Kabilan Senthil

M.Sc. Electrical Engineering Student | Power Electronics

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Profile

Master's student in Electrical Engineering at the University of Stuttgart (Power Electronics), with a strong interest in battery technology. Looking for a student assistant position and future PhD opportunities in battery technology or electrified mobility research.

Education

M.Sc. Electrical Engineering - Power Electronics *10/2023 – Present*
University of Stuttgart Stuttgart, Germany

- Core subjects: Battery Modelling and Energy Management, Robust Power Semiconductor Systems, Engineering Materials, Embedded Systems, Applied Numerical Field Computations

B.E. Electronics and Communication Engineering *08/2019 – 05/2023*
R.M.K. Engineering College, Anna University Chennai, India

- Final grade: 9.14 / 10 CGPA , German equivalent grade: 1.7
- Major subjects: Electronic Devices, Electronic Circuits, Control System Engineering, VLSI Design, Microprocessors and Microcontrollers

Research & Professional Experience

Student Research Assistant *12/2024 – 07/2026*
Fraunhofer-Institut für Produktionstechnik und Automatisierung IPA Stuttgart, Germany

- Develop physics-based electrochemical and thermo-electrical simulation workflows for lithium-ion and sodium-ion cylindrical cells
- Focus on degradation analysis, formation optimisation, ageing behaviour, and cell design evaluation
- Combine PyBaMM-based modelling with studies of cylindrical cell architectures to support virtual prototyping and digital battery engineering

Intern – Automation Maintenance *02/2022 – 06/2022*
Hyundai Motor India Ltd. Chennai, India

- Worked within the Industrial Automation Maintenance team, gaining hands-on exposure to car manufacturing operations and PLC-based control systems
- Developed a focused interest in ECUs/ECMs, motivating subsequent specialisation in embedded and power electronics

Intern – Electric Vehicles Programme *08/2021*
National Small Industries Corporation Chennai, India

- Studied EV design, drivetrain framework, and future scope of electric mobility
- Built a basic electric bike as part of a hands-on training program

Projects

Modelling Optimised Cylindrical Cell Designs for Lithium-ion and Sodium-ion Batteries *Ongoing*
Erstprüfer: Prof. Dr.-Ing. Kai-Peter Birke, Betreuer: Daniel Reichert

Develop and analyse optimised cylindrical battery cell designs

Simulative Optimization of SEI Formation in Lithium-Ion Batteries as a Function of Electrode Thickness using PyBaMM *06/2025 – 02/2026*
Erstprüfer: Prof. Dr.-Ing. Kai-Peter Birke, Betreuer: Daniel Reichert

Conducted physics-based electrochemical modelling of lithium-ion batteries using PyBaMM to optimise cell formation, SEI growth, degradation behaviour, and electrode design

Design and Implementation of a Water Component Tester using PLC *12/2022 – 05/2023*
Published at: IEEE ICCPCT 2023 (International Conference on Circuit, Power and Computing Technologies), Kollam, India.

Designed and developed a custom test rig for functional validation of a customer-specific fuel system component

DOI: 10.1109/ICCPCT58313.2023.10245006 | IEEE Xplore: https://ieeexplore.ieee.org/document/10245006

Emergency Alert *08/2022 – 10/2022*

Voice Based SOS alerting module

Technical Skills

- **Programming & Simulation:** Python, C, MATLAB, LTspice, PyBaMM, Arduino, COMSOL Multiphysics
- **Domain Expertise:** Battery Modelling, Computational Electrochemistry, Battery Degradation Analysis, Power Semiconductor Systems, Embedded Systems, EV Powertrain Fundamentals
- **Tools:** Microsoft Office, Software Design Patterns & Architecture

Languages

- **Tamil:** Native | **English:** C2 (Proficient User) | **German:** A1

Leadership & Extracurricular Activities

- **Vorstand, Studentische Selbstverwaltung und Tutorium Allmandring e. V.** – Student Association (Ongoing)
- **President, Department Student Body** – University student body (06/2022 – 05/2023)
- **Head, Organizing Committee, HON-E-KEN'22** – National-level technical symposium (08/2022 – 09/2022)
- **Class Representative** – R. M. K. Engineering College (08/2019 – 05/2023)