Mohamed Abuella

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Summary

An electrical engineer by training, traditionally interested in Mathematical and Computational Analysis, Modeling and Optimization, with extensive experience in Data Analytics. Researcher working to modernize the electric grid and optimize its integration of distributed energy resources, as well as improving energy efficiency by applying descriptive, predictive, and prescriptive analytics. My broader interest involves utilizing Artificial Intelligence for Energy Systems and Sustainability. Looking for opportunities to transfer, improve, and acquire knowledge and skills.

Experience

Northumbria University **Newcastle, UK**
Research Fellow *May 2024–May 2026*
Supporting the delivery of the EPSRC-funded "Hydrogen Integration for Accelerated Energy Transitions (HI-ACT)" project.
- Developed a Policy-Navigation Framework and an Interactive Policy Navigator (IPN) to explore hydrogen integration pathways in Great Britain.
- Applied Cooperative Game Theory and Shapley value analysis to evaluate multi-energy infrastructure investments and cost allocations.
- Utilized pandapower and pandapipes for national-scale integrated energy system modeling.

Halmstad University **Halmstad, Sweden**
Postdoctoral Researcher *Apr 2022–Apr 2024*
Research on AI for Sustainability within the maritime sector at the Center for Applied Intelligent Systems Research (CAISR).
- Developed Explainable AI (XAI) models using SHAP values to estimate vessel fuel consumption and provide actionable insights for captains.
- Optimized vessel speed profiles using Hidden Markov Models (HMM), LSTM, and KNN to enhance energy efficiency in short-sea shipping.
- Implemented Spatial Clustering (DBSCAN, GMM) for vessel path identification and route planning.

College of Industrial Technology **Misurata, Libya**
Lecturer *Feb 2020–Mar 2022*
Taught undergraduate courses including Electrical Circuits, Electrical Measurements, and Mathematics 101.
- Focused on curriculum revision and "modeling the student's way of thinking".

UNC Charlotte, EPIC **Charlotte, USA**
Research Assistant *2014–2019*
Statistical and predictive analytics to modernize the grid and optimize renewable integration.
- Specialized in Solar Power Ramp Event Forecasting using Random Forest ensembles and data-driven post-processing approaches.
- Conducted spatiotemporal analysis of weather data for regional PV power prediction.

SIU Carbondale **Carbondale, USA**
M.Sc Research Assistant *2010–2012*
Focused on optimization for electric power systems including wind power.
- Applied Particle Swarm Optimization (PSO) to solve Optimal Power Flow (OPF) and Economic Dispatch problems in systems with high wind penetration.

Water & Wastewater Company **Misurata, Libya**
Electrical Technician *2000–2008*
Maintained electrical control equipment at pumping stations.
- Conducted a technical internship (2000) at the Industrial Complex for Shoes, focusing on power factor improvement and transformer maintenance.

Education

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

Dissertation: "A Post-processing Approach for Solar Power Combined Forecasts of Ramp Events".

Southern Illinois University at Carbondale **USA**
M.Sc. in Electrical and Computer Engineering, GPA: 4.0 *2010–2012*
Thesis: "Study of Particle Swarm for Optimal Power Flow in IEEE Benchmark Systems Including Wind Power Generators".

College of Industrial Technology **Misurata, Libya**
Bachelor of Technology (B.Tech) in Electromechanical Engineering, 86% *2002–2008*
Project: Design of an 11/0.4 kV distribution network using NEPLAN and MATLAB for load flow and fault analysis.

Higher Polytechnic Institute **Misurata, Libya**
Higher Diploma (DipHE) in Instrumentation, 82% *1998–2001*
Project: Design and implementation of a Triggering Circuit for SCR Thyristors of an AC-DC Converter.

Recognitions

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

2017: Outstanding Reviewer: IEEE Transactions on Sustainable Energy.

2015: Third Prize for Student Papers: The 47th North American Power Symposium (NAPS).

2014: The Institute Prize: Global Energy Forecasting Competition (GEFCom).

Selected Publications

2026: M. Abuella, et al., "Game Theory Approaches to Hydrogen Infrastructure Investment Planning in Great Britain," Int. J. Hydrogen Energy.

2026: M. Abuella, et al., "A Cooperative Planning Framework for Hydrogen Blending in Great Britain's Integrated Energy System," Energies.

2025: M. Abuella, et al., "Time-Series Analysis Approach for Improving Energy Efficiency of Fixed-Route Passenger Vessel," Ocean Engineering.

2024: M. Abuella, et al., "Spatial Clustering Approach for Vessel Path Identification," IEEE Access.

2019: M. Abuella and B. Chowdhury, "Forecasting of Solar Power Ramp Events: A Post-Processing Approach," Renewable Energy.

Technical Skills

Programming: Python (pandas, pandapower, pandapipes, scikit-learn, XGBoost), MATLAB, R, SAS.

Software: NEPLAN, PowerWorld, PSAT, MATPOWER, HOMER, PLC Ladder Logic, LaTeX.

Methods: Machine Learning, Deep Learning (LSTM), Game Theory, Monte Carlo Simulation, Sensitivity Analysis, Time-Series Forecasting.