

Dr. Singaravelan Arumugam

Associate Professor, Department of Electrical and Electronics Engineering
Nitte Meenakshi Institute of Technology (NMIT), Nitte (Deemed to be University), Bengaluru, India
Research Fellow, INTI International University, Malaysia · **Postdoc, POSTECH, South Korea**

> *Power electronics, solar and EV systems, embedded control and product design: hands-on, from concept to working hardware.*

Web drsingaravelan.com **Enquiries** drsingaravelan.com/contact
LinkedIn linkedin.com/in/dr-singaravelan-a-1ba751100 **YouTube** youtube.com/@DrSingaravelanA
ORCID 0000-0001-9599-4893

Real hardware
10.5 kW interleaved boost · SiC DAB · GaN CC-CV charging

Industry consultant
MPPT and charger firmware delivered to Aviva Smart Solutions

International
Postdoc, POSTECH Korea · Research Fellow, INTI Malaysia

Resource person
Cambridge IT · INTI Malaysia · KwantumG FDP (2026)

13+ years
teaching, research and lab development

PROFILE

A hands-on power electronics researcher who turns control ideas into working hardware: MPPT firmware on TI C2000 and dsPIC controllers, a 10.5 kW interleaved boost converter at POSTECH, and SiC dual-active-bridge and GaN converters on FPGA-based real-time control at NMIT. Principal Consultant to industry for solar charge-controller firmware. Every workshop uses real lab hardware and live measurements that participants can repeat in their own labs.

WORKSHOPS & FDPS I OFFER

1 · Power Electronics

- DC-DC converter design and closed-loop control
- SiC and GaN devices, gate drivers, switching behaviour
- FPGA / DSP-based digital control of converters
- Measurement practice: probes, power analysis, efficiency

2 · Solar & Electric Vehicles

- PV modelling and MPPT on a PV array simulator
- Battery charging (CC-CV) with a GaN buck converter
- Bidirectional DAB converters for EV charging
- EV chargers, batteries and BMS, EV drive and inverter control fundamentals

3 · Embedded Systems, IoT & Robotics

- Microcontroller firmware: Arduino, ESP32, ARM Cortex-M (TM4C123), PIC / dsPIC
- Debugging and validating real-product firmware
- IoT energy monitoring with Modbus and MQTT
- Sensors, actuators and motor control for robotics

4 · Product Design & AI Tools

- AI-assisted PCB design in KiCad
- From schematic to PCB to working prototype
- PCB fabrication and assembly (through-hole and SMD)
- Hardware testing and troubleshooting methods

hands-on with real lab hardware

SIGNATURE WORKSHOP

Build a Smart Solar Charger: From Panel to Battery with MPPT and CC-CV Charging

PV simulator → MPPT → GaN buck converter charging a battery on a 12 kW battery simulator, shown live with measured waveforms. 1–2 days.

Formats: guest lecture · 1-day workshop · 2–5 day FDP · skill-lab training · offline or online · for faculty, students and industry engineers

RECENT WORKSHOPS AND FDPS

Oct 2026 — **Skill Lab Training, "Industrial Power Electronics"** · Cambridge Institute of Technology, Bengaluru (6–10 Oct)

Jul 2026 — **Workshop, "Embedded Systems for Sustainable Energy and Smart Applications"** · INTI International University, Malaysia

Aug 2026 — **Resource Person, 5-Day FDP on Quantum Machine Learning** · KwantumG Research Labs, Bengaluru (incubated under NSRCEL, IIM Bangalore)

Jul 2026 — **Workshop, "Introduction to Programming and Smart System Applications for Business Innovation"** · INTI International University, Malaysia

INDUSTRY CONSULTANCY

May–Oct 2026 — **Principal Consultant, Aviva Smart Solutions Pvt. Ltd., Bengaluru**
MPPT firmware and battery-charger algorithm development for an existing solar buck charge controller (NMIT proposal NMIT/EEE/2026/026)

- MPPT firmware with load curtailment that limits charging current to the battery setting, independent of PV array size
- Diagnosed the earlier firmware's high-current trips; improved it in controlled, documented steps
- Structured bench testing on a programmable PV array simulator; delivered the report and a firmware build for field evaluation

EXPERIENCE

2024 – present — **Associate Professor, Dept. of EEE** · NMIT, Bengaluru (Assistant Professor, Aug 2022 – Aug 2024)

2026 – 2028 — **Research Fellow** · INTI International University, Malaysia (Feb 2026 – Dec 2028) · Visiting Scholar, 2–6 July 2026

2024 – 2025 — **Postdoctoral Researcher, Energy Lab, Dept. of Electrical Engineering** · POSTECH, South Korea

- Partial-shading MPPT on a TI F280049C controller, demonstrated on a 10.5 kW interleaved boost converter
- Solar inverter performance testing and inverter–PV–grid simulator communication checks for Korean certification

2013 – 2022 — **Earlier positions** · Senior Assistant Professor, New Horizon College of Engineering, Bengaluru (2018–22) · Assistant Professor (Junior) and Research Associate, School of Electrical Engineering, VIT Vellore (2014–18) · Assistant Professor, EEE, Global Institute of Engineering and Technology, Vellore (2013–14)

LAB & HANDS-ON CAPABILITY

- In-charge, **Product Design and Development Lab**, Dept. of EEE, NMIT
- Faculty in-charge and system administrator, **PARAM Shavak** supercomputer, Dept. of EEE
- SiC dual-active-bridge and interleaved boost hardware on a Wavect Tru-Control FPGA real-time controller
- GaN synchronous buck CC-CV charging demonstrated on an ITECH IT6012C-500-80 (12 kW) battery simulator

TI C2000 · CCS | dsPIC33 | ESP32 | TM4C123 | Arduino | Raspberry Pi | FPGA control | MATLAB / Simulink | LabVIEW | Python | KiCad | PCB fabrication & SMD assembly | Tektronix MDO34 power analysis | PV & battery simulators

Teaches power electronics, embedded systems labs and the M.Tech course *Advanced Battery Technology for EV*. Guides UG, M.Tech and Ph.D. research.

SELECTED PUBLICATIONS

29 Scopus-indexed publications · 261 citations · h-index 11 (Scopus ID 55810671600, November 2026)

1. **A. Singaravelan**, B. Gunapriya, S. Sujitha, V. Sekhar, "**Design and implementation of wireless charger for EV with high alignment tolerance: Gannet Optimization Algorithm (GOA)**," *Optimal Control Applications and Methods*, 47(3), 719–734, 2026. doi:10.1002/oca.70070
2. T. Poompavai, M. Kowsalya, **A. Singaravelan**, et al., "**Standalone solar water pump incorporating modified seven-level inverter and fitness dependent optimizer based MPPT technique**," *Discover Applied Sciences*, 8(9), 974, 2026.
3. **A. Singaravelan**, A. Shibindas, N. Samanvita, et al., "**Closed-loop PI control of a buck converter on Wavect TruControl: a hardware-validated approach for power conversion**," *IEEE i-PACT 2025*.
4. **A. Singaravelan**, M. Kowsalya, J. Prasanth Ram, B. Gunapriya, Y. Kim, "**Application of two-phase simplex method (TPSM) for an efficient home energy management system to reduce peak demand and consumer consumption cost**," *IEEE Access*, 9, 63591–63601, 2021.
5. **A. Singaravelan**, M. Kowsalya, "**A novel minimum cost maximum power algorithm for future smart home energy management**," *Journal of Advanced Research* (Elsevier), 8(6), 731–741, 2017.

EDUCATION

2019 — **Ph.D.** · VIT, Vellore
Thesis: An efficient home energy management system for reducing operational cost and peak demand

2013 — **M.Tech, Power Electronics and Drives** · VIT, Vellore

2010 — **B.Tech, Electronics and Communication Engg.** · Dr. M.G.R. University, Chennai

INVITE ME

For FDPs, workshops, guest lectures, lab set-up advice or industry projects, send your institution, topic, dates and audience through the enquiry form:

drsingaravelan.com/contact

ACADEMIC SERVICE

Session Chair: IEEE SPERT 2025, SVNIT Surat (Dec 2025) · ICNGSMCA-26, Cambridge IT (Jul 2026)