

Gayan Chaminda Lankeshwara

CONTACT INFORMATION	The University of Queensland School of Electrical Engineering and Computer Science Desk 304-1, Bldg 47, Staff House Road, St. Lucia, QLD 4072, Australia. Tel: +61 47 51 34643 Email: glankeshwara@gmail.com
CORE COMPETENCIES	<ul style="list-style-type: none">• Well-grounded knowledge in Power and Energy Systems• Advanced Control Systems and Mathematical Optimisation• Data Analytics and Machine Learning
EDUCATION	<p>The University of Queensland, Australia July 2019 to Aug 2023 Ph.D. in Electrical Engineering Thesis title: <i>Network-aware Demand Response in the Presence of Uncertainties</i> Advisors: Dr. Rahul Sharma, Prof. Tapan Saha, Dr. Ruifeng Yan</p> <p>The University of Peradeniya, Sri Lanka Jan 2018 to March 2021 M.Sc. Eng. in Electrical Power Applications Thesis title: <i>Short-term wind speed prediction and wind power integration to the grid under the dynamic line ratings</i> Advisor: Prof. Janaka Ekanayake</p> <p>The University of Peradeniya, Sri Lanka Mar 2013 to Sep 2016 B.Sc. in Electrical and Electronic Engineering (First-Class Honours) Thesis title: <i>Interference mitigation in co-working Wireless Local Area Networks</i> Advisor: Dr. Himal Suraweera</p>
RESEARCH EXPERIENCE	<p>Postdoctoral Research Fellow, The University of Queensland Aug 2023 to present</p> <ul style="list-style-type: none">• Time-series analysis of photovoltaic (PV) soiling and back-end development using <i>Python</i> and associated machine learning modules for the <i>SolarisAI</i> project. This project aims to develop an all-in-one system that automatically detects and locates faulty or under-performing PV panels in utility-scale solar farms. <p>Ph.D. Thesis project, The University of Queensland July 2019 to March 2023</p> <ul style="list-style-type: none">• Developed robust distributed model predictive control schemes based on ADMM and Lagrangian relaxation for behind-the-meter distributed energy resources (DERs) participation in wholesale markets and ancillary services in the presence of uncertainties.• Proposed approaches for distribution network service providers to adopt <i>dynamic operating envelopes</i> to maximise the utilisation of DERs in low-voltage (LV) distribution networks without breaching network statutory limits.• Tested the proposed DER control schemes using software-in-the-loop (SIL) validations in a real-time digital simulator to determine how effective and scalable the schemes are when dynamic operating envelopes are enabled.

M.Sc. Eng. Thesis project, University of Peradeniya Jan 2018 to July 2019

- Proposed a cost-effective approach for integrating wind energy into the medium-voltage network under the dynamic rating of the wind farm collector conductor. This approach reduced capital expenditure by 10-20%.
- Developed an auto-regressive time-series model for forecasting wind speed at hub height during the operational stage of a wind farm.

B.Sc. Eng. Thesis project, University of Peradeniya Mar 2013 to Sep 2016

- Developed a mathematical model to find the best location for a new wireless access point. This model used path-loss to minimise the interference from nearby access points.
- Designed an antenna tilting mechanism for a wireless access point to maximise end-user power reception.

Research Collaborations

- From January 2022 to March 2023, I worked with postdoctoral research fellows from the Power, Energy and Control Engineering research group at The University of Queensland. Together, we proposed a scalable approach for setting up dynamic operating envelopes in a medium-voltage to low-voltage (MV-LV) network with minimal network visibility.
- From March 2022 to January 2023, I collaborated with a postdoctoral research fellow from the Monash University. We developed an approach to integrate dynamic operating envelopes in peer-to-peer (P2P) energy trading.

PUBLICATIONS

Journal papers

- **G. Lankeshwara**, R. Sharma, R. Yan, and T. K. Saha, "Control algorithms to mitigate the effect of uncertainties in residential demand management," *Appl. Energy*, vol. 306, p. 117971, 2022, doi:10.1016/j.apenergy.2021.117971.
- **G. Lankeshwara**, R. Sharma, R. Yan, and T. K. Saha, "A hierarchical control scheme for residential air-conditioning loads to provide real-time market services under uncertainties," *Energy*, vol. 250, p. 123796, 2022, doi:10.1016/j.energy.2022.123796.
- **G. Lankeshwara** and R. Sharma, "Robust Provision of Demand Response from Thermostatically Controllable Loads using Lagrangian Relaxation," *International Journal of Control*, 2023, doi:10.1080/00207179.2023.2241579.
- **G. Lankeshwara**, R. Sharma, R. Yan, T. K. Saha and J.V. Milanovic, "Time-varying Operating Regions of End-users and Feeders in Low-voltage Distribution Networks," *IEEE Transactions on Power Systems*, 2023, doi:10.1109/TPWRS.2023.3302421.
- M. Imran Azim, **G. Lankeshwara**, Wayes Tushar, R. Sharma, T. K. Saha, Mohsen Khorasany and Reza Razzaghi, "Dynamic Operating Envelope-enabled P2P Trading to Maximise Financial Returns of Prosumers," *IEEE Transactions on Smart Grid*, 2023, doi:10.1109/TSG.2023.3297366.
- M.R. Alam, Phuong T. H. Nguyen, Lakshitha Naranpanawe, Tapan K. Saha and **G. Lankeshwara**, "Allocation of Dynamic Operating Envelopes in Distribution Networks: Technical, Economic and Equitable Perspectives," *IEEE Transactions on Sustainable Energy*, 2023, doi:https://doi.org/10.1109/tste.2023.3275082.

Conference papers

- **G. Lankeshwara** and R. Sharma, "Dynamic Operating Envelopes-enabled Demand Response in Low-voltage Residential Networks," in *2022 IEEE PES 14th Asia-Pacific Power and Energy Engineering Conference (APPEEC), Melbourne*,

Australia, 2022, pp. 1–7, doi:10.1109/APPEEC53445.2022.10072108

- **G. Lankeshwara**, “A Real-time Control Approach to Maximise the Utilisation of Rooftop PV Using Dynamic Export Limits,” in *2021 IEEE PES Innovative Smart Grid Technologies - Asia (ISGT Asia)*, 2022, pp. 1–5, doi:10.1109/isgtasia49270.2021.9715714.
- **G. Lankeshwara**, R. Sharma, R. Yan, and T. K. Saha, “Control of Residential Air-conditioning Loads to Provide Regulation Services under Uncertainties,” in *IEEE Power and Energy Society General Meeting, 2021*, vol. 2021-July, pp. 1–5, doi:10.1109/PESGM46819.2021.9637890.

AWARDS AND SCHOLARSHIPS

Student Travel Award 07 Oct 2022

14th IEEE PES Asia-Pacific Power and Energy Engineering Conference 2022
offered by: *IEEE PES-DEIS Queensland chapter*
amount: *AUD 1,000*

Registration Fee Award 04 Nov 2021

2021 IEEE Power & Energy Society General Meeting (PESGM)
offered by: *IEEE PES-DEIS Queensland chapter*
amount: *USD 200*

Research Training Tuition Fee Offset July 2019 to July 2023

The University of Queensland, Australia.

HDR Living Allowance Scholarship July 2019 to Dec 2022

The University of Queensland, Australia.

TEACHING EXPERIENCE

Visiting Lecturer May 2023 to August 2023

Distribution Systems Engineering (EE 662) — M.Sc. Eng. in Electrical Power Applications
Department of Electrical and Electronic Engineering, University of Peradeniya, Sri Lanka.

Content covered: Voltage drop, K-factor, and power loss in distribution lines, Types of distribution lines, Considerations for overhead distribution lines, Understanding resistance and reactance in distribution lines, Series impedance of transposed lines, Self and mutual impedance of untransposed distribution lines, Shunt admittance of overhead distribution lines, Distribution system line models

Teaching Assistant Semester 2— 2022, 2021 and 2020

Circuits, Signals & Systems (ELEC 2004) — Undergraduate Course
School of Information Technology and Electrical Engineering,
The University of Queensland, Australia.
Course Coordinator: Dr. Rahul Sharma

Temporary Lecturer Oct 2018 to May 2019

Department of Electrical and Electronic Engineering
University of Peradeniya, Sri Lanka.

Temporary Instructor May 2018 to Oct 2018

Department of Electrical and Electronic Engineering,
University of Peradeniya, Sri Lanka.

Courses: Principles of Electrical Measurements, Electrical Machines, Power Engineering

Instructor-in-charge of the First-Year Undergraduate program

CONFERENCE
PRESENTATIONS
AND SEMINARS

2021 IEEE Power & Energy Society General Meeting (PESGM) 26 Jul 2021

Conference Presentation (virtual)

Title: *Control of Residential Air-conditioning Loads to Provide Regulation Services under Uncertainties*

Power, Energy and Control Discipline Seminar Series 05 Feb 2021

School of Information Technology and Electrical Engineering, The University of Queensland, Australia.

Title: *Control of Residential Inverter-type Air-conditioning Loads to Provide Real-time Regulation Services under Uncertainties*

CERTIFICATIONS

Machine Learning Specialization (*DeepLearning.AI | Stanford Online*)

- [certificate]

Deep Learning Specialization (*DeepLearning.AI*)

- Neural Networks and Deep Learning [certificate]
- Improving Deep Neural Networks: Hyper-parameter Tuning, Regularization and Optimization [certificate]
- Structuring Machine Learning Projects [certificate]

Google Data Analytics Professional Certificate (*Google*)

- Foundations: Data, Data, Everywhere [certificate]
- Ask Questions to Make Data-Driven Decisions [certificate]
- Prepare Data for Exploration [certificate]
- Process Data from Dirty to Clean [certificate]
- Analyse Data to Answer Questions [certificate]
- Share Data Through the Art of Visualisation [certificate]

WORK
EXPERIENCE

Power System Engineer (*Part-time*) Sep 2022 to Feb 2023

GSMT Consulting, Brisbane, Australia.

- Performed PSS/E due diligence assessments of generator performance standards (GPS) for Yabulu solar farm (QLD), Goulbourn River Solar Farm (NSW) and Bungala Battery Energy Storage (SA).
- Prepared technical reports for due diligence assessment of GPS.
- Participated in internal training for generator connection studies, PSS/E dynamic model development, python automation tools for power systems studies in PSS/E.

Electrical & Mechanical Engineer Oct 2016 to May 2018

Star Industrial Machinery (Pvt) Ltd, Kandy, Sri Lanka.

- Supervised the industrial training program for apprentices and trainees.
- Systematised the sizing of single-phase and three-phase induction motors for cement concrete mixers with drum capacities 340 Litres and 250 Litres.

- Designed and manufactured a pedal-assisted four-wheeler to be used in a research facility.

Trainee Power System Engineer

Oct 2014 to Jan 2015

Ceylon Electricity Board (CEB), Sri Lanka.

- Prepared proposals for transformer augmentations and reconductoring to mitigate under-voltage issues and to improve the voltage in remote residential distribution networks.
- Performed feasibility studies pertaining to load balancing in MV and LV distribution networks.

OTHER SKILLS

Technical Skills

- MATLAB, Python, OpenDSS, PSS/E, RSCAD, PSCAD, Microsoft Excel, SQL, Tableau, Tensorflow, Simulink, Linux (High-performance computing), Control theory, Data analytics

Soft Skills

- Verbal and Written Communication, Leadership, Team Work, Time Management, Problem-solving, Creativity, Work ethic

Industry Knowledge

- Power System studies, Electrical Machines, Electrical Design

ACTIVITIES AND INTERESTS

- Reviewer for IEEE Systems Journal, CSEE Journal of Power & Energy Systems, IETE Technical Review and Australian Journal of Electrical & Electronics Engineering
- Treasurer, University of Queensland Power and Energy Society Branch, 2020.
- Volunteer, IEEE and IEEE Power and Energy Society Branch, First-year Orientation program, The University of Queensland, February 2020.
- Rated Chess player, International Chess Federation (FIDE) — rating: 1879

PROFESSIONAL MEMBERSHIPS

Member

2016–present

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE Power and Energy Society (2017–present)
- IEEE Smart Grid Community (2019–present)
- IEEE Control Systems Society (2020–present)

Associate Member

2017–present

Institute of Engineers Sri Lanka (IESL)

Associate Engineer

2017–present

Engineering Council Sri Lanka (ECSL)

REFERENCES AVAILABLE TO CONTACT

Dr. Rahul Sharma (e-mail: rahul.sharma@uq.edu.au; phone: +61 7 336 57240)

- Senior Lecturer, School of Electrical Engineering and Computer Science, The University of Queensland, Australia.
- *Dr. Sharma was my PhD supervisor.*

Prof. Tapan K. Saha (e-mail: saha@itee.uq.edu.au; phone: +61 7 336 53962)

- Discipline Leader, Power, Energy and Control Engineering research group, The University of Queensland, Australia.
- *Prof. Saha was one of my PhD co-supervisors.*

Prof. Janaka B. Ekanayake (e-mail: ekanayakej@eng.pdn.ac.lk; phone: +94 81 239 3434)

- Chair Professor, Department of Electrical and Electronic Engineering, University of Peradeniya, Sri Lanka.
- *Prof. Ekanayake was my Master's thesis supervisor.*