Laknath Ashwin De Silva

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I am a second-year PhD student in the Department of Biomedical Engineering at Johns Hopkins University where I am fortunate to be advised by Dr. Joshua Vogelstein, Dr. Pratik Chaudhari (UPenn), and Dr. Carey E. Priebe (JHU). I broadly work on machine learning, with an aspiration to strive towards reducing the gap between machine and natural intelligences. My doctoral research is currently focused on out-of-distribution (OOD) generalization, robustness to distribution shifts, and domain adaptation. Additionally, I am interested in causal inference, generative modeling, cognitive neuroscience, and biomedical data science. In the past, I have worked on a number of computer vision and signal processing problems.

Education

2021–present	**Doctor of Philosophy, Biomedical Engineering**, *Johns Hopkins University*, MD, USA.
	Highlighted Courses: Statistical Pattern Recognition, Probability Theory, Statistical Theory, Brain, Mind, and Behavior, Probabilistic Models of Visual Cortex, Theoretical and Computational Neuroscience
CGPA :	4.00/4.00
2016–2020 :	**Bachelor of Science, Biomedical Engineering**, *University of Moratuwa*, Sri Lanka.
	Class Rank : 1 out of 117, Faculty Rank : 1 out of 948, Included in Dean's Honors List in all 8 consecutive semesters.
	Highlighted Courses: Real Analysis, Calculus, Differential Equations, Linear Algebra, Signals and Systems, Machine Vision, Digital Signal Processing, Data Structures & Algorithms
CGPA :	4.09/4.20 (First Class Honors)

Work Experience

2019-2021	**Junior Lecturer**, *Department of Electronic and Telecommunication Engineering*, University of Moratuwa, Sri Lanka.
2018	**Research Intern**, *Center for Advanced Imaging*, University of Queensland, Australia.
2017,2018	**Research Intern**, *Florey Institute of Neuroscience & Mental Health*, University of Melbourne, Australia.

Publications

In Conference Proceedings

2022 Mohamed Afham, Udith Haputhanthri, Jathurshan Pradeepkumar, Mithunjha Anandakumar, **Ashwin De Silva**, and Chamira US Edussooriya. Towards accurate cross-domain in-bed human pose estimation. In *ICASSP 2022-2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 2664–2668. IEEE, 2022.

2021 Malsha V Perera and **Ashwin De Silva**. A joint convolutional and spatial quad-directional lstm network for phase unwrapping. In *ICASSP 2021-2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 4055–4059. IEEE, 2021.

2020 **Ashwin De Silva**, Malsha V Perera, Kithmin Wickramasinghe, Asma M Naim, Thilina Dulantha Lalitharatne, and Simon L Kappel. Real-time hand gesture recognition using temporal muscle activation maps of multi-channel semg signals. In *ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 1299–1303. IEEE, 2020.

2020 Asma M Naim, Kithmin Wickramasinghe, **Ashwin De Silva**, Malsha V Perera, Thilina Dulantha Lalitharatne, and Simon L Kappel. Low-cost active dry-contact surface emg sensor for bionic arms. In *2020 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, pages 3327–3332. IEEE, 2020.

Workshop Papers

2022 **Ashwin De Silva**, Rahul Ramesh, Carey E. Priebe, Pratik Chaudhari, and Joshua T. Vogelstein. The value of out-of-distribution data. *ECCV Workshop on Out-of-distribution Generalization in Computer Vision*, 2022.

For exhaustive lists of courses and research works, please visit: list of courses, list of research works

2022 **Ashwin De Silva**, Rahul Ramesh, Carey E. Priebe, Pratik Chaudhari, and Joshua T. Vogelstein. The value of out-of-distribution data. *NeurIPS 2022 Workshop on Distribution Shifts (DistShift)*, 2022.

Preprints

2022 **Ashwin De Silva**, Rahul Ramesh, Carey E. Priebe, Pratik Chaudhari, and Joshua T. Vogelstein. The value of out-of-distribution data. *arXiv preprint arXiv:2208.10967*, 2022.

2022 Jayanta Dey, Will LeVine, **Ashwin De Silva**, Ali Geisa, Jong M Shin, Haoyin Xu, Tiffany Chu, Leyla Isik, and Joshua T Vogelstein. Deep discriminative to kernel generative modeling. *arXiv preprint arXiv:2201.13001*, 2022.

2021 **Ashwin De Silva**, Malsha V Perera, Navodini Wijethilake, Saroj Jayasinghe, Nuwan D Nanayakkara, and Anjula De Silva. A thickness sensitive vessel extraction framework for retinal and conjunctival vascular tortuosity analysis. *arXiv preprint arXiv:2101.00435*, 2021.

Theses

2020 **Ashwin De Silva**, Malsha V Perera, Kithmin Wickramasinghe, Asma M Naim, Thilina Dulantha Lalitharatne, and Simon L Kappel. Designing a cost-effective dry contact semg sensor system for controlling a bionic hand. 2020.

Academic Achievements & Recognitions

2022 **Best Paper Award** ECCV 2022 Workshop on Out-of-distribution Generalization in Computer Vision, Tel Aviv, Israel

2021 **2nd Runners-up of the IEEE Video and Image Processing Cup** awarded at the International Conference on Image Processing (ICIP) 2021, Anchorage, Alaska, USA

2020 **Prof. Pathuwathawithana Memorial Prize** for attaining the *highest* GPA at the Faculty of Engineering, University of Moratuwa, Sri Lanka

2020 **Gold Medal sponsored by Technomedics International Pvt Ltd** for the *highest* overall academic performance in the Biomedical Engineering Stream (University of Moratuwa)

2020 **National Finalists at the Migara Ranatunga Awards** awarded by Institution of Engineers, Sri Lanka (IESL) for the *best* performance in the research internship

2019 **World Finalists at the IEEE ComSoc Student Competition** ranked among *the top 15 in the world*, received an Honorable Mention

2019 **Merit Award at SLAAS Awards** awarded by Sri Lanka Association for the Advancement of Science (SLAAS) for the *best undergraduate* project in the country

2019 **National Finalists at the Sri Lankan IoT Challenge** ranked among *the top 10 in the country*, received an Honorable Mention

2019 **Runners-Up at the the National Inter-University Statistics Quiz Competition** Organized by University of Sri Jayawardenapura, Sri Lanka

2016 **Dialog Merit Scholarship for Engineering Undergraduates** awarded by Dialog Axiata PLC for the students who excelled at the university entrance examinations at the national level (country rank: 10 out of $\sim$ 35,000 in the physical science stream)

2016 **Mahapola Merit Scholarship for Engineering Undergraduates** awarded by the Government of Sri Lanka for the students who excelled at the university entrance examinations

2015 **Darrel Medal** awarded by Richmond College, Sri Lanka for the most outstanding advanced level student.

Selected Teaching Experience

Teaching Assistant

2021 Fall: **EN 1060: Signals and Systems**, UoM, Sri Lanka.

2020 Fall: **EN 2030: Laboratory Practice II**, UoM, Sri Lanka.

2020 Spring: **EN 3030: Circuits and Systems Design**, UoM, Sri Lanka.

2020 Spring: **BM 4111: Medical Electronics and Instrumentation**, UoM, Sri Lanka.

2020 Fall: **BM 2101: Analysis of Physiological Systems**, UoM, Sri Lanka.

2020 Fall: **BM 2011: Human Anatomy and Physiology**, UoM, Sri Lanka.

2019 Fall: **EN 1093: Laboratory Practice I**, UoM, Sri Lanka.

2018 Spring: **DE 2410: Astronomy and Cosmology**, UoM, Sri Lanka.

Visiting Lecturer

2020 Spring: **Workshop on MATLAB for signal/image processing, communication systems, and electronics**, Institute of Engineering Technology, Sri Lanka.

Technical skills

Programming Languages: Python, MATLAB, C/C++, Verilog HDL, LATEX

Frameworks: PyTorch, PyG (PyTorch Geometric), Tensoflow, Keras, scikit-learn, ITK/VTK

Software: Quartus, Multisim, AutoCAD, Altium, Solidworks

Hardware: STM32 Family, Atmel AVR, Altera DE2, Raspberry Pi, Arduino

Selected Talks

Oct. 2022 *The Value of Out-of-distribution Data*, ECCV 2022 workshop on Out-of-distribution Generalization in Computer Vision, Tel Aviv, Israel

Sep. 2022 Critique on *Invertible Neural Networks for Graph Predictions*, Theorinet Retreat, Simons Foundation, NY, USA

Jun. 2021 *A Joint Convolutional and Spatial Quad-Directional LSTM Network for Phase Unwrapping*, 46th International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Toronto, Canada

Jun. 2020 *Real-time hand gesture recognition using temporal muscle activation maps of multi-channel sEMG signals*, 45th International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Barcelona, Spain

Selected Poster Presentations

Dec. 2022 *The Value of Out-of-distribution Data*, NeurIPS 2022 workshop on distribution shifts (DistShift), New Orleans, LA, USA

Apr. 2022 *Kernel Density Networks*, From Neuroscience to Artificially Intelligent Systems (NAISys), Cold Spring Harbor Laboratory, NY, USA

Jun. 2021 *A Joint Convolutional and Spatial Quad-Directional LSTM Network for Phase Unwrapping*, 46th International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Toronto, Canada

Professional Activities

Organizing

2021 *IEEE EMBS International Student Conference*, Moratuwa, Sri Lanka

2018 *Workshop on Brain Computer Interfaces*, MerCon 2018, Moratuwa, Sri Lanka

2017 *TechMedImpact Forum*, Sri Lanka

Reviewing (Conferences)

2021 *IEEE EMBS International Student Conference*, Moratuwa, Sri Lanka

2021 *MerCon 2021*, Moratuwa, Sri Lanka

Services and Leadership

2018-Present **Richmond to University (R2U) Foundation**, *Co-Founder*.
- An alumni-run organization aimed at organizing career guidance programs for the students of Richmond College, Sri Lanka

2016-2020 **IEEE Engineering in Medicine and Biology Student Branch Chapter, University of Moratuwa**, *Chairperson 2019/20, Vice Chairperson 2018/19, 2017/18*.
- Received the *Most Outstanding EMB Student Branch Chapter Regional Award* for the term 2019/20 (Asia-Pacific region)
- Received the *IEEE Darrel Chong Award (Silver Category)* for the term 2019/20

2016-2017 **Mathematics Society, University of Moratuwa**, *Assistant Secretary 2016/17*.