MD SAMAR AHMAD

Ph.D in Electrical Enginnering, Scientist, ARTC, A*STAR, Singapore

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ABOUT MYSELF

- Results-driven scientist with 8+ years of experience in mathematical modelling, Power System, Renewable Energy Integration, AI-driven forecasting, Model-Based Design, Simulation & HIL Testing, Hardware POC (TRL 6-8) and optimization for electrified power and energy storage systems using MATLAB, Python, C, and PLC.
- Developed and deployed advanced planning and optimization frameworks for international stakeholders, supporting data-driven analysis in EV Charger Infra, BESS development and integration, microgrid sizing, techno-economic assessment, and large-scale industrial integration across diverse energy systems.

JOB EXPERIENCE

Scientist I | Technical Lead

Advanced Remanufacturing and Technology Centre (ARTC), Agency for Science, Technology and Research (A*STAR), Singapore

📅 March 2023 - present   📍 Singapore

Research Scientist

Rolls-Royce Corporate Lab @ NTU

📅 May 2019- March 2023   📍 Singapore

CORE COMPETENCIES

Electrical & Power Systems

Load-Flow   Microgrid   ESS   BMS   EMS   PV
EV Charger   Load/Energy Forecast   Automation
Plant Modelling   Techno-Economic Analysis
Controller Design   DSM

Development Tools

MATLAB   Simulink   SpeedGoat   PowerFactory
HOMER Pro   TwinCAT   B&R   Visual Studio
Jupyter Lab   Spyder   Obsidian   Git   Docker
Linux   RDBMS   GAMs

Programming & Scripting

C/C++   Python   ST   SQL   MongoDB   LaTeX
Markdown   JavaScript

Applications & Frameworks

Optimization   Operations Research   MILP   MINLP
Multi-Objective   Meta-Heuristic   Probabilistic Modeling
RestAPI   FastAPI   GLPK   Power System Analysis
CAN   RS232/485   SAE J1772   ISO 15118
PMS

STRENGTHS

Flow-Mode   Improvise   Team Work   Leadership
Persuasive   Tech-Lead   Deep-work   R&D

PROJECT EXPERIENCE

Develop and deploy Second Life ESS Conversion Framework using retired EV

ARTC-A*STAR

📅 May 2024 – Ongoing   📍 Singapore

- Developed universal framework for second-life EV battery repurposing incorporating reverse-engineered CAN protocols and machine learning-driven State-of-Charge/State-of-Health estimation across LFP, NMC, and LMP chemistries.
- Validated system robustness through Hardware-in-the-Loop (HIL) testing with standardized BMS interface, eliminating OEM data dependency and enabling vendor-agnostic battery integration.

EV Charger Maintenance Data Analysis of Shell's Charger

ARTC-A*STAR

📅 Oct 2024 – Ongoing   📍 Singapore

- Built an anomaly detection framework using OCPP 1.6J data from 600+ EV chargers, enabling fault pattern recognition via clustering and statistical validation of preventive maintenance effectiveness.
- Leveraged generative AI to automate severity classification from unstructured maintenance logs, improving diagnostic efficiency.

Predictive Maintenance of EV Charger Cable

ARTC-A*STAR

📅 March 2024 – March 2025   📍 Singapore

- Developed a DOE framework for accelerated ageing testing of EV chargers using robotic cable handling and SAE J1772 load profiles, identifying temperature sensors as primary failure points via mechanical stress monitoring.
- Recommended integration of sensor health monitoring into preventive maintenance to prevent ISO-15118 infrastructure failures.

Mobile EV Charger : Contact Type
ARTC-A*STAR

📅 Oct 2024 – Feb 2026 📍 Singapore

- Extended wireless EV charging infrastructure with CCS-2 integration for unified EV and ESS charging (IEC 15118).
- Enabled seamless ESS-CCS-2 operation via automatic engagement/disengagement and OCPP-based interoperability.
- Reduced carbon footprint and payload through second-life battery repurposing and circular economy design.

Hybrid Mobile EV Charging System : Wireless
ARTC-A*STAR

📅 July 2023 – Oct 2024 📍 Singapore

- Automated ESS deployment for seamless EV charging support with AI-driven peak shaving and predictive availability.
- Unified platform integrating AGVs, chargers, battery packs, and mobile apps with intelligent scheduling and load forecasting.
- Real-time ESS monitoring and safety system featuring predictive fault detection for enhanced reliability.

Early Detection of Thermal Runaway in EV Batteries
ARTC-A*STAR

📅 April 2023 – April 2024 📍 Singapore

- Developed MATLAB-based electro-thermal models for EV battery packs, validated with ARC test data to simulate thermal runaway propagation.
- Designed a real-time detection algorithm that identifies early thermal runaway signs through correlated electrical and thermal anomalies.

EV Fleet Battery pack optimization (Phase-1)
ARTC-A*STAR

📅 May 2023 – Jan 2024 📍 Singapore

- Designed a data logging framework and anomaly detection system for SingPost EV fleet, enabling real-time telemetry capture and identification of energy inefficiencies and route deviations.
- Conducted empirical analysis of urban logistics EV usage patterns in Singapore, delivering insights into energy consumption profiles and operational behavior for fleet optimization.

EV Fleet Battery life optimization (Phase-2)
ARTC-A*STAR

📅 March 2024 – Jan 2025 📍 Singapore

- Extended EV fleet data collection and analysis to characterize operational patterns under urban delivery conditions, enabling data-driven fleet performance insights.
- Developed route optimization and driver-to-route matching algorithms; synthesized drive profiles for predictive energy consumption and performance modeling.

Electrification of Refrigeration Truck - Hwee Jan (Singapore SME)
ARTC-A*STAR

📅 May 2023 – June 2024 📍 Singapore

- Designed and commissioned second-life battery energy storage system (BESS) for refrigerated trucks, enabling auxiliary refrigeration during vehicle standby without engine idling.
- Developed dual-charging strategy optimizing compatibility across domestic and commercial EV infrastructure, maximizing operational flexibility and grid integration.
- Eliminated ICE idling during extended parking, reducing operational costs and emissions while extending refrigeration uptime.

Second Life ESS Conversion – 2-Wheeler Battery Systems
ARTC-A*STAR

📅 May 2023 – Ongoing 📍 Singapore

- Designed intuitive user interfaces and edge AI-driven Energy Management System (EMS) for load forecasting, optimization, and battery scheduling in second-life ESS deployments.
- Conducted comprehensive battery testing, remaining useful life (RUL) estimation, BMS replacement, system integration, and Hardware-in-the-Loop (HIL) validation with IEC 62933-2-1 compliance and remote monitoring.
- Delivered integrated, remotely monitored ESS with real-time diagnostics, predictive maintenance, and operational resilience.

Unified Electro-Thermal Microgrid Controller – Development & Delivery
ROLLS-ROYCE@NTU CORPORATE LAB

📅 March 2020 – March 2023 📍 Singapore

- Developed real-time dynamic Levelized Cost of Energy (e-LCOE) methodology integrating economic variables and asset control strategies for hydrogen and flow-battery systems in microgrid environments, enabling techno-economic optimization.

Hybrid Rail Power System – Optimization & Control
ROLLS-ROYCE@NTU CORPORATE LAB

📅 Aug 2021 – June 2022 📍 Singapore

- Designed optimal energy management controller for hybrid diesel-electric railway systems, dynamically balancing power distribution between diesel generators and energy storage to minimize fuel consumption and emissions.
- Developed and validated real-time control algorithms through comprehensive system modeling and simulation, demonstrating robust performance across diverse load profiles and operating scenarios.

Land-based Microgrid Controller Development
ROLLS-ROYCE@NTU CORPORATE LAB

📅 May 2019 – March 2020 📍 Singapore

- Successful product delivery of bespoke microgrid controller for the external customers – gas generator, diesel generators, energy storages, fuel cell, PV and grid
- Validated the microgrid controller performance on 5MW testbed in Galieos, Germany.

LIFE PHILOSOPHY

"You Plan Yourself but God is a better planner."

MOST PROUD OF

🏆 **Courage I had**
Followed my dream and went for higher study after my bachelor degree even if I had a job offer from top software company.

💗 **Hard work Pays**
Awarded 'Star Researcher Award' for excellent contribution for my work by Rolls Royce Corporate lab(2020-2022)

📈 **Key Achievement**
Demonstrated in-house developed mobile EV charging solution powered by second-life battery packs to Singapore's Deputy Prime Minister at Industrial Transformation ASIA-PACIFIC (ITAP) 2024.

LANGUAGES

English
Hindi
Urdu

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EDUCATION

Ph.D in Electrical Engineering, Power System
Indian Institute of Technology Patna, India
📅 April 2013 – March 2019

B.Tech. in Electrical and Electronics Engineering
Kalinga Institue of Industrial Technology, India
📅 Aug 2008 – July 2012

PUBLICATIONS

📄 **Journal Articles**

- Sadhukhan, A., Ahmad, M. S., & Sivasubramani, S. (2021). Optimal allocation of ev charging stations in a radial distribution network using probabilistic load modeling. *IEEE Transactions on Intelligent Transportation Systems*.
- Ahmad, M. S., & Sivasubramani, S. [Shanmugavelu]. (2019). Potential impacts of emission control policy on the vehicle to grid environment: A novel approach. *IET Smart Grid*, *2*(1), 50–59.
- Ahmad, M. S., & Sivasubramani, S. (2018). Optimal number of electric vehicles for existing networks considering economic and emission dispatch. *IEEE Transactions on Industrial Informatics*, *15*(4), 1926–1935.
- Sivasubramani, S., & Ahmad, M. S. (2014). Hybrid harmony search algorithm and interior point method for economic dispatch with valve-point effect. *International Journal of Emerging Electric Power Systems*, *15*(3), 253–261.

👥 Conference Proceedings

- Sadhukhan, A., Sivasubramani, S., & Ahmad, M. S. (2019). Optimal placement of electric vehicle charging stations in a distribution network. In *2019 8th international conference on power systems (icps)* (pp. 1–6). IEEE.
- Ahmad, M. S., & Sivasubramani, S. (2016a). Feasibility of v2g ideology in developing economy: Operation, analysis and impact. In *2016 national power systems conference (npsc)* (pp. 1–5). IEEE.
- Ahmad, M. S., & Sivasubramani, S. (2016b). Multi-objective v2g energy storage system for grid support with cost and emission reduction. In *2016 ieee region 10 conference (tencon)* (pp. 1925–1928). IEEE.
- Ahmad, M. S., & Sivasubramani, S. (2015). Optimal solution of plug in hybrid electric vehicles to minimize cost and emission in a smart grid-a developing country view. In *2015 ieee power & energy society general meeting* (pp. 1–5). IEEE.

REFEREES

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