L. THARINDU NIRMAL WICKREMASINGHE

webpage tharindu.ncr@gmail.com +1 765 7019348 Profiles Documentation

A PhD student image and video enhancement. I work in the intersection of generative AI, image/video restoration, and computational imaging.

Research Interests:

Computational Imaging | Vision Language Models | Physically consistent restoration | Generative AI

EDUCATION

Purdue University, USA **GPA: 4.00/4.00** *2024-present*
PhD student at the Intelligent Imaging Lab, Electrical & Computer Engineering, Purdue.

University of Moratuwa, Sri Lanka **GPA: 4.16/4.20**(First Class Hons.) *2018-2023*
B.Sc.Engineering(Hons.) Dean's List in all Semesters 1,2,3,4,5,6,7,8
Electronics and Telecommunications rank **1**/118, Gold medal from the department
Faculty of Engineering rank **1**/980, Gold medal from the faculty

Nalanda College, Sri Lanka-Physical Science *Graduated: 2018*
G.C.E. Advanced Level 2017 (Physical Sciences) 4As/Country rank: 24 /Z-score: 2.4985 (top 0.5%)
(National university entrance examination taken approx. 270,000 students)

G.C.E. Ordinary Level 2014 9As/Country rank: **1**
(National exam taken by approx. 290,000 highschool students)

CIMA-Chartered Institute of Management Accounting: Diploma in Accounting *2017-2018*

EXPERIENCE

Graduate Teaching/Research Assistant- Purdue University, USA *Aug 2024 - Present*
Junior Lecturer- University of Moratuwa, Sri Lanka *Dec 2023 - 2024*
Visiting Instructor- University of Moratuwa, Sri Lanka *2022-2023*
Technical Consultant- IQ labs, Sri Lanka *Fall 2023*
Remote Undergraduate Researcher- Centre for Advanced Imaging, Harvard University *2022-2023*
Research Intern-School of Computing, University of Sydney, Australia *2021-2022*

GRADUATE RESEARCH AND PUBLICATIONS

FlowSteer: Text-to-Video Generation via Neural Newtonian Dynamics Apr 2025 - Nov 2025
Physics-Consistent and Controllable Text-to-Video Generation *Project page*-

- Pioneered a zero-shot framework for flow-models across multiple image restoration tasks. Produced images with high pixel-level fidelity, while also achieving high perceptual quality.
- **Tharindu Wickremasinghe**, Chenyang Qi, Harshana Weligampola, Zhengzhong Tu, Stanley H. Chan. FlowSteer: Conditioning Flow Field for Consistent Image Restoration(arxiv)

NewtonGen: Text-to-Video Generation via Neural Newtonian Dynamics May 2025 - Oct 2025
Physics-Consistent and Controllable Text-to-Video Generation *Project page*-

- Developed a physics-consistent and controllable text-to-video framework that explicitly incorporates learnable dynamics. Innovated novel metrics to monitor the Newtonian dynamics of the subject with different motions.
- Yu Yuan, Xijun Wang, **Tharindu Wickremasinghe**, Zeeshan Nadir, Bole Ma, Stanley H. Chan. NewtonGen: Physics-Consistent and Controllable Text-to-Video Generation via Neural Newtonian Dynamics. (arxiv)

SeeU: Seeing the Unseen World via 4D Dynamics-aware Generation Aug 2025 - Dec 2025
Physically Consistent Video Restoration *Project page*-

- Pioneered a 2D $\rightarrow$ 4D $\rightarrow$ 2D learning pipeline that lifts 2D inputs, models 4D dynamics, and projects back to produce coherent 2D results—introducing a new information flow and training scheme. Guided the generation of the 2D video within a realistic spatial and temporal context.

· Yu Yuan, **Tharindu Wickremasinghe**, Zeeshan Nadir, Xijun Wang, Yiheng Chi, Stanley H. Chan. SeeU: Seeing the Unseen World via 4D Dynamics-aware Generation (arxiv)

OTHER RESEARCH AND PUBLICATIONS

IEEE-ME-UYR young researcher program Jan - Fall 2024

Affine Subspace Models and Clustering for Patch-Based Image Denoising *IEEE ACSSC 2025-*

· Research subspace models of image patches under the mentorship of prof. Marco Duarte.
· Introduced Affine Subspace Clustering to improve the image denoising baseline by 15%.
· Presented our work at ICASSP 2025, and full paper accpeted at Alisomar Conference on Circuits, Signals and Systems 2025.
· **T. Wickremasinghe**, Marco F. Duarte; *Affine Subspace Models and Clustering for Patch-Based Image Denoising* (arxiv)

Undergraduate research collaborator with Wadduwage lab, Harvard University Nov 2022 - 2024

Masked Optimisation with Selective Attention for Image Reconstruction *arxiv-*

· Team lead for our research team- Formulate the mathematical principles for a transformer-based adaptive attention model for image reconstruction.
· Achieved state-of-the-art image reconstruction from highly compressed (10x, 25x, 100x) measurements.
· Presented as an extended abstract in the OSA Optica Imaging Congress, Cambridge, MA, 2023.
· P. Somarathne, **T. Wickremasinghe**, A.Niwarthana, A. Thieshanthan, C. Edussooriya, D. Wadduwage; *MOSAIC: Masked Optimization with Selective Attention for Image Reconstruction* (arxiv)

Research Intern- Human Motion Prediction in Virtual Reality Dec 2021 - July 2022

· Improve short term prediction of human motion, as a part of the Engineering Vacation Research Internship scholarship of the University of Sydney. Work carried under the aid lab, School of Computer Science, University of Sydney. Supervised by Dr. A.Withana

Team lead- self directed undergraduate research. May- Dec 2021

Feature Generation through Graph Neural Networks *ICPR 2022 publication*

· Lead four undergraduates and formed a research group to make the most of our time during the lockdowns.
· Researched online and taught each other Graph Neural Networks, and related areas of Geometric Deep learning.
· Significantly improved 3D point cloud segmentation (+36.7 mIoU on Semantic KITI- self driving car data).
· A. Thieshanthan, A. Niwarthana, P. Somarathne, **T. Wickremasinghe** and R. Rodrigo,"HPGNN: Using Hierarchical Graph Neural Networks for Outdoor Point Cloud Processing," in 2022 26th International Conference on Pattern Recognition (ICPR), Montreal, QC, Canada, 2022 pp. 2700-2706.

Real-time Configuration of Intelligent Reflecting Surfaces Feb - June 2021

Research competition- ICASSP 2021 *Video* *Report* *Announcement-*

· Mathematical Modelling and Data Analyst among an 8-person undergraduate team, in the IEEE Signals Processing Cup 2021. We designed fast and personalized reconfiguration algorithms of Intelligent Reflecting Surfaces in a setting of OFDM transmission of 5G signals. Our solution was **awarded 1st** place, after being invited to present at **IEEE ICASSP 2021-Toronto, Canada**. Supervised by Dr. P. Dharmawansa

Real-time Object Detection Fall 2020 - 2021

Undergraduate Research *IV Symposium 2022 publication*

· O. Jayasinghe, S. Hemachandra, D.Anhettigama, S. Kariyawasam, **T. Wickremasinghe**, C. Ekanayaka, R. Rodrigo, P.Jayasekara,"Towards Real-time Traffic Sign and Traffic Light Detection on Embedded Systems," 2022 IEEE Intelligent Vehicles Symposium (IV), Aachen, Germany, 2022, pp. 723-728.

PROJECTS

Smart Breadboard for remote lab experiments October 2020 - Feb 2021
Self supervised Research and Innovation *Video and Report-*

· Remote Access Breadboard to assist student laboratory work during lockdowns in the Pandemic. Recognitions: **1st place** at IEEE **PES** national design competition, Selected from IEE **CAS** student design competition 2020-2021, to represent Sri Lanka in the IEEE region 10 (Australia-Asia-Pacific level).

Undergraduate projects 2018 - 2022

· Fall detection for elders (*Electronic Design Realization module: May 2022*)
· FPGA based processor design (*Circuits and Systems Design module: May 2022*)
· Object avoidance, Colour detection, Line and Wall following, Ramp navigating robot. (*Robotics Design module: June 2021*)
· FIR bandpass filter design (*Digital Signals and Processing module: February 2021*)
· AM transmission Walkie Talkie (*Electronics II module: October 2020*)
· PID controlled line following robot (*Electronics I module: December 2019*)

SELECTED PROGRAMS, UNDERGRADUATE AWARDS

Gold medal for the most outstanding graduand in the faculty of Engineering, University of Moratuwa, Sri Lanka. For overall excellence in academics, extra curriculars, leadership, and civic service. *2023*

UNESCO Gold Medal for the best academic performance among all faculties, University of Moratuwa, Sri Lanka. Awarded at the general convocation of the university. *December 2023*

Pre-doctoral invitee, Cornell-Maryland Max Planck Research School (CMMRS), Germany. *August 2023*

ME-UYR 2023/24 Selected Young Researcher by the IEEE Signal Processing Society. *2023/24*

SGI 2023 Selected to audit the workshops of the Summer Geometry Initiative at MIT- MA,USA. *August 2023*

Fathima Fellow 2023/24, mentored by Mohammed El Banani on analysis in ML models. *Fall 2023*

Engineering Vacation Research Scholarhsip, under Anusha Withana at University of Sydney *2021/22*

ScholarX Fellow 2021/22, mentored by Vinoj Jayasundara, on ML concepts related to VAEs. *2021/22*

Mahapola Merit scholarship from the Sri Lankan goverment for the top 1% of University entrants *2018*

COMPETITIONS AND HACKATHONS

Runners up	Datathon 2023 - Inter University Data science competition *An anomally detection of suspicious activities on a website*	*SLIIT*
Champions	Datathon 2022 - Inter University Data science competition *A recommending system for a telecommunications company using Next Best Action.*	*SLIIT*
Champions	Data storm 2021- All island open Data science and analytics hackathon *Predict customer status and recommend the most suitable product.*	*RCUOM*
Runners up	Datathon 2020- Inter-University Data science competition *Forecast Coronavirus case counts and sector impact*	*SLIIT*
Champions	Belt and Road Electricity simulation competition 2020 *Economical and energy efficient power distribution*	*Shanghai University of Power*
Champions	Decrypt 2019- Product Innovation Ideathon *Heart disease and emergency alerting app for drivers*	*University of Moratuwa*
Finalists	Mora Xtreme 2019,2020 - Algorithmic coding competitions	*IEEE SB UOM*
Finalists	Futurecast ideathon 2021 - for IOT products	*Arimac Lanka*

TEACHING AND PEER REVIEW EXPERIENCE

Graduate TA
ECE301 - Signals and Systems *Fall 2024*

Visiting Instructor, Junior Lecturer
EN4553 Machine Vision, UoM, Sri Lanka *Fall 2023*
EN3551 Digital Signal Processing, UoM, Sri Lanka *Fall 2023*
EN3160 Fundamentals of Image Processing and Machine Vision, UoM, Sri Lanka *Fall 2023*
EN2412 Electronic Control Systems, UoM, Sri Lanka *Fall 2022*
EN2091 Laboratory practise and projects, UoM, Sri Lanka *Fall 2022*

Peer reviewing as a graduate student
ICASSP(2025,2026), ICML2026.

Peer reviewing as an undergraduate
ISCAS 2024 - Machine learning for Signal Processing, Circuits and Systems track *November 2023*
ACM Interactive Surfaces and Systems (ACM ISS) *July 2022*
CVPR 2023 in the Machine Learning track assisting Dr. R.Rodrigo *January 2023*
ICPR 2022 in the Graph Networks category assisting Dr. R.Rodrigo *March 2022*

TECHNICAL SKILLS

Languages and frameworks Python(Numpy, Pandas, Sklearn, Pytorch, Tensorflow), MATLAB, C++, HTML, Markdown, Latex.

Software and technologies Diffusers, Transformers, Huggingface, CUDA, OpenCV, Solidworks, Altium, Multisim, LTSpice, Webots, Slurm, Git, Bash.

MOOCs:
Mathematics for Machine Learning- Imperial College London- *(Coursera, August 2020)*, Neural Networks and Deep Learning- Deeplearning.AI *(Coursera, July 2020)*, Computational Thinking and Datascience- MIT 6.00.2 *(EdX, June 2020)*, Machine Learning- Stanford University *(Coursera, May 2020)*.

VOLUNTEERING, LEADERSHIP AND EXTRA-CURRICULARS

Lecturing, Instructing and Community service

- Instructor at our lab's outreach for teaching machine learning for high school students- Summer 2025.
- Instructor for the "Algebra by 7th" Minority Education program with Purdue- Spring 2025.
- Co-founder-Danuma Yathra Foundation, volunteering in rural schools of Sri Lanka, teaching highschool Mathematics and Science in schools with severe shortage of STEM teachers 2018-2020.
- Volunteer lecturer and instructor at astronomical society events 2018-2022.
- Assistant Manager, Knowldge Hub of ENTC 2021-2022.
- Member of the Rotaract Club - University of Moratuwa 2018-2023.
- Physics Laboratory Instructor for Advance-Level students at Lyceum International School- Colombo 2017-2018.

Featured Talks, Presentations, and Articles

- Moderator on the panel *"Future of AI in Engineering"* at EXMO-2023 Flagship Public Engineering Exhibition of the University of Moratuwa, July 2023.
- Poster Presentation at the International Conference on Communicating Astronomy with the Public (CAP) 2022.
- Featured in an article by Emil Bjornson, Lucio Marcerano; *Configuring an Intelligent Reflecting Surface for Wireless Communications: Highlights from the 2021 IEEE Signal Processing Cup student competition*, IEEE Signal Processing Magazine,Volume 39,Issue 1, January 2022, pp 126-131.

HIGHLIGHTS PRIOR TO UNIVERSITY

Awards

- The **Most Outstanding Student** award in both Junior and Senior categories for the graduating class at Nalanda College-Colombo, Sri Lanka. For overall excellence in academics and extra curriculars. *2011,2017*
- The **Best performance in Academics** award for Physical Sciences,
  Overall Best in Academics in Nalanda College for the graduating class. *2017*
- **3 Bronze** medals - International Mathematics Competition (Individual and team), Indonesia *2011*
  2 Bronze medals - International Mathematics and Science Olympiad (Individual), Indonesia *2009,2010*
- **2 Bronze** medals - International Earth Science Olympiad (Individual and Field project), Brazil *2015*
- **Gold** medalist in the National Physics Olympiad *2017*, **Bronze** medalist in *2016*
  2 Gold, 1 Silver, and 1 Bronze medal in the National Astronomy and Astro-Physics Olympiads in Junior (2012/13) and Senior categories (2014/15)
- High distinction with national rank 3 in the Royal Australian Chemical Institute Junior Quiz *2014*
  Class excellence with national rank **1** in the Royal Australian Chemical Institute Senior Quiz *2016*

Activities *2008-2017*

- Junior Prefect for the term 2013/14.
- Patrol leader of the Scout Group, Represent Sri Lanka in the 23rd World Scout Jamboree in Kirara-Hama, Japan (2015), and the Asia Pacific Jamboree- Dambulla (2011).
- Captain of the debating team, Best Orator in inter-house and inter-school debates in 2014, President of the debating society in 2016/17.
- Treasurer of the Astronomical Society: conducting nightcamps,lectures and workshops in schools islandwide.
- Chess: Colours award, (FIDE Elo rating 1660), Captained the team winning the National Championship in 2010.
- Badminton: Colours award, member of division A champion and runner-up teams.
- Music: Member of the college choir and the orchestra (violin).

References available upon request