

# Ashwin De Silva

Ph.D. candidate in Biomedical Engineering with expertise in statistical machine learning and deep learning, focused on developing theory and robust methods for out-of-distribution generalization and continual learning. Passionate about bridging artificial and natural intelligence. My work spans applications in large language models, biomedical data, and computer vision.

## Education

- 2021–present **Ph.D., Biomedical Engineering, Johns Hopkins University, MD, USA.**  
*Highlighted Courses:* Probability Theory, Statistical Theory, High-Dimensional Approximation, Machine Learning, Optimal Transport, Probabilistic Models of Visual Cortex, Neuroscience and Cognition, Computational Molecular Medicine, Compressed Sensing & Sparse Recovery  
CGPA : 3.97/4.00
- 2021–2024 **M.S.E., Applied Mathematics and Statistics, Johns Hopkins University, MD, USA.**  
*Focus Area:* Statistics and Statistical Learning  
CGPA : 3.97/4.00
- 2016–2020 : **B.Sc., 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 every semester.  
*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)

## Research Experience

- Summer 2025 **Amazon (AWS AI), Santa Clara, CA, Applied Scientist Intern.**  
Memory management for multi-turn tool-using agents
- Summer 2024 **Amazon (AWS AI), Santa Clara, CA, Applied Scientist Intern.**  
Developed large language models (LLMs) based on state-space models (SSMs) to perform code generation and constrained generation
- 2021–Present **Johns Hopkins University, Baltimore, MD, Graduate Research Assistant.**  
Building theory and methods for learning from non-stationary and out-of-distribution data, with applications in large language models, computer vision, and biomedical data science
- 2019–2021 **University of Moratuwa, Sri Lanka, Junior Lecturer.**  
Developed deep learning models for various problems including retinal vascular segmentation, surface EMG based hand gesture recognition, human pose estimation, and phase unwrapping
- 2018 **Center for Advanced Imaging, University of Queensland, Australia, Research Intern.**  
Developed convolutional neural networks (CNNs) to solve the inverse problem of phase unwrapping
- 2017,2018 **The Florey Institute of Neuroscience, University of Melbourne, Australia, Research Intern.**  
Developed machine learning and signal processing algorithms for characterizing epileptogenic mutations based on multi-electrode array (MEA) recordings acquired from in-vitro neuronal networks.

## Selected Publications

- 2025 Jayanta Dey, Haoyin Xu, **Ashwin De Silva**, and Joshua T Vogelstein. Simple calibration via geodesic kernels. *Transactions on Machine Learning Research*, 2025. [\[pdf\]](#).
- 2025 Yuxin Bai, Cecelia Shuai, **Ashwin De Silva**, Siyu Yu, Pratik Chaudhari, and Joshua Vogelstein. Prospective learning in retrospect. *Artificial General Intelligence (AGI)*, 2025.
- 2024 **Ashwin De Silva**, Rahul Ramesh, Rubing Yang, Pratik Chaudhari, and Joshua T. Vogelstein. Prospective learning: Learning for a dynamic future. *Neural Information Processing Systems (NeurIPS)*, 2024. [\[pdf\]](#).
- 2024 Hayden Helm, **Ashwin De Silva**, Joshua T. Vogelstein, Carey E. Priebe, and Weiwei Yang. Approximately optimal domain adaptation with fisher's linear discriminant. *Mathematics*, volume 12, 2024.

- 2023 **Ashwin De Silva**, Rahul Ramesh, Carey E. Priebe, Pratik Chaudhari, and Joshua T. Vogelstein. The value of out-of-distribution data. *International Conference on Machine Learning (ICML)*, 2023. [\[pdf\]](#).
- 2023 **Ashwin De Silva**, Rahul Ramesh, Pratik Chaudhari, and Joshua T. Vogelstein. Prospective learning: Principled exploration to the future. *Conference on Lifelong Learning Agents (CoLLAs)*, 2023. [\[pdf\]](#).
- 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. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022. [\[pdf\]](#).
- 2021 Malsha V Perera and **Ashwin De Silva**. A joint convolutional and spatial quad-directional lstm network for phase unwrapping. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021. [\[pdf\]](#).
- 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. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2020. [\[pdf\]](#).
- 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. *IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 2020. [\[pdf\]](#).
- [Preprints](#)
- 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. 2021. [\[pdf\]](#).

## Academic Achievements & Recognitions

- 2025 **Member, Alpha Eta Mu Beta (AEMB) – National Biomedical Engineering Honor Society** Invited for membership in recognition of academic excellence, ranking in the top third of the Biomedical Engineering PhD class.
- 2024 **MINDS Fellowship** selected as a fellow of the Mathematical Institute of Data Science, Johns Hopkins University
- 2023 **Johns Hopkins School of Medicine Student Spotlight** for research and academic accomplishments
- 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 ~ 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.

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## Selected Teaching Experience

### Teaching Assistant

2025 Fall: **EN.580.697 Biomedical Data Design**, JHU, USA..

### Junior Lecturer

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.

### Visiting Lecturer

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

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## Reviewing Activities

**Reviewer** NeurIPS 2025, Conference on Language Models (COLM) 2025, Moratuwa Engineering Research Conference (MERCon) 2024

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## Technical skills

*Programming Languages:* Python, MATLAB, C/C++, Verilog HDL,  $\text{\LaTeX}$

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

*Software:* Quartus, Multisim, AutoCAD, Altium, Solidworks

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

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## Selected Talks

Dec. 2024 *Prospective Learning*, Center for Imaging Science (CIS) Retreat, Johns Hopkins University, MD, USA

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

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

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## Selected Poster Presentations

Apr. 2025 *Prospective Learning: Learning for a Dynamic Future*, Johns Hopkins Data Science and AI Institute Spring 2025 Symposium, Baltimore, MD, USA

Dec. 2024 *Prospective Learning: Learning for a Dynamic Future*, NeurIPS 2024 workshop on NeurIPS Workshop on NeuroAI: Fusing Neuroscience and AI for Intelligent Solutions, Vancouver, Canada

Sept. 2024 *Prospective Learning*, Mathematical and Scientific Foundations of Deep Learning Annual Meeting (MoDL), Simons Foundation, NY, USA

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

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## 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.*