Md Sabbir Hossen

AI Researcher — Smart Energy Systems — EV Charging — Second-Life Batteries
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Research Profile

AI researcher specializing in smart energy systems, electric vehicle charging, second-life battery (SLB) technologies, artificial intelligence, and sustainable power infrastructure. My research integrates reinforcement learning, machine learning, optimization, battery diagnostics, and data-driven modelling to develop intelligent solutions for energy transition. My work has resulted in multiple first-author publications in internationally recognized journals, contributing to EV charging optimization, battery health estimation, smart grids, and sustainable energy management.

Research Interests

Artificial Intelligence for Sustainable Energy Systems; Battery Intelligence; Battery State-of-Health Estimation; Second-Life Battery Technologies; Battery Digital Passport; Electric Vehicle Charging Systems; Machine Learning; Reinforcement Learning; Smart Grid Optimization; Power Electronics; Energy System Optimization; Digital Twin Technologies

Publications

First-Author Journal Articles

- **Hossen, M. S.**, Al Qwaid, M., & Ramasamy, G., "Predict-Then-Optimize EV Charging Scheduling: When Higher Forecast Accuracy Fails to Improve Peak Shaving, with Second-Life Battery Characterization," *Journal of Engineering Research* Vol. (2026). DOI: https://doi.org/10.1016/j.jer.2026.11.019
- **Hossen, M. S.**, Ramasamy, G., & Al Qwaid, M., "A Battery Health State Index-Driven Digital Twin Framework for Battery Condition Assessment and Predictive Maintenance in Electric Vehicle Charging Environments," *Scientific Reports*, 2026. DOI: https://doi.org/10.1038/s41598-026-67798-y
- **Hossen, M. S.**, Ramasamy, G., Eng Eng, N., & Al Qwaid, M., "Experimental Multi-Metric Health Assessment of Second-Life Electric Vehicle Batteries for Reuse Pathway Classification," *Batteries* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 6.3**], Vol. 12, Article 265, 2026. DOI: https://doi.org/10.3390/batteries12070265
- **Hossen, M. S.**, Ramasamy, G., & Al Qwaid, M., "A Sustainable Charging Session Index (SCSI): A Data-Driven Framework for Evaluating Electric Vehicle Charging Session Sustainability," *Energies* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 3.2**], Vol. 19, Article 3366, 2026. DOI: https://doi.org/10.3390/en19143366
- **Hossen, M. S.**, Ramasamy, G., & Al Qwaid, M., "An Integrated Machine Learning Framework for EV Charging Behavior Characterization and Anomaly Detection in Public Charging Infrastructure," *Applied Sciences* [**SCIE WoS: Q2, SJR: Q2, Scopus: Q2, Impact Factor: 2.9**], Vol. 16, Article 7203, 2026. DOI: https://doi.org/10.3390/app16147203
- **Hossen, M. S.**, et al., "Intelligent EV Charging Management in Smart Grids Using OCPP: Forecasting, Fair Scheduling, and Cybersecure Optimization," *IEEE Systems Journal* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 4.9**], 2026. DOI: https://doi.org/10.1109/JSYST.2026.3752811
- **Hossen, M. S.**, et al., "Smarter Electric Vehicle Charging from Open Charge Point Protocol Data: Reducing Grid Peaks and Energy Costs with Tariff-Aware Scheduling," *Smart Energy* [**ESCI WoS: Q2, SJR: Q1, Scopus: Q1, Impact Factor: 6.1**], Article 100267, 2026.
https://doi.org/10.1016/j.segy.2026.100267
- **Hossen, M. S.**, Sarker, M. T., Ramasamy, G., & Eng, N. E., "Safe and Tariff-Aware Reinforcement Learning for EV Charging Using Real OCPP Data," *Energy Reports* [**SCIE WoS: Q2, SJR: Q1, Scopus: Q1, Impact Factor: 6.6**], Vol. 16, Article 109498, 2026.
https://doi.org/10.1016/j.egyr.2026.109498
- **Hossen, M. S.**, Ramasamy, G., Eng, N. E., et al., "OCPP Integrated Artificial Intelligence for Forecasting, Scheduling and Anomaly Detection in City-Scale Electric Vehicle Charging under Urban Tariffs," *Scientific Reports* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 4.9**], Vol. 16, Article 19725, 2026.
https://doi.org/10.1038/s41598-026-49535-7
- **Hossen, M. S.**, Ramasamy, G., & Eng, N. E., "AI-OCPP Framework for Smart and Safe EV Charging: Real-World Performance Evaluation," *IEEE Access* [**SCIE WoS: Q2, SJR: Q1, Scopus: Q1, Impact Factor: 4.2**], 2026. DOI: https://doi.org/10.1109/ACCESS.2026.3666978
- **Hossen, M. S.**, Ramasamy, G., Sarker, M. T., & Eng, N. E., "Real-World Tariff-Aware Safe Reinforcement Learning for Grid-Stable OCPP EV Charging Networks," *IEEE Access* [**SCIE WoS: Q2, SJR: Q1, Scopus: Q1, Impact Factor: 4.2**], 2026. DOI:
https://doi.org/10.1109/ACCESS.2026.3657040
- **Hossen, M. S.**, Ramasamy, G., Eng Eng, N., & Al Qwaid, M., "An Anomaly-Aware, Q-Learning Framework for Real-Time Scheduling in Multi-Station EV Charging Networks," *Electronics* [**SCIE WoS: Q2, SJR: Q2, Scopus: Q2, Impact Factor:**

2.9], Vol. 15, Article 2494, 2026. DOI: https://doi.org/10.3390/electronics15112494

- **Hossen, M. S.**, Sarker, M. T., Ramasamy, G., & Eng, N. E., "Physics-Informed and Explainable Machine Learning for State-of-Health Estimation of Second-Life Lithium-Ion Batteries Under Sparse Cycling," *Batteries* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 6.3**], 2026. DOI: https://doi.org/10.3390/batteries12050149
- **Hossen, M. S.**, Sarker, M., Ramasamy, G., et al., "Quantifying Carbon Emission Reduction from Carbon-Aware Electric Vehicle Charging in Distribution Power Networks," *Carbon Research* [**Scopus: Q1, SJR: Q1**], Vol. 5, Article 43, 2026. https://doi.org/10.1007/s44246-026-00280-6
- **Hossen, M. S.**, Sarker, M. T., Al Qwaid, M., Ramasamy, G., & Eng, N. E., "AI-Driven Framework for Secure and Efficient Load Management in Multi-Station EV Charging Networks," *World Electric Vehicle Journal* [**ESCI WoS: Q2, SJR: Q2, Scopus: Q2, Impact Factor: 3.3**], 2025. DOI: https://doi.org/10.3390/wevj16070370
- **Hossen, M. S.**, Sarker, M. T., Nabi, M. S., Bannah, H., Ramasamy, G., & Eng, N. E., "Federated AI-OCPP Framework for Secure and Scalable EV Charging in Smart Cities," *Urban Science* [**ESCI WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 3.2**], 2025. DOI: https://doi.org/10.3390/urbansci9090363

First-Author Conference Publication

- **Hossen, M. S.**, Sarker, M. T., Ramasamy, G., Eng, N. E., Al Farid, F., & Sadeque, M. G., "Integration of AI-Driven Systems with Open Charge Point Protocol (OCPP) for Enhanced Electric Vehicle Charging Management," *Proceedings of the IEEE Malaysia Technical Scientist Association Conference on Engineering and Technology (MECON)*, 2025. DOI: https://doi.org/10.1109/MECON67253.2025.11277062

Co-Author Journal Articles

- Sarker, M. T., Al Qwaid, M., **Hossen, M. S.**, & Ramasamy, G., "Performance Optimization of Grounding System for Multi-Voltage Electrical Installation," *Applied Sciences* [**SCIE WoS: Q2, SJR: Q2, Scopus: Q2, Impact Factor: 2.9**], Vol. 15, No. 15, Article 8600, 2025. DOI: https://doi.org/10.3390/app15158600
- Sarker, M. T., **Hossen, M. S.**, Ramasamy, G., et al., "Techno-Economic and Environmental Evaluation of Second-Life Battery PV Hybrid Charging Stations for Sustainable E-Mobility in Tropical Regions," *Scientific Reports* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 4.9**], Vol. 16, Article 8195, 2026. DOI: https://doi.org/10.1038/s41598-026-39034-0
- Sarker, M. T., Ramasamy, G., Al Qwaid, M., et al., "AI-Driven Smart Grid Optimization for Hospital Energy Systems Integrating Renewable Generation, Predictive Maintenance, and Resilient Infrastructure," *Scientific Reports* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 4.9**], Vol. 15, Article 44787, 2025. DOI: https://doi.org/10.1038/s41598-025-28907-5
- Al Qwaid, M., Sarker, M. T., **Hossen, M. S.**, Shawon, S. M., & Karim, H. A., "A Hybrid ANN–RF and IoT-Enabled Framework for Water Energy Optimization in Arid Smart Farming: Evidence from Saudi Arabia," *Smart Agricultural Technology* [**WoS: Q1, Scopus: Q1, SJR: Q1, Impact Factor: 7.1**], Vol. 14, Article 102098, 2026. DOI: https://doi.org/10.1016/j.atech.2026.102098
- Siddiquee, K. NeA., Sarker, M. T., Al Qwaid, M., et al., "Advanced machine learning techniques for daily streamflow forecasting: a case study of the Brahmaputra River," *Scientific Reports* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 4.9**], Vol. 16, Article 35242, 2026. DOI: https://doi.org/10.1038/s41598-026-69747-1
- Al Qwaid, M., Ramasamy, G., **Hossen, M. S.**, "Physics-Informed Attention-Enhanced Reinforcement Learning for Safe and Explainable Fast Charging of Lithium-Ion Batteries," *Batteries* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 6.3**], Vol. 12, Article 323, 2026. DOI: https://doi.org/10.3390/batteries12090323
- Al Qwaid, M., Ramasamy, G., **Hossen, M. S.**, "A data-driven framework for assessing second-life electric vehicle batteries for stationary energy storage applications," *Energies* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 3.2**], Vol. 19, No. 16, Article 3876, 2026. DOI: https://doi.org/10.3390/en19163876
- Al Qwaid, M., Ramasamy, G., **Hossen, M. S.**, "Federated Anomaly Detection for IoT-Enabled EV Charging Cybersecurity Under Aggressive and Stealth Cyberattacks," *Sensors* [**SCIE WoS: Q1, SJR: Q1, Scopus: Q1, Impact Factor: 3.5**], Vol. 26, Article 5541, 2026. DOI: https://doi.org/10.3390/s26175541

Publication Summary

Total Publications: 26
First-Author Publications: 18
Co-Author Publications: 8
Journal Articles: 14
Conference Papers: 1
Google Scholar Citations: 199
h-index: 8

i10-index: 7

Education

Doctor of Philosophy in Engineering (PhD) *Nov 2026 – Nov 2031*
Multimedia University (MMU), Malaysia
Faculty of Artificial Intelligence and Engineering
Research Thesis: Digital Battery Passport-Enabled Lifecycle Intelligence for Sustainable Second-Life Battery Deployment in EV Charging Ecosystems

Master of Engineering Science (By Research) *Nov 2024 – May 2026*
Multimedia University, Malaysia
Thesis: Integration of AI-Driven Systems with Open Charge Point Protocol for Enhanced Electric Vehicle Charging Management

B.Sc. in Computer Science and Engineering *2016 – 2022*
North Western University, Bangladesh
CGPA: 2.83/4.00

Diploma in Computer Science and Technology *2009 – 2013*
Jessore Polytechnic Institute, Bangladesh
CGPA: 3.38/4.00

Research Experience

Postgraduate Researcher, Multimedia University Nov 2024 – May 2026

- Developed reinforcement learning models (PPO and Q-Learning) for EV charging and smart grid optimization.
- Designed multi-station OCPP simulation environments using real Malaysian charging datasets.
- Achieved 25–40% peak-load reduction and approximately 30% energy-cost savings.
- Developed forecasting models using LSTM, GRU, XGBoost, and Prophet for charging-demand prediction.
- Conducted carbon-aware energy optimization studies to reduce operational emissions.
- Investigated second-life EV battery integration for sustainable energy storage and grid support.
- Developed federated learning frameworks for privacy-preserving smart energy systems.

Research Assistant (RA), Multimedia University May 2026 – Oct 2026

- Conduct research on artificial intelligence, smart energy systems, electric vehicle charging, and second-life battery technologies.
- Develop data-driven and AI-based methodologies for intelligent energy management, battery diagnostics, and sustainable energy systems.
- Conduct research, computational modelling, data analysis, manuscript preparation, and publication activities.

Student Mentorship

Bachelor Final Year Project (FYP) 2026

- Mentoring the undergraduate research project entitled *"Feasibility Study on Second-Life Electric Vehicle Batteries for Photovoltaic Energy Storage Systems."*
- Mentoring the undergraduate research project entitled *"Quantifying the Environmental Value of Second-Life Electric Vehicle Batteries Through Green Cost Modelling: From Battery Reuse to Sustainable Cost Reduction."*

Selected Projects

AI-Driven OCPP Framework for EV Charging Dec 2024 - March 2025

- Optimized EV charging across 6 stations under 80 kW grid constraint
- Reduced peak demand and improved grid stability using RL-based scheduling

Federated AI-OCPP Network for Smart Cities March 2025 - Aug 2025

- Designed distributed learning system for scalable EV infrastructure
- Enhanced privacy and resilience in smart energy networks

Second-Life Battery Integration for Smart Grids Sept 2025 - Feb 2026

- Investigated reuse of EV batteries for stationary energy storage
- Modeled sustainable energy storage with AI-driven optimization

Technical Skills

Programming: Python, MATLAB

Machine Learning: Reinforcement Learning (PPO, Q-Learning), Deep Learning (LSTM, GRU), Federated Learning, Explainable AI

Data Analytics: XGBoost, Prophet, Time-Series Forecasting, Data Preprocessing

Energy Systems: Smart Grids, EV Charging Infrastructure, OCPP, Second-Life Batteries, Carbon-Aware Optimization

Research Tools: TensorFlow, Git, GitHub, LaTeX, Overleaf

Academic Service

Peer Reviewer and Invited Reviewer *2026*

- Peer Reviewer for international academic journals, evaluating manuscripts in artificial intelligence, smart energy systems, electric vehicle technologies, and battery research.
- Invited Reviewer for the IEEE Malaysia Technical Scientist Association Conference on Engineering and Technology (MECON 2026), reviewing manuscripts in artificial intelligence, smart energy systems, and power engineering.

Awards

- **Permata TM Award** Best performer in Master's Degree 2026.
- **Silver Medal** iNVENTX 2026 International Innovation Competition.
- **Bronze Medal** iNVENTX 2026 International Innovation Competition.
- **Gold Medal** Innovation Exhibition for AI-Driven Sustainable Energy System Research 2025.
- 3MT Competition Participant, Multimedia University. 2025

Leadership

Research Team Leader – AI-OCPP Smart Charging Project Nov 2024 – March 2026

- Led interdisciplinary research activities involving AI-driven EV charging and smart grid optimization.
- Coordinated model development, experimentation, manuscript preparation, and publication activities.

References

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Co-Supervisor and Research Collaborator