Md. Alamgir Hossain

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Google Scholar, ResearchGate

PROFILE

- Lectured in electrical and electronic fields across 7 years to over 1,200 students, and facilitated workshops
- Experienced in modelling, control and optimisation of renewable energy sources for more than five years
- Published 15 journal publications on renewable energy control, modelling and optimization
- Presented at 14 conferences locally and internationally, and placed 1st and 2nd in Research Day Competitions
- Collaborated with multi-disciplinary researchers to publish benchmarking study in power system
- Proven team-working capabilities, communication skills and ability to work independently

EDUCATION

Degree	University	Outcome	Years
PhD in Renewable Energy (RE)	UNSW, Australia	6-Publications	2016 – 2019
Masters by Research in RE Control	UNSW, Australia	10-Publications	2014 – 2016
M.Sc. in RE Protection	DUET, Bangladesh	4/4, 7 Pub.	2013 – 2014
B.Sc. in Electrical & Electronic Eng.	DUET, Bangladesh	3.89/4 (1st /122)	2008 – 2012
Diploma in Electrical Technology	KPI, Khulna, BD	3.82/4 (7th/352)	2003 – 2007

RESEARCH EXPERIENCE

PhD Research | University of New South Wales (UNSW), Australia　　　　　　　Sep 2016 – Current
- Developed an optimisation framework for managing energy of a microgrid considering uncertainties
- Solved real-time energy management problems of microgrids using artificial intelligence (AI) algorithm
- Estimated optimal battery size for a grid-connected microgrid considering its degradation costs
- Compared optimisation algorithms for the application of energy scheduling
- Scheduled battery energy optimally while considering its degradation costs using AI algorithm
- Forecasted power generation (solar and wind) and load using neural networks for scheduling problems
- Conducted load flow studies and fault analysis of IEEE 14 bus power system using PowerFactory software
- Modelled PV generators, wind generators, a battery system and grid utility for optimal power dispatch

Masters by Research | UNSW, Australia　　　　　　　Aug 2014 – Sep 2016
- Conducted experiments on grid-tied solar PV generators for controlling output power and current
- Explored a new solution method to protect unintentional shut down of distributed generators
- Improved power sharing strategies of microgrids for renewable energy sources
- Validated CIGRE benchmark model using Matlab/Simulink software which enables the integration of solar PV and wind generators
- Modelled an inverter-based microgrid for small-signal analysis to determine its stability
- Modelled and designed a solar PV system for delivering energy to the grid utility using PSCAD and Matlab softwares

M.Sc. Research | Dhaka University of Engineering and Technology (DUET), Bangladesh　　　　Jan 2013 – Aug 2014
- Modelled solar PV panels, dc cables, a lightning channel and power condition system using Virtual Surge Test Lab (VSTL) software
- Analysed the impacts of lightning on solar panels to investigate possible reasons of a system damaged
- Designed a protection system to reduce the impact of lightning on solar PV panels

B.Sc. Research | DUET, Bangladesh　　　　　　　Apr 2008 – Jan 2012
- Developed a hardware and software platform using PLC for automatic supply of beverage
- Designed an LCD display using a micro-controller (ATmega 32 of AVR)
- Developed a hardware and software for an automatic control of car parking using PLC
- Estimated the costs of electrical wiring of a four storage building ensuring its safety

TEACHING EXPERIENCE

Assistant Professor | DUET, Bangladesh　　　　　　　Jul 2015 – Current

- Instructed electrical and electronic courses to undergraduate students, and supervised final year thesis
- Supervised the postgraduate students to publish research work in high-impact factor journals

o Provided one-by-one guidance to undergraduate students to solve course- and project -related problems in the field of electrical engineering
o Conducted load flow studies and fault analysis of power system using DIgSILENT PowerFactory software
o Experimented electrical equipment, such as transformer, cables and oil, and reported them for consultancy purpose
o Actively involved with Consultancy Research and Testing Services (CRTS) group in the EEE department of DUET

Lab Demonstrator | UNSW, Australia   Jul 2016 – Current

o Examined and troubleshot the experimental setups of the Design of Electronic Circuits 1 lab
o Provided a comprehensive report on the experiment to the course coordinator before demonstrating labs
o Supported students by experimental setup, and providing analytical, comprehensive feedback to queries

Lecturer | DUET, Bangladesh   Jun 2012 – Jul 2015

o Lectured courses of 60-120 students on electrical and electronics engineering at the University
o Taught power system optimisation, control and modelling
o Developed core course contents, examined questions, and facilitated workshops
o Graded assignments, provided comprehensive feedback, and responded promptly to queries
o Supervised and troubleshot experimental equipment to facilitate lab demonstration
o Communicated to industries for arranging internship of final year students
o Assembled, tested and modified electrical machinery, electrical control equipment, electrical circuitry and components as per general instructions and standards

LEADERSHIP & COMMUNITY ENGAGEMENT

Miscellaneous

o Achieved championship of intra-hall chess tournament, S.M. Hall, DUET, 2011
o Achieved group champion for district-wise rally swimming competition at 31st Sport Competition-2002
o Accomplished runner up for district-wise 200m free swimming at 31st Sport Competition-2002
o Organised the PROJECT FAIRWELL-2014 at DUET
o Engaged with successful Hall management committee at S.M Hall, DUET for improving management system
o Elected Organised Secretary for the English Language Club at DUET, 2011
o Participated in math and 3-minute thesis competitions, 2010
o Engaged with IEEE Student member, UNSW alumni, IEB, Engineers Australia

PROFESSIONAL SKILLS

o **Technical software**: MATLAB (Simulink/SimPowerSystems + Coding)—7 years' experience; PSCAD—1 years; DIgSILENT Power Factory—2 years; HOMER PRO—1 years; AUTOCAD, PSAF, MICROWIND, VSTL, and WINDMIL
o **Coding:** Python, C, C++, Java
o **Electronic software:** OrCAD (PSpice, Capture and Layout), Circuit Maker, Proteus, EMU 8086, and Atmel AVR Studio
o **Writing software:** LaTeX (advanced), MS Word (advanced), MS Excel (advanced), MS Power Point (advanced), MS Access (intermediate), and MS Operating System (intermediate)

o **Languages:** English (fluent), Bangla (native), Hindi (moderate), Arab (read only)

o **Workshops:** Health and Safety for Laboratory-based Supervisor training, Health and Safety Awareness for Laboratory Supervisors, Information for ARC Discovery Project
o **Short courses/training:** Programmable Logic Controller (PLC) & Automation, Microcontroller, B.Sc. internship at AFBL, Diploma internship at PGCB, Vocational internship at STML
o **Others:** Independent research, Group based research, International collaboration and Interdisciplinary collaboration

FUNDING & AWARDS

o Master's and PhD Scholarships (TFS, UIPA and UPA) across 5.0 years—$151,184	2014 – 2019
o PRSS conference travel top-up — $2600	2019
o UNSW Canberra - Study Canberra Scholarship — $10,000	2016
o Student travel grant, IEEE ISGT- 2016, Melbourne, Australia— $ 550	2016
o PRSS conference travel top-up — $2200	2015

o 2nd research presenter (poster), 2nd prize, UNSW Canberra— $200	2018
o Honorarium for reviewing paper from 'Energies' journal— CHF 1900	2016 – 2017
o Honorarium for reviewing a book proposal from Elsevier— US$ 150	2017
o Certified "Outstanding contribution in reviewing" from IJEPES (Elsevier)	2017
o Best research presenter (poster), overall winner, UNSW Canberra — $500	2015
o Prime Minister Gold Medal-2012 for securing the 1st position in the EEE faculty at DUET	2012
o University Gold Medal for securing the 1st position in the EEE department	2012

INTERNATIONAL EXPERT AND COLLABORATION

Reviewer　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Oct 2015 – Current

- o IEEE Transaction on Power Electronics
- o IEEE Transaction on Industrial Electronics
- o IEEE Transaction on Smart Grid
- o IEEE Access
- o Energy Conversion and Management (Elsevier)
- o International Journal of Electrical Power & Energy Systems (Elsevier)
- o Journal of Energy Storage (Elsevier)
- o Energies (MDPI), Switzerland

Research collaboration　　　　　　　　　　　　　　　　　　　　　　　　Sep 2014 – Current

- o Aalborg University, Denmark
- o Sheffield Hallam University, UK
- o Università Politecnica delle Marche, Italy
- o Macquarie University, Australia
- o University of Wollongong, Australia
- o King Fahd University of Petroleum and Minerals, Saudi Arabia

CURRENT ACTIVITIES

- o Optimal battery size determination considering uncertainties in power generation and demand for a community microgrid
- o Optimal operation of a community microgrid considering battery degradation costs and uncertainties in power generation and demand

PUBLICATIONS

Journal articles

1. **Md. Alamgir Hossain**, Hemanshu R. Pota, Forhad Zaman, Stefano Squartini and Josep M. Guerrero "Energy Scheduling of Community Microgrids Considering Battery Degradation Cost," under review in Applied Energy (Elsevier).
2. **Md. Alamgir Hossain,** Hemanshu R. Pota, Md. Jahangir Hossain and Frede Blaabjerg "Evolution of Microgrids with Converter-Interfaced Generations: Challenges and Opportunities," International Journal of Electrical Power & Energy Systems (IF: 3.610), Vol. 109, pp. 160-186, 2019.
3. **Md. Alamgir Hossain,** Hemanshu R. Pota, Stefano Squartini, Forhad Zaman and Kashem M. Muttaqi "Energy Management of Community Microgrids Considering Degradation Cost of Battery," Journal of Energy Storage (CiteScore: 3.74, Elsevier), 2019.
4. **Md. Alamgir Hossain**, Hemanshu R. Pota, Stefano Squartini, and Ahmed Fathi Abdou "Modified PSO algorithm for Real-time Energy Management in Grid-connected Microgrids" Renewable Energy (IF: 4.900), Vol. 136, pp 746-757, 2019.
5. **Md. Alamgir Hossain**, Hemanshu R. Pota, Md. Jahangir Hossain and Abu Md. Osman Haruni "Active Power Management in a Low-Voltage Islanded Microgrid" International Journal of Electrical Power & Energy Systems (IF: 3.610), Vol. 98, pp. 36-47, 2018.
6. Ashish Kumar Karmaker, Md. Raju Ahmed, **Md Alamgir Hossain**, Md. Mamun Sikder "Feasibility Assessment & Design of Hybrid Renewable Energy Based Electric Vehicle Charging Station in Bangladesh" Sustainable Cities and Society (IF: 3.073), Vol. 39, pp. 189-202, 2018.
7. Md Mijanur Rahman , A. Hasib Chowdhury and **Md Alamgir Hossain** "Improved Load Frequency Control Using a Fast Acting Active Disturbance Rejection controller" Energies (IF: 2.676),Vol. 10, No.11, 2017.
8. **Md. Alamgir Hossain**, Hemanshu R. Pota, Walid Issa and Md Jahangir Hossain "Overview of AC Microgrid Controls with Interfaced Generation" Energies (IF: 2.676), Vol 10, No.9, 2017.
9. **Md. Alamgir Hossain**, Hemanshu R. Pota, Abu Md. Osman Haruni and Md. Jahangir Hossain "DC-Link Voltage Regulation of Inverters to Enhance Microgrid Stability during Network Contingencies" Electric Power System Research (IF: 2.856), Vol. 147C, pp. 233-244, 2017.
10. **Md. Alamgir Hossain** and Hemanshu R. Pota, "Voltage Tracking of a Single-phase Inverter in an Islanded Microgrid" International Journal of Renewable Energy Research (Scopus, Thomson Reuters) Vol. 5, No. 3, 2015.
11. **Md. Alamgir Hossain** and Md. Raju Ahmed, "Analysis of Lightning Induced Phenomena on Solar Power System," International Journal of Electrical Engineering (Scopus, ERA: C), Vol. 21, No. 4, pp. 127-133, 2015.
12. **Md. Alamgir Hossain** and Md. Raju Ahmed, "Overvoltage in Solar Power System due to nearby Lightnings," Journal of Electrical Engineering (Scopus, ERA: C), Volume 15, No. 1, 2015.
13. **Md. Alamgir Hossain**, Md. Zakir Hossain, Md. Mijanur Rahman and Md. Atiqur Rahman, "Perspective and Challenge of Tidal Power in

Bangladesh," World Academy of Science, Engineering and Technology (ERA: B), Vol. 8, No. 7, August-2014.

14. **Md. Alamgir Hossain** and Md. Raju Ahmed, "Present Energy Scenario and Potentiality of Wind Energy in Bangladesh," World Academy of Science, Engineering and Technology (ERA: B), Vol. 7, No. 11, Nov.-2013.

15. M. Zakir Hossain, Md. Kamal Hossain, **Md. Alamgir Hossain**, and Md. Maidul Islam, "Performance Analysis of a High Voltage DC (HVDC) Transmission System under Steady State and Faulted Conditions," TELKOMNIKA Indonesian Journal of Electrical Engineering, Vol. 12, No 8, August-2014.

16. **Md. Alamgir Hossain**, Arif Mahmud, Mahfuzul Haque Chowdhury, and Md. Mijanur Rahman, "Capacitance – Voltage Characteristics of Nanowire Trigate MOSFET Considering Wave Function Penetration," International Journal of Electrical and Computer Engineering (Scopus) Vol. 2, No. 6, Dec.-2012.

17. M. Zakir Hossain, **Md. Alamgir Hossain**, Md.Saiful Islam, Md. Mijanur Rahman, and Mahfuzul Haque Chowdhury, "Electrical Characteristics of Trigate FinFET," Global Journal of Science Frontier Research (GJSFR), Vol. 11, Issue 7, Version 1.0, Dec. - 2011.

18. Md. Saiful Islam, Md. Abdullah al-Mamun, **Md. Alamgir Hossain** and Md. Jahidul Islam, "A Comprehensive Analysis of Amount of Liquid in a Horizontally Mounted Right Cylindrical Tank," Global Journal of Science Frontier Research (GJSFR), Vol. 11, Issue 8, Version 1.0, October/ November - 2011.

Conferences

19. **Md. Alamgir Hossain,** Hemanshu R. Pota and Carlos Macana Moreno "Real-time Battery Energy Management for Residential Solar Power System," in the 2019 IFAC Workshop on Control of Smart Grid and Renewable Energy Systems, Jeju, S. Korea (**Invited paper**).

20. Carlos Macana Moreno**,** Hemanshu R. Pota and **Md. Alamgir Hossain** "Modeling and Simulation of Inverter based Distributed Generators for Renewable Energy Integration," in the 2019 IFAC Workshop on Control of Smart Grid and Renewable Energy Systems, Jeju, S. Korea (**Invited paper**).

21. M. Shafiul Alam, Md Ismail Hossain, **Md Alamgir Hossain**, Md Shamimul Haque Choudhory, and Muhammad Athar Uddin. "Protection of Inverter-based Distributed Generation with Series Dynamic Braking Resistor: A Variable Duty Control Approach." In 2018 10th International Conference on Electrical and Computer Engineering (ICECE), pp. 253-256. IEEE, 2018.

22. **Md. Alamgir Hossain,** Hemanshu R. Pota, Abu Md. Osman Haruni and Md. Jahangir Hossain "Over-voltage Regulation of an Inverter to Improve Microgrid Reliability During Abrupt Cases," in the 2016 IEEE Innovative Smart Grid Technologies-Asia (ISGT ASIA), Melbourne, Australia.

23. **Md. Alamgir Hossain**, Md. Imran Azim, Md. Apel Mahmud and Hemanshu R. Pota, "Primary Voltage Control of a Single-phase Inverter using Linear Quadratic Regulator with Integrator" in Australasian Universities Power Engineering Conference (AUPEC)-2015, Australia.

24. Md. Imran Azim, **Md. Alamgir Hossain**, Sheik Mohammad Mohiuddin, Md. Jahangir Hossain and Hemanshu R. Pota, "Proportional Reactive Power Sharing for Islanded Microgrids" in 2016 IEEE 11th Conference on Industrial Electronics and Applications (ICIEA 2016), China.

25. Md. Imran Azim, **Md. Alamgir Hossain**, Md. Jahangir Hossain and Hemanshu R. Pota, "Droop Control for islanded microgrids with compensating approach" in Australasian Universities Power Engineering Conference (AUPEC)-2015, Australia.

26. Md. Imran Azim, **Md. Alamgir Hossain**, Md. Jahangir Hossain and Hemanshu R. Pota, "Effective Power Sharing Approach for Islanded Microgrids" in IEEE PES Innovative Smart Grid Technologies (Asia)-2015, Bangkok, Thailand.

27. **Md. Alamgir Hossain** and Md. Raju Ahmed, "Study and protection of lightning overvoltage on DC cables of solar power generation," in 2014 International Conference on Electrical and Computer Engineering (ICECE), Dhaka, Bangladesh.

28. **Md. Alamgir Hossain** and Md. Raju Ahmed, "Analysis of Lightning Induced Overvoltage in DC Line of PV Panel System," in National Conference on Electronics for Digital Society, 2014.

29. **Md. Alamgir Hossain**, "Energy Management Strategy for Renewable Sources Considering Degradation Cost of Battery," UNSW Canberra Research Day 2018 (**poster**), UNSW@ADFA, Oct 2018

30. **Md. Alamgir Hossain**, "Power Management Strategy in an Islanded Microgrid," Climate and Energy Student Expo-2015, Australian National University, Aug 2015.

31. **Md. Alamgir Hossain**, "Power Management Strategy for Renewable Sources," UNSW Canberra Research Day 2015 (**poster**), UNSW@ADFA, Oct 2015.

32. **Md. Alamgir Hossain**, "DC-Link Voltage based Active Power Control of an Islanded Microgrid," presented at the 1st Annual Faculty of Engineering Postgraduate Research Symposium-2015, UNSW, Nov 2015.

HIGHLIGHTED RESEARCH

Optimisation   Sep 2016 – Current

Publication 1: Challenges and opportunities of emerging distribution networks

This study discusses critically the present challenges and opportunities of an emerging distribution network to clearly distinguish it from a traditional distribution network

o   Conducted a comprehensive literature review on microgrids' challenges, with future research direction
o   Established a definition of a microgrid after analysing well-known definitions
o   Summarised the characteristics of microgrids
o   Presented a clear distinction between a distribution network and microgrid
o   Collaborated research work with the most renowned researcher, Frede Blaabjerg, in Denmark
o   Published in International Journal of Electrical Power & Energy Systems (IF: 3.610)

Publication 2: Battery energy management of community microgrids considering its degradation cost

Optimal energy management of a battery system is proposed, in which the objective function includes the degradation cost of the battery and a dynamic penalty, to reflect the true operational cost

o   Developed a new formulation for energy management of a battery while considering its degradation cost
o   Designed a PSO algorithm for evaluating the objective function to find the optimal battery energy management
o   Reduced electricity cost by up to 37.16% compared to another existing approach
o   Collaborated research work with the researcher, Stefano Squartini, in Spain
o   Published in Journal of Energy Storage (CiteScore: 3.74, Elsevier)

Publication 3: Real-time battery energy management of grid-connected microgrids

This study proposes an efficient energy management approach for optimal use of battery energy after analysing different existing operational strategies to reduce electricity cost of a community power system

o Presented a regularised PSO algorithm for the application of real-time energy management
o Analysed various objective functions to determine the optimal operation of a battery system
o Developed a dynamic objective function to efficiently manage battery energy
o Reduced operational cost by 12% as compared to the original cost function
o Published in Renewable Energy (IF: 4.900)

Control   Aug 2014 – Sep 2016

Publication 4: Comprehensive review on hierarchical control levels of emerging distribution networks

Various control methods for improving voltage quality and power sharing approaches are analysed to categorise and present them in a comprehensive manner for novice researchers

o Discussed the basic elements of DG units and extracted the characteristics of a typical microgrid
o Analysed different control methods critically to choose them for appropriate places
o Directed future research opportunities on microgrid controls to undertake existing research approaches
o Collaborated research work with the researcher, Walid Issa, in UK
o Published in Energies (IF: 2.676)

Publication 5: Active power management in a low-voltage islanded microgrid

A novel power control strategy is proposed to autonomously maintain network stability and improve the power quality during temporary disturbances in a network

o Designed a novel voltage-band in a DC-link voltage control for outer control to improve power quality
o Designed a linear quadratic integrator for inner control to regulate the output voltage of a generator
o Implemented the proposed control methods in a modified IEEE 16-node test system
o Executed autonomous load curtailments with respect to voltages at nodes using relay functions
o Published in International Journal of Electrical Power & Energy Systems (IF: 3.610)

Publication 6: Voltage regulation of converters to enhance microgrid stability during network contingencies

This study proposes a regulator for controlling the dc-link voltage of the microgrid's converter during a period of circulating power that may violate the voltage limit and, as a result, may shut down the converter unintentionally

o Identified a drawback of existing control methods, which leads to circulating power flow
o Designed a novel over-voltage regulator in order to prevent a converter shutdown unintentionally
o Analysed small-signal models to evaluate a microgrid's stability
o Validated the effectiveness of the proposed regulator by implementing in a realistic microgrid
o Published in Electric Power System Research (IF: 2.856)

REFEREES

Md. Anwarul Abedin, DUET   Hemanshu Roy Pota, UNSW   Contact details upon request