medical Electronics and Instrumentation (conducting the ECG lab classes) *UoM Fall 2020*
- EN2030 - Laboratory Practice II (conducting analog electronics lab classes) *UoM Spring 2020*
- EN3030 - Circuits and Systems Design (conducting the lab classes) *UoM Spring 2020*
- BM2101 - Analysis of Physiological Systems (teaching & preparing neuro-modeling assignments) *UoM Fall 2020*

- BM2011 - Human Anatomy and Physiology (conducting lab classes & preparing assignments) *UoM Fall 2020*
- Visiting Lecturer**
- Workshop on MATLAB for Signal/Image Processing, *IET, Sri Lanka Spring 2020*
Communications Systems and Electronics (teaching & preparing course material)
- Visiting Instructor**
- EN1093 - Laboratory Practice I (conducting signals and systems lab classes) *UoM Fall 2019*
 - DE2410 - Astronomy and Cosmology (conducting observation sessions) *UoM Spring 2018*

PARTICIPATED WORKSHOPS

- Neuromatch Academy (Observer Track) *2020*
- Graph Filters with Applications to Distributed Optimization and Neural Networks, ICASSP'20 *2020*
- Graph Neural Networks, ICASSP'20 *2020*
- Biomedical Image Reconstruction—From Foundations to Deep Neural Networks, ICASSP'20 *2020*
- Neural Computational Modelling Workshop, University of Melbourne *2018*
- Advanced Magnetic Resonance Imaging Workshop, University of Melbourne *2018*
- QSM Workshop, 1st OHBM Australia Chapter Symposium *2018*

TECHNICAL SKILLS AND COMPETENCIES

Programming Languages	Python, C/C++, Verilog
Libraries	Tensorflow, Keras, PyTorch, ITK/VTK, Neuron, Nengo
Software Tools	L ^A T _E X, MATLAB, Quartus, Multisim, AutoCAD, Altium, Solidworks
Operating Systems	MacOS, Linux, Windows
Hardware	STM32 Family, Atmel AVR, Altera DE2, Raspberry Pi

SELECTED COURSE PROJECTS

Bachelors Projects

- De-noising Diffusion MRI using non-local means algorithm in the joint X-Q space *2019*
- Designing and Manufacturing a Finger-Tip Pulse Sensor *2019*
- Simulating Wave-functions within Various Potential Wells using Schrodinger's Wave Equation *2019*
- Custom Processor Implemented on FPGA for Image Down-sampling *2018*

SERVICES AND LEADERSHIP

IEEE Engineering in Medicine and Biology Student Branch Chapter at UoM *2016-2020*

Chairperson 2019/20

Vice Chairperson 2018/19, 2017/18

- Received the *Most Outstanding EMB Student Branch Chapter Regional Award* for the term 2019/20
- Received the *IEEE Darrel Chong Award (Silver Category)* for Brainstorm 2019
- Organizing Committee Member, Brainstorm BME Design Competition 2018 & 2019
- Project Chair, TechMedImpact Forum 2017 - Sri Lanka's first ever BME Conference
- Organizing Committee Member, "Hack Your Thoughts" Brain-Computer Interfaces Workshop at MerCON 2018

OUTREACH

Volunteering

2016 - 2019

- Organized and conducted recreational astronomy observation sessions for several local communities including a group of autistic children and their parents
- Conducted "Akurata Mali Nowemu", a high school ordinary level mathematics workshop for a under-privileged school in Southern Sri Lanka
- Organized workshops in Central Sri Lanka to promote robotics among school girls

Richmond to University (R2U)

2018-Present

Co-Founder

- Formed R2U with the intention of organizing motivation and career guidance programs for the advanced level students of Richmond College

PERSONAL INFORMATION

Full Name

Laknath Ashwin De Silva Kariyawasam Gonapinuwalla Gamage

Professional Memberships

IEEE SPS, IEEE EMBS, IEEE ComSoc

Interests and Skills

Music (Piano), Public Speaking, Travelling, Astronomy