

A.S. Bandara, **S.J. Siriwardena**, A. Wijethunge, J. Ekanayake, "Development of Multivariate Attention LSTM model for Dynamic Line Rating forecasting" in Proceeding of the 2025 16th International Conference on Sustainable Build Environment 2025 and Next-Gen Innovation & Advancement (DIAMOND 75), The Kandy Conference 2025.

IN REVIEW

Sahan Siriwardena, Sayura Nemidara, Dilshan Dissanayake, Anushka Bandara, Janaka Ekanayaka, Chalinda Beneragama, Lilantha Samaranyake. "Next-Generation Computational Approaches for Modeling, Optimization, and Techno-Economic Analysis of Sustainable Energy Agrivoltaic Systems", Information Processing in Agriculture, 2026

Awards & Honors

- 2025 **Best Scientific Paper**, 16th International Conference on Sustainable Build Environment 2025 and Next-Gen Innovation Advancement (DIAMOND 75), The Kandy Conference 2025.
- 2024 **Semifinalist**, VolCast 1.0 Ideathon
16th Rank, Coders V11.0 Coding Competition (out of 100+ teams)
- 2023 **Semifinalist**, IEEE Electronic Design Competition
2nd Runners up, Hackathon 2023 (Social Category)
- 2021 **Top Ten Robots**, ROBOTRICKS'21 Line Following Robots Competition
Excellence Performance, EFI Mini Project Competition 2021 (Agriculture Category)

Projects

2025-Present **Enhancing Photovoltaic Hosting Capacity in Medium Voltage Distribution Networks through Integrated SCR-Based Planning and Dynamic Line Rating: A Techno-Economic Analysis.**

This ongoing research proposes an integrated framework to enhance PV hosting capacity in MV distribution networks by combining Short Circuit Ratio (SCR)-based probabilistic PV allocation, coordinated voltage control, Dynamic Line Rating (DLR), and techno-economic assessment.

Technologies: Python, MATLAB, OpenDSS

Contribution: Developing an SCR-based probabilistic PV allocation framework; modeling DLR thermal limits using heat balance equations; performing time-series and Monte Carlo hosting capacity simulations; conducting techno-economic comparison between DLR and battery energy storage systems (BESS).

2025 **Development of Multivariate Attention LSTM For Dynamic Line Rating Forecasting.**

This project proposed a multivariate Long Short-Term Memory (LSTM) model enhanced with an attention mechanism to improve Dynamic Line Rating (DLR) forecasting accuracy. The model captures nonlinear interdependencies among environmental variables including ambient temperature, conductor temperature, wind speed, humidity, and solar irradiance.

Technologies: Python, MATLAB, Tensorflow

Contribution: Designed and implemented a multivariate attention-based LSTM architecture for DLR forecasting; performed data preprocessing and feature engineering of meteorological parameters; conducted model training, validation, and comparative analysis against conventional LSTM models to enhance transmission line utilization and renewable energy integration..

2025 **Modeling of Battery Capacitor Behavior for Power Electronics Applications.**

The project developed a Thevenin equivalent circuit model to accurately represent the charge-discharge behavior of battery capacitors. Model parameters were identified using Hybrid Pulse Power Characterization (HPPC) tests and refined through MATLAB parameter estimation for improved accuracy. The model was validated in MATLAB/Simulink and applied in an off-grid photovoltaic (PV) system with integrated battery capacitor storage.

Technologies: MATLAB, Simulink, Python

Contribution: Developed the Thevenin-based equivalent circuit model, performed HPPC-based parameter identification, established OCV-SOC relationship for SOC estimation, and validated the model against experimental data

2025-Present **Single-Phase DQ-Frame Grid-Tied Inverter Controller Development.**

Developing the controls for a single-phase grid-connected inverter capable of operating in both power injection and static compensator (STATCOM) modes. The project involves implementing synchronous reference frame control, including Clarke and Park transformations, orthogonal signal generation, and phase-locked loop (PLL) synchronization for accurate grid angle detection. The system is implemented on a TI C2000 microcontroller platform.

Technologies: PLECS

Contribution: Designing the DQ-frame control architecture; implementing PLL-based grid synchronization; developing current control algorithms.

2025-Present **Development of Soft Programmable Logic Controllers for Precision Agriculture.**

Developing a cost-effective soft PLC solution to replace traditional PLCs by using distributed sensor nodes that communicate with a central hub via LoRa technology. The hub is being integrated with cloud services to enable real-time monitoring and manual control through a fully hosted user interface. The project aims to reduce wiring complexity, improve scalability, and enhance remote accessibility for irrigation management.

Technologies: Python, Arduino, LoRa, Raspberry pi

Contribution: Developing the central control system using Raspberry Pi; developing a user interface using Node RED; validating the control layers according to the industrial standards.

2024 Dec-2025 Aug **Techno Economic Analysis of Agrivoltaics Plants.**

Conducted a comprehensive analysis of agrivoltaic systems integrating solar energy generation with crop cultivation. The project evaluated land use efficiency, crop selection, solar panel configuration, and economic viability. Simulations were carried out using Rhino 3D and Grasshopper to model solar irradiance, shading patterns, and crop productivity under semi-transparent PV panels.

Technologies: Python, Rhino 3D, C++

Contribution: Performed load behavior analysis; modeled the agrivoltaics system using Rhino and Grasshopper; integrated grow light simulations using Honeybee plugin; and carried out techno-economic evaluations for optimized design.

2024 Jan- 2024 Apr **Smart Socket Project.**

Developed a prototype smart socket to measure the power usage of connected components, compatible with Alexa. The prototype socket can be controlled using the Alexa smart control hub, and power usage monitoring is displayed through a custom-developed mobile app.

Technologies: Arduino, React.js

Contribution: Designed and developed the PCB; implemented Alexa integration and prototype connectivity; and developed the mobile application.

2023 Aug-2023 Dec **Digital Level Meter Project.**

Developed a prototype to measure the incline of a surface and display how much the surface inclines in degrees. The whole system is programmed in assembly language.

Technologies: Assembly

Contribution: Developed the algorithm from Assembly language.

2023 **Smart Meter (IntelliSwitcher) Project.**

An IoT-based energy optimization system designed to reduce household energy consumption and costs. It features an IoT device that connects to existing switches, continuously monitors power usage, and provides real-time data via a mobile app. Using AI, it analyzes consumption patterns and offers personalized recommendations to improve energy efficiency.

Technologies: Arduino, AutoCAD, Tensorflow

Contribution: Designed the 3D model; Implemented and developed the Circuit and the PCB.

Voluntary Work

2025 **Technical Volunteer**, Peradeniya University International Research Sessions and Exposition (iPURSE2025), University of Peradeniya, Sri Lanka.

2025 **Webmaster**, IEEE Student Branch, University of Peradeniya, Sri Lanka.

2025 **Webmaster**, IEEE MTT-S Student Branch, University of Peradeniya, Sri Lanka.

2021-2023 **Teaching Volunteer**, Arunalla Seminar Program, Sri Lanka

2022 **Instructor – Electrical Safety Program**, IEEE Women in Engineering Student Branch Affinity Group, University of Peradeniya, Sri Lanka.

2021 **Member – Logistics Team**, IEEE Robotics & Automation Society Student Branch Chapter, University of Peradeniya, Sri Lanka.

Skills Summary

COMPUTER SKILLS

Programming Languages, Python, C, C++, MATLAB

Power System Softwares, Openss, Pandapower, PSS/E, Digisilent, PSCAD, Altair PSIM

PCB Desinging Softwares, KiCAD, Fusion 360, Eagle CAD, Altium Designer

Deep Learning Frameworks, Tensorflow, PyTorch

Web, React-js, HTML, CSS

Mobile Programming, Android, React-native

Graphics / Video, Adobe Photoshop, Adobe Illustrator, Adobe After Effects

Hardware-oriented Programming, Arduino, Verilog HDL, Assembly, Altair Embedded, dSpace, C2000 Texas Instrumentation, PLECS

LANGUAGE SKILLS

English, Professional fluency

Sinhala, Mother tongue

Referees

Prof. Janaka Ekanayake

Senior Professor

Department of Electrical and Electronic
Engineering,

Faculty of Engineering,
University of Peradeniya.

☎ +94 77-714-6979

✉ ekanayakej@eng.pdn.ac.lk

Prof. Lilantha Samaranayake

Professor

Department of Electrical and Electronic
Engineering,

Faculty of Engineering,
University of Peradeniya.

☎ +94 71-684-8319

✉ lilantha@eng.pdn.ac.lk