Sasika Amarasinghe

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INTERESTS

Multimodal Understanding, Efficient AI Systems, Robot Perception, AI Engineering

EXPERIENCE

Singapore-MIT Alliance (SMART) & Singapore Management University Dec 2024 – Jun 2025
Research Intern (Advisor: Prof. Archan Misra) *Singapore*

- Designed **FreqPAC**, a novel framework for efficient few-shot adaptation of compact language models (≤10B) using frequency-based perturbations.
- Engineered a preference-guided optimization pipeline integrating feedback from frontier models to fine-tune attention maps. Applied this to Preference-Guided Few-Shot Adaptation and Grounded Planning for embodied agents (inspired by LLM-Planner).
- **Output:** Co-authored manuscript *"FreqPAC: Frequency-based, Preference-Guided, Few-Shot Adaptation of Compact Models Using Human Feedback Augmented By AI"* (Under revision - Submitted to **AAAI 2026**).

University of Moratuwa & A*STAR Singapore Aug 2025 – Present
Research Intern (Advisors: Dr. Ranga Rodrigo, Dr. Vigneshwaran Subbaraju) *Remote*

- Conducting research on **Language-Based 4D Visual Grounding** using dynamic point clouds to improve spatial understanding in autonomous systems.
- Implementing PyTorch-based cross-modal attention mechanisms to align linguistic queries with 3D visual features.

EDUCATION

University of Moratuwa, Sri Lanka Aug 2022 – Present
B.Sc. Eng. (Hons.) in Electronic & Telecommunication Engineering *CGPA: 3.65/4.00 (as of Sem 7)*

- **Academic Standing:** Dean's List (Semesters 4, 6 & 7).
- **Relevant Coursework:** Image Processing & Machine Vision (A+), Linear Algebra (A+), Deep Learning for Vision (A), Robotics (A), Pattern Recognition (A-), Autonomous Systems (A), Medical Image Processing (A).

Ananda College, Colombo Jan 2012 – Dec 2020

- **G.C.E. Advanced Level:** Physical Science Stream – Z-Score: **2.4466** (Island Rank: 206/30,000 Top **0.62%**).
- **G.C.E. Ordinary Level:** Ranked **2nd in the college** with 9 'A' Distinctions.
- **Awards:** National Merit Scholarship (2021) for excellence in university entrance examination.

PROJECTS

*Full portfolio & demos: Scan the **QR** above.*

Evaluation Tool for Vision Encoder Explainability Methods *PyTorch, DCT, LLMs, VLMs*
Deep Learning for Vision Project [Try Live Demo] *(University)*

- Developed a comprehensive tool to evaluate explainability methods for Vision Transformers including CheferCAM (CVPR 2021), Attention Rollout (ACL 2020), and Grad-CAM (IJCV 2019).
- Implemented positive and negative perturbation tests to analyze the impact of input features on final model predictions.
- Supported model families include ViT, DeiT, DINOv2, and ViTs with Registers (ICLR 2024).
- Deployed in Huggingface Spaces.

DCT-Based Efficient Adaptation Layer for Transformer Architectures *PyTorch, DCT, LLMs, VLMs*
Research Project (Internship @M3S, SMART & SMU)

- Developed a novel parameter-efficient adaptation layer (similar to LoRA) utilizing Discrete Cosine Transforms (DCT) and Inverse DCT to reduce trainable parameters for Preference Optimization of LLMs (< 10B).

Mapping Photography Portfolios by Visual Similarity *Three.js, WebGL, Python*
Interactive Web Tool [Try Live Demo] *(Personal)*

- Created an interactive 3D visualization tool optimized to load and render over 2,250 images, using data scraped from photography portfolios (@withluke).
- Implemented multiple viewing modes inspired by Google Arts Experiments and IsoMatch, including 3D t-SNE view, Spherical view, and Grid view.
- Built a reproducible Python pipeline (Grid-Layout-Image-Artwork) utilizing non-linear dimensionality reduction (t-SNE, UMAP) to arrange arbitrary image datasets into cohesive grid layouts.

GCE AL Exam 2020 Student Performance Dataset *Python, AWS EC2, Pandas*

Data Engineering Project (Personal)

- Compiled a dataset of over **330,000** records of student performance in the GCE AL exam (university entrance exam) in Sri Lanka.
- Engineered a data pipeline involving scraping, cleaning, and storage of student demographics and scores.
- Orchestrated a robust scraping script that executed continuously for 10 days in an EC2, saving me 100GB+ of bandwidth usage.

System Integration of Jetson-Hololens-Server *Python, Edge Computing, MRTK, HL2SS, Docker*

(Research Demo - Internship @M3S, SMART & SMU)

- Engineered a distributed system connecting an NVIDIA Jetson (Edge), Microsoft Hololens 2, and a remote server for hybrid inference.
- Developed a pipeline where visual and audio inputs from the Hololens are processed by lightweight VLM (Moondream, Florence-2) on the Jetson or offloaded to large VLM(Llama 3.2 Vision) on the remote server based on query complexity.

State Estimation Filter for 3D Human Point Cloud Tracking *Python, Kalman Filter, Point Clouds*

Autonomous Systems Project (University)

- Implemented a Kalman Filter-based pipeline for tracking human movement using 3D point cloud data.
- Developed visualization tools to analyze state estimation performance in the synthetic pointcloud dataset created for the Final Year Project.

Real-Time 4K Video Exposure Correction Pipeline *Python, PyTorch, OpenCV*

Video Inference Optimization (University)

- Extended the official WACV 2024 implementation of *"4K-Resolution Photo Exposure Correction"* (8K params) from static image processing to a full video inference pipeline.
- Implemented frame-wise inference logic to enable rapid exposure correction on video data.

CycleGAN for Low Light Image Enhancement *PyTorch, CycleGANs, Computational Photography*

Implementation of D2BGAN Paper (Personal)

- Implemented the D2BGAN architecture from scratch to enhance low-light photography.
- Trained the adversarial network to balance noise reduction with texture preservation.

Vision System for Bin Picking Robot *PyTorch, Semantic Segmentation, TinyML*

(University)

- Designed a vision pipeline to locate warehouse boxes using Semantic Segmentation (DeepLab, UNet).
- Optimized and deployed the **Fast Segment Anything Model (SAM)** on a Raspberry Pi 4B for edge inference.

Full-Stack Web App for Power Transformer Inspections with AI *Java Springboot, ReactJS, Python*

Software Design Project (University)

- Developed a comprehensive web application for managing power transformer inspections.
- Integrated AI-powered thermal image analysis (Object Detection using YOLOv11) for automated defect detection and maintenance scheduling.

iCliQ: Smart Wearable Presenter *ESP32, BLE, C*

Hardware Design Project (University & Hackathon Finalist)

- Engineered a wearable presentation clicker with haptic feedback and OLED display.
- A custom 4-layer PCB for compact form factor and EMI performance.
- I was responsible for developing the firmware.

Unilink: Social Media Platform *Django, Python, SQLite*

Full-Stack Web Development (Personal)

- Built a social media platform for university community building with user authentication and feed features.
- Implemented post creation, editing, and user interaction functionalities.

RoboVox: Far-field Speaker Recognition *Python, ResNet, Signal Processing*

Signal Processing Cup Competition 2024

- Developed a robust speaker recognition pipeline for mobile robots in noisy environments.
- Implemented denoising and feature extraction using x-vectors.

TECHNICAL SKILLS

- **Languages:** Python, C, C++, JavaScript, MATLAB, SQL.
- **AI/ML/CV:** PyTorch, Hugging Face, Open3D, OpenCV, Scikit-learn.
- **Architectures:** Vision Transformers (ViT, DINOv2), Point-LLMs, VLMs, GANs.
- **Robotics & Control:** State Estimation (Kalman Filters/EKF/Particle Filter), Reinforcement Learning.
- **DevOps & Tools:** Docker, Git, Linux, AWS, LaTeX.
- **Hardware:** Raspberry Pi, NVIDIA Jetson Orin Nano, ESP-32S.
- **Web Development:** Django, React, Three.js, MySQL, Selenium.

ACHIEVEMENTS

- **Honorary Mention:** IEEE ComSoc Student Competition (International) 2024
- **Champion:** Spark Challenge (ENTC, University of Moratuwa) 2024
- **Champion:** ComFix Ideathon (IEEE ComSoc UOM Student Chapter) 2024
- **Finalist:** Intellihack 3.0 (AI Hackathon by UCSC) 2023
- **Finalist:** HackX (Inter-University Hackathon, University of Kelaniya) 2023
- **ScholarX Mentee:** Sustainable Education Foundation (SEF) 2023
- **Semi-Finalist:** Idealize 2022 (University of Moratuwa) 2022

LEADERSHIP & VOLUNTEERING

- **Webmaster:** IEEE Signal Processing Society Student Chapter (Dec 2024 – Present).
- **STEM Mentor:** Conducted robotics workshops for rural school students at Sri Lanka Robotics Challenge 2024.
- **Vice President:** Anandian Astronomical Association (2018–2019); Organized national observation camps.

REFERENCES

- **Dr. Ranga Rodrigo**
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  Senior Lecturer, Department of Electronic and Telecommunication Engineering
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- **Dr. Dulanga Weerakoon**
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