

Udith Haputhanthri

uh2753@princeton.edu
<https://udithhaputhanthri.github.io/>

RESEARCH INTERESTS	Natural and Artificial Intelligence, Computational Cognitive Science, Computational Neuroscience, Neuromorphic Computing, Machine Learning, Computational Imaging
RESEARCH EXPERIENCE	<ul style="list-style-type: none">• Graduate Researcher, Department of Electrical and Computer Engineering, Princeton University, United States Advisor: Dr. Jonathan D. Cohen Aug 2024 – Present• Visiting Student Researcher, Department of Biology, Stanford University, United States Advisors: Dr. Mark Schnitzer (Award: \$50,000/ year) Jan 2024 – June 2024• Post-Baccalaureate Fellow, Faculty of Arts and Sciences, Harvard University, United States Advisors: Dr. Dushan Wadduwage, Dr. Hidenori Tanaka (Award: \$50,000/ year) July 2022 – Dec 2023• Visiting Undergraduate Research Fellow (Remote), Faculty of Arts and Sciences, Harvard University, United States Advisors: Dr. Dushan Wadduwage May 2021 – June 2022
EDUCATION	<p>Ph.D. in Electrical and Computer Engineering, Princeton University, United States Aug 2024 – Present</p> <p>B.Sc. Eng (Hons.) in Biomedical Engineering, Department of Electronic & Telecommunication Engineering, University of Moratuwa, Sri Lanka Oct 2017 – Dec 2022</p> <ul style="list-style-type: none">• First Class Honours Degree (cGPA : 4.00/ 4.20)
PUBLICATIONS	<ol style="list-style-type: none">1. U Haputhanthri*, L Storan*, Y Jiang*, A Shai, H Akengin, M Schnitzer[†], F Dinc[†], H Tanaka[†], "Why do recurrent neural networks suddenly learn? Bifurcation mechanisms in neuro-inspired short-term memory tasks," <i>Mechanistic Interpretability Workshop ICML 2024</i>. (view publication)2. U Haputhanthri*, L Storan*, A Shai*, S Ganguli, M Schnitzer, H Tanaka[†], F Dinc[†], "Enhanced associative memory in temporally consistent recurrent neural networks," <i>AMHN Workshop NeurIPS 2023</i>. (view publication)3. U Haputhanthri, K Herath, R Hettiarachchi, H Kariyawasam, A Ahmad, B S Ahluwalia, C Edussooriya, and D N Wadduwage, "Towards Ultrafast Quantitative Phase Imaging via Differentiable Microscopy," <i>BOE</i>, 2023. (view publication)4. M Afham*, U Haputhanthri*, J Pradeepkumar*, M Anandakumar, A De Silva, and C Edussooriya, "Towards Accurate Cross-Domain In-Bed Human Pose Estimation," <i>International Conference on Acoustics, Speech, & Signal Processing</i>, 2022. (view publication)5. H Arguello, J Bacca, H Kariyawasam, E Vargas, M Marquez, H Garcia, R Hettiarachchi, K Herath, U Haputhanthri, B S Ahluwalia, P So, D N Wadduwage, and C Edussooriya, "Deep Optical Coding Design in Computational Imaging," <i>IEEE Signal Processing Magazine</i>, 2022. (view publication)6. S Herath and U Haputhanthri, "Topologically Optimal Design and Failure Prediction using Conditional Generative Adversarial Networks," <i>International Journal for Numerical Methods in Engineering</i>, 2021. (view publication)7. R Hettiarachchi, U Haputhanthri, K Herath, H Kariyawasam, S Munasinghe, K Wickramasinghe, D Samarasinghe, A De Silva, and C Edussooriya, "A Novel Transfer Learning-Based Approach for Screening Pre-existing Heart Diseases Using Synchronized ECG and PCG Signals," <i>ISCAS 2021 - 2021 IEEE International Symposium on Circuits and Systems</i>, 2021. (view publication)

	8. S Herath and U Haputhanthri , “Nonlinear Multiscale Modelling and Design using Gaussian Processes,” <i>Journal of Applied and Computational Mechanics</i> , 2021. (view publication)
PATENT APPLICATIONS	<ol style="list-style-type: none"> 1. D N Wadduwage, U Haputhanthri, H Kariyawasam, “Optical Transformers,” Provisional Application - Harvard Case No.: HU 9391 - Apl. Serial Nos.: 63/456,416 & PCT/US24/22258, 2023. 2. K Herath*, U Haputhanthri*, R Hettiarachchi*, H Kariyawasam*, A Ahmad, B S Ahluwalia, C Edussooriya, and D N Wadduwage, “Differentiable Microscopy Designs an All-Optical Quantitative Phase Microscope,” Provisional Application - Harvard Ref. No. HU 8932 - F&L Ref. 098930-0366, 2022.
PREPRINTS	<ol style="list-style-type: none"> 1. U Haputhanthri*, L Storan*, Y Jiang*, T Raheja, A Shai, O Akengin, N Miolane, M Schnitzer, F Dinc[†], H Tanaka[†], “Understanding and controlling the geometry of memory organization in RNNs,” 2025. (in preparation for journal publication) 2. U Haputhanthri, H Kariyawasam, and D N Wadduwage, “Differentiable Microscopy ($\partial\mu$) as a Generalized Paradigm of Optics and Optical System Design,” 2024. (in preparation for journal publication) 3. K Herath, U Haputhanthri*, R Hettiarachchi*, H Kariyawasam*, R N Ahmad, A Ahmad, B S Ahluwalia, C Edussooriya, and D N Wadduwage, “Differentiable Microscopy Designs an All-Optical Quantitative Phase Microscope,” <i>Nature Machine Intelligence</i>, 2024. (under review)
ONGOING PROJECTS	<ul style="list-style-type: none"> • F Dinc, U Haputhanthri, H Tanaka, M Schnitzer (no specific author order), “Large-scale neural modeling via convex optimization methods,” 2024.
HONORS AND AWARDS	<ul style="list-style-type: none"> • 3rd place (International rank) - Video and Image Processing Cup (VIP Cup) 2021 (Computer Vision Competition) • 2nd place (National rank) - Datastorm 1.0V 2020 (Data Science Competition) • 1st place (National rank) - Intellihack 2019 (Machine Learning Competition) • Ceylinco Life - Pranama Scholarship (National award) 2017 for best academic performance in the GCE Advanced Level (University Entrance) examination. • Mahapola Merit Scholarship (National award) for best academic performances in the GCE Advanced Level (University Entrance) examination. • Best All-Rounder of the Year 2017, Dharmaraja College, Sri Lanka for excellence in both academic and extra-curricular activities. • Award for highest Z-score (2.7069) of the Year 2016 for GCE Advanced Level Examination (University Entrance), Dharmaraja College, Sri Lanka (out of ~ 400 candidates). • Dagoba Award for Chess - The highest color for a sport/ game (Chess) one can obtain as a student of Dharmaraja College, Sri Lanka. Awarded based on national-level championships in the years 2012, 2013, and 2014.
SELECTED INVITED/ CONFERENCE TALKS	<ul style="list-style-type: none"> • “Differentiable Microscopy ($\partial\mu$) as a Generalized Paradigm of Optics and Optical System Design,” <i>Optica Biophotonics Congress: Optics in the Life Sciences 2023</i>, Canada (invited) April 2023 • “From Hours to Seconds: Towards 100x Faster Quantitative Phase Imaging via Differentiable Microscopy,” <i>Quantitative Phase Imaging IX</i>, SPIE Photonics West 2023, United States Jan 2023 • “Differentiable Microscopy for Content and Task Aware Compressive Fluorescence Imaging,” <i>High-Speed Biomedical Imaging and Spectroscopy VIII</i>, SPIE Photonics West 2023, United States Jan 2023

- “Machine Learning in Action,” Informatics Institute of Technology, Sri Lanka Jan 2022
 - “Differentiable DEEP TFM,” Rowland Summer Student Seminar, Rowland Institute at Harvard University, United States Aug 2021
-

VOLUNTEER/
OUTREACH
ACTIVITIES

- **Teaching Assistant** (volunteer), Department of Electronic and Telecommunication Engineering, University of Moratuwa, Sri Lanka (EN2550 - Fundamentals of Image Processing and Machine Vision, EN3900 - Seminar (Geometric Deep Learning, Signal Processing on Graphs)).
- **Reviewer** (CVPR 2022, ECCV 2022)
- **Outreach Activities:** "Soyuru Sathkara"- a high school ordinary-level workshop series that aimed to improve the quality of education in rural villages, Mentored a team of undergraduate students toward the MICCAI 2021 competition.