SAVINDU WANNIGAMA

Department of Computer Engineering, University of Peradeniya, Sri Lanka. 20400.

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Education

University of Peradeniya — Nov 2018—Dec 2023
BSc. Engineering (Hons.) in Computer Engineering — *GPA: **3.95**/4.00*

Trinity College, Kandy — 2007— 2017
GCE Advanced Level Examination — *Provincial Rank: **1**/2784 | National Rank: **6**/32075 | Z-Score: 2.6383*

Academic Achievements

University of Peradeniya Gold Medalist | *Best All-Round Student in Faculty of Engineering* — **Aug 2024**
- Excellence in academic and extracurricular activities among 400+ students across the Faculty of Engineering.

Sri Lanka Bronze Medalist | *Physics Olympiad Competition* — **Nov 2017**
- Awarded a bronze medal for achieving a high score in the National Physics Olympiad exam.

Mahapola Merit Scholarship (National) | *Granted by the Ministry of Education* — **Nov 2018—Dec 2023**
- Recipient of a monthly living allowance awarded for being ranked within the **top 10%** out of 32,000+ students at the 2017 General Certificate of Education (GCE) Advanced Level examination in Sri Lanka

Dialog Merit Scholarship (National) | *Granted by Dialog Axiata PLC* — **Nov 2018—Dec 2023**
- Recipient of a monthly living allowance awarded for being **ranked 1st** out of 2,700+ students in the district at the Physical Sciences stream at the 2017 GCE Advanced Level examination in Sri Lanka.

IEEEXtreme 16.0 (International) | *A 24-hour algorithmic programming competition organised by IEEE* — **Oct 2022**
- Country Rank: 34/311 | Global Rank: 768/6373

IEEEXtreme 14.0 (International) | *A 24-hour algorithmic programming competition organised by IEEE* — **Oct 2020**
- Country Rank: 32/180 | Global Rank: 311/2155

Hacktitude (National) | *A 12-hour inter-university hackathon organised by 99x* — **Jan 2022**
- Ranked 32*nd* among more than 200 teams.

Hackdown (National) | *A 3-hour inter-university coding competition organised by IEEE WIE* — **Jan 2022**
- Ranked 35*th* among more than 200 teams.

Industry Work Experience

Software Engineer (Research and Development) — **Feb 2024—Jan 2025**
CodeGen International
- Designed and implemented Retrieval-Augmented Generation (RAG) pipelines, incorporating chunking, vectorization, semantic search, reranking, and question generation for optimized document retrieval and context generation.
- Developed and fine-tuned AI models, including zero-shot intent classifiers and GPT-based systems, to enhance context-aware decision-making and improve response accuracy.
- Integrated and optimized knowledge-base systems by implementing hybrid search techniques, semantic indexing, and automated pipelines for large-scale document processing.
- Deployed AI models and services on GPU-accelerated infrastructure, optimizing performance through Dockerized environments, CUDA integration, and memory-efficient reranking algorithms.
- Automated workflows for data processing and indexing, leveraging Apache Airflow, persistent storage, and scalable vector databases for real-time AI-driven insights.

Research Intern — **Dec 2022—May 2023**
CyAmast, a UNSW spinout
- Contributed to a project, in collaboration with UNSW researchers, focusing on developing deterministic models to identify assets and associated risk through passive network data analysis.
- First-authored a research paper accepted at the competitive conference IEEE WoWMoM 2024.

Academic Work Experience

Temporary Instructor
Jan 2025—Present

Department of Computer Engineering, University of Peradeniya
- Supervised and graded lab sessions for multiple undergraduate courses.
- Designed and developed questions and assessments aligned with course objectives and learning outcomes.
- Provided academic support and mentorship to students, assisting with coursework, projects and presentations.

Teaching Assistant: CO222: Programming Methodology
May 2021—Sep 2021

Department of Computer Engineering, University of Peradeniya
- Supervised weekly 2-hour online lab sessions.
- Developed questions for online quizzes focused on the C programming language.
- Conducted one-on-one sessions with students to provide tutoring in the C programming language and foundational programming methodology concepts.

Teaching Assistant: CO224-2021: Computer Architecture
Nov 2021—Jan 2022

Department of Computer Engineering, University of Peradeniya
- Led introductory tutorial sessions on laboratory exercises.
- Supervised 2-hour online lab sessions twice a week.
- Developed marking schemes to assess lab sessions.
- Invigilated online quizzes fortnightly.

Teaching Assistant: CO321-2022: Embedded Systems
Sep 2022—Jan 2023

Department of Computer Engineering, University of Peradeniya
- Conducted in-class tutorial classes fortnightly.
- Supervised in-class lab sessions fortnightly.
- Graded lab and tutorial submissions

Teaching Assistant: CO322-2022: Data Structures and Algorithms
Sep 2022—Jan 2023

Department of Computer Engineering, University of Peradeniya
- Conducted introductory sessions to labs.
- Graded lab and tutorial submissions
- Contributed to developing instruction sheets for lab sessions

Member of the Web Consultation Team
Aug 2021—Jan 2023

University of Peradeniya
- Voluntarily contributed to a team of engineering undergraduates, providing web consultation services to enhance and optimise the digital presence of the University of Peradeniya.

Publications

Unveiling Behavioral Transparency of Protocols Communicated by IoT Networked Assets

S. Wannigama, A. Sivanathan, A. Hamza and H. Habibi Gharakheili, Proc. IEEE WoWMoM, Perth, Australia.   *Jun 2024*

My specific contributions:

- First author, responsible for conducting research experiments, as well as leading the paper writing.
- Created a public dataset of traffic traces specific to network protocols used by commercial IoT devices.
- Analysed traffic flows and highlighted protocol characteristics, parameters, and adherence to industry best practices.
- Developed a common model to specify protocol signatures, facilitating systematic and automatic analysis of protocols.

A Spatiotemporal Approach to Tri-Perspective Representation for 3D Semantic Occupancy Prediction

*S. Silva, S. Wannigama, G. Jayatilaka, M. Khan and R. Ragel, **Best Paper** at ML4AD at AAAI, Philadelphia, US Mar 2025*

My specific contributions:

- Part of a two-member team focused on enhancing a complex deep learning model that integrates a ResNet, FPN, a transformer with an encoder-decoder architecture, a Detr3D decoder head for 3D object detection, and MLPs for 3D semantic occupancy prediction tasks.
- Implemented temporal attention in the deep learning model with existing spatial attention, enhancing it to incorporate spatiotemporal attention capabilities.
- Trained, validated and tested the model on the nuScenes dataset.
- Conducted performance comparison of our RGB camera-based 3D semantic occupancy prediction (SOP) model against existing camera-based, LiDAR-based, and other multimodal architectures.

Projects

Sobriety Detection using Mobile Phone Gyroscope Data | *ML, DL, Python, TensorFlow, JavaScript, No-SQL, MQTT*

My specific contributions:

- Extracted actionable features from raw time series gyroscope readings through data segmentation and windowing and employed techniques such as Principal Component Analysis (PCA) and Feature Importance to select a minimal subset of features, optimising the performance of machine learning models.
- Developed an API that allows mobile phones to post streams of real-time gyroscopic readings and receive classifier results.

Remote Proctoring system | *JavaScript, Node, No-SQL, Raspberry Pi, Linux, Jitsi-Meet*

My specific contributions:

- Designed and built a proctoring device based on a Raspberry Pi microcontroller, which acted as a bridge for a live video stream between all the students and a set of proctors and enabled students to continue the exam uninterrupted during a short power or connectivity failure. (Jitis Meet was used to integrate live video streaming into the web and desktop applications of the system)
- Designed and built a system to store and handle exams and courses of a set of students registered in a system that implemented a scalable MongoDB database and a Node-based server running on a Linux server to serve requests from several users and store and auto update details about exams, courses, students etc.

Reconstructing Highly Degraded License Plates Images | *Python, OpenCV*

My specific contributions:

- Demonstrated how traditional image processing techniques such as Otsu thresholding, morphological transformation, contouring, spatial and frequency domain filtering, and degradation modeling can be used to restore highly distorted images along with the limitations of the traditional image processing theoretical techniques.

Technical Skills

Languages: C, Java, Python, JavaScript, SQL, NoSQL, Verilog HDL, ARM Assembly
Developer Tools: Git, VS Code, Eclipse, Docker, Google Cloud Platform, Node
Technologies/Frameworks: Linux, GitHub, ExpressJS

Relevant Coursework

- Computer Communication Networks I
- Computer Communication Networks II
- Computer and Network Security
- Network and Web Application Design
- Discrete Mathematics
- Probability and Statistics
- Ordinary Differential Equations
- Calculus I
- Calculus II
- Numerical Methods
- Image Processing
- Machine Learning and Data Mining
- Signal Processing
- Electronics I
- Electronics II
- Data Structures and Algorithms

Leadership / Extracurricular

Sports

Tennis

- Captain of the school Tennis team (2016 and 2017)
- Member of the university Tennis team (2019—2024)
- University half-colours in Tennis (2019, 2022, and 2023)

Other

Extra Curricular Activities

- Committee member of the Association of Computer Engineering Students (ACES) and member of several clubs and societies in University and school, including the Music Society and the Ceylon Dramatic Society of the University of Peradeniya, and the Cadet Band and the Science Society of Trinity College Kandy.