Mohamed Abuella

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Summary

My research develops data-driven decision analytics for integrated energy systems to support the transition toward net-zero energy infrastructures. I combine artificial intelligence, optimization, and game-theoretic modeling to analyze the planning and operation of modern energy systems with high penetration of renewable resources and emerging technologies such as hydrogen.

My work spans energy forecasting, spatiotemporal analytics, and strategic infrastructure planning, with applications in renewable integration, energy efficiency, and sector coupling. Through interdisciplinary research that bridges power systems engineering, artificial intelligence, and policy-oriented modeling, I aim to develop analytical tools that support resilient, efficient, and sustainable energy transitions.

I am particularly interested in advancing AI-enabled decision support for complex socio-technical energy systems and collaborating across academia, industry, and policy stakeholders to accelerate the deployment of sustainable energy solutions.

Education

University of North Carolina at Charlotte (UNCC) **USA**
Ph.D in Electrical Engineering, GPA 4.0 *2014–2018*

Southern Illinois University at Carbondale (SIUC) **USA**
M.Sc in Electrical and Computer Engineering, GPA 4.0 *2010–2012*

Higher Polytechnic Institute & College of Industrial Technology at Misurata **Libya**
DipHE in Instrumentation 82%, and B.Tech Electromechanical Engineering, 86% *2002–2008*

Experience

Research Fellow **UK**
Northumbria University, Department of Mathematics, Physics and Engineering *May 2024–Present*
Supporting the delivery of the "Hydrogen Integration for Accelerated Energy Transitions (HI-ACT)" research project.
○ Acquired Expertise: *Integrated Energy Systems, Game Theory, Strategic & Policy Modeling, Hydrogen Integration, Energy Transition*

Researcher **Sweden**
Halmstad University *April 2022–April 2024*
Postdoctoral Researcher at the Center for Applied Intelligent Systems Research (CAISR). Research on AI for Sustainability applying Machine Learning techniques.
○ Acquired Expertise: *Integrated Industry-Academia Collaboration, Big-Data & Spatiotemporal Analysis, Explainable AI (XAI), Research Methodologies & Project Supervision.*

Lecturer **Libya**
College of Industrial Technology at Misurata *February 2020–March 2022*
Taught Electrical Circuits, Electrical Measurements, Math 101.
○ Acquired Expertise: *Curriculum Revision & Preparing, Dedication, Listening, "Try to Modeling the Student's Way of Thinking".*

Research Assistant **USA**
Energy Production and Infrastructure Center (EPIC) at UNC Charlotte *2014–2019*
Statistical and Predictive Analytics to Modernize the Grid and Optimize its Integration of Renewables, focusing on Solar Energy Resources.
○ Acquired Expertise: *Energy Analytics, Energy Markets, Renewable Energy & Supply Chain, Machine Learning.*

M.Sc Research **USA**
Department of Electrical and Computer Engineering at SIUC *2010–2012*
Optimization for Electric Power Systems Including Wind Power.
○ Acquired Expertise: *Power Systems Analysis, Operation and Planning, Systems Optimization, Smart Grid.*

Teaching Assistant and Lab Instructor **Libya**
College of Industrial Technology at Misurata *2008–2009*
Taught Mathematics, Power Systems Analysis, and PLC.
○ Acquired Expertise: *Teaching, Tutorials, Lab Modeling & Simulations.*

Electrical Technician **Libya**
Residential Electrical Wiring and Water & Wastewater Company *2000–2008*
Wiring and maintain electrical control equipment.
○ Acquired Expertise: *Electrical Wiring & Installations, Maintenance & Operation.*

Recognitions

Best Paper Award (Third Prize): RPG 2025 – 14th Int. Conf. on Renewable Power Generation, Shanghai, China *2025*

Outstanding Reviewer: IEEE Transactions on Sustainable Energy *2017*

Third Prize for Student Papers: The 47th North American Power Symposium *2015*

The Institute Prize for team of Energy Analytics Lab at UNCC: Global Energy Forecasting Competition *2014*

The 1st Place: Department of Electromechanical Engineering at College of Industrial Technology *2008*

Publications

Authored numerous peer-reviewed publications (all as first author). For the complete list, see my Google Scholar profile: Mohamed Abuella. Accumulating over 700 citations and current H-index is **9**. my ORCID.

Journal Articles

1. M. Abuella, A. Allahham, S. L. Walker, "Game Theory Approaches to Hydrogen Infrastructure Investment Planning in Great Britain: A Comparative Analysis of Competitive and Cooperative Frameworks," *International Journal of Hydrogen Energy*, vol. 220, p. 154064, 2026. DOI: 10.1016/j.ijhydene.2026.154064.
2. M. Abuella, A. Allahham, S. L. Walker, "A Cooperative Planning Framework for Hydrogen Blending in Great Britain's Integrated Energy System," *Energies*, accepted, April 2026.
3. M. Abuella, A. Allahham, N. A. Rufa'I, S. L. Walker, "Hydrogen-Based Decarbonisation Strategies for Residential Heating: An Energy Efficiency and Conservation Analysis in the North of Tyne Region," *Energies*, vol. 18, no. 23, 2025, Article 6237. doi: 10.3390/en18236237.
4. M. Abuella, H. Fanaee, S. Nowaczyk, S. Johansson, E. Faghani, "Time-Series Analysis Approach for Improving Energy Efficiency of Fixed-Route Passenger Vessel in Short-Sea Shipping," *Ocean Engineering*, 334, 121555, 2025.
5. M. Abuella, M. Atoui, S. Nowaczyk, S. Johansson, E. Faghani, "Spatial Clustering Approach for Vessel Path Identification," *IEEE Access*, 2024.
6. M. Abuella and B. Chowdhury, "Forecasting of Solar Power Ramp Events: A Post-Processing Approach," *Renewable Energy*, 133, 1380-1392, 2019.
7. M. Abuella and B. Chowdhury, "Improving Combined Solar Power Forecasts Using Estimated Ramp Rates: Data-Driven Post-Processing Approach," *IET Renewable Power Generation*, 12(10), 1127-1135, 2018.

Manuscript Under Review

M. Abuella, A. Allahham, S. L. Walker, "A Policy-Navigation Framework for Exploring Hydrogen Integration Pathways in Great Britain Towards Net Zero," Submitted to *Energy Policy*, February 28, 2026.

Conference Papers

1. M. Abuella, A. Allahham, S. L. Walker, "Socio-Technical, Electrification, and Hydrogen-Driven Pathways for Residential Heating Decarbonisation in the North of Tyne," in *9th International Conference on Environment Friendly Energies and Applications (EFEA 2025)*, 4–5 December 2025, Newcastle upon Tyne, UK.
2. M. Abuella, A. Allahham, S. L. Walker, "A Game-Theoretic Framework for Hydrogen Integration to Accelerate Energy Transitions in Great Britain," in *14th International Conference on Renewable Power Generation (RPG 2025)*, 24–26 October 2025, Shanghai, China.
3. M. Abuella, M. Atoui, S. Nowaczyk, S. Johansson, E. Faghani, "Data-Driven Explainable Artificial Intelligence for Energy Efficiency in Short-Sea Shipping," in *ECML PKDD*, 2023.
4. M. Abuella and B. Chowdhury, "Adjusting Post-Processing Approach for Very Short-Term Solar PV Power Forecasts," in *2021 IEEE MI-STA*, 2021.
5. M. Abuella and B. Chowdhury, "Qualifying Combined Solar Power Forecasts in Ramp Events' Perspective," in *IEEE*

Power and Energy Society General Meeting, 2018.
6. M. Abuella and B. Chowdhury, "Forecasting Solar Power Ramp Events Using Machine Learning Classification Techniques," in *IEEE PEDG*, 2018.
7. M. Abuella and B. Chowdhury, "Hourly Probabilistic Forecasting of Solar Power," in *North American Power Symposium (NAPS)*, 2017.
8. M. Abuella and B. Chowdhury, "Random Forest Ensemble of Support Vector Regression Models for Solar Power Forecasting," in *IEEE ISGT*, 2017.
9. M. Abuella and B. Chowdhury, "Solar Power Forecasting Using Support Vector Regression," in *ASEM International Annual Conference*, 2016.
10. M. Abuella and B. Chowdhury, "Solar Power Forecasting Using Artificial Neural Networks," in *North American Power Symposium (NAPS)*, 2015.
11. M. Abuella and B. Chowdhury, "Solar Power Probabilistic Forecasting by Using Multiple Linear Regression Analysis," in *IEEE SoutheastCon*, 2015.