

Debjyoti Chatterjee | Ph.D. student, UT Austin

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SUMMARY

Power electronics and systems researcher specializes in Renewable Integration, Energy Storage, Micro-grid Stability, and Grid forming Inverters. Skilled in EMT power system modeling software, data analytics, and optimization. Highly motivated, collaborative problem solver, passionate about grid modernization.

EDUCATION

Ph.D. in Electrical and Computer Engineering, The University of Texas at Austin, TX **Expected Dec. 2025**

- **Track:** Power Electronics and Power Systems, **Advisor:** Dr. Brian Johnson **GPA: 3.90/4**
- **Coursework:** Power Electronics, Power System Analysis with Renewable Energy Sources, Energy System Optimization, Power System Operation and Control, Power System Analysis, Power Quality, Introduction to Machine Learning
- **MS Thesis:** From Grid Following to Grid Forming: Modeling, Control and Applications to Inverter-based Resources [Advised by Dr. Surya Santoso, Dec. 2022]

B. Tech. (Hons.) in Electrical Engineering, National Institute of Technology Tiruchirappalli, India **May 2020**

- **B.Tech Thesis:** Protection Scheme for Microgrid: Relay Coordination Using Convex Optimization **GPA: 4.0/4.0**

AREAS OF INTEREST

- Power Electronic Interfaces for Renewable Energy Integration
- Micro-Grid Design, Operation, and Protection
- Modelling and Control of Grid Forming Power Converters
- Low Inertia Power System

SKILLS

- **Software and Tools:** PSCAD, PSSE, PLECS, LTspice, OpenDSS, EMTP-RV, PowerWorld, Simulink, RTDS
- **Programming Languages:** Python (NumPy, Pandas, Matplotlib, SciPy, Scikit-learn), MATLAB

PROFESSIONAL EXPERIENCE

Technical Power Consulting Intern (Transmission), Hitachi Energy, Raleigh, NC **May-Aug 2022**

- Conducted generation interconnection studies: power flow, fault, and contingency analysis using PSS/E and Python
- Synthesized 1-sec resolution irradiance data to capture intermittency in PV output for microgrid frequency stability analysis
- Performed transmission routing study in QGIS to propose possible transmission paths and introduced a metric to rank them

GRADUATE RESEARCH EXPERIENCE

Graduate Research Assistant, Dr. Santoso's Lab, UT Austin **Jan 2021- Present**

Project 1: Symmetrical Components-Based Analysis on Voltage Balancing Ability of Grid Forming (GFM) Inverters

- Modeled droop-controlled GFM in PSCAD and analyzed the black start capability of GFM inverters in islanded grid
- Estimated the sequence currents required to maintain a balanced load voltage in an unbalanced microgrid
- Demonstrated that a 3-legged GFM inverter with decoupled positive- and negative-sequence controller and grounding transformer can mimic the behavior of an ideal voltage source with regard to voltage balancing ([slides](#))

Project 2: Precise Power Sharing in Hybrid AC-DC Nanogrid-Based Virtually Islanded Residential Buildings

- Proposed a hybrid AC-DC nanogrid architecture for the residential community and suggests a single system-wide optimization-driven control (ODC) to achieve multiple control targets ([slides](#))
- Developed ODC to replicate primary droop control as well as to provide an additional layer of control to form and maintain a virtual island, control power flow between sub-grids, equally distribute power generation, and minimize system losses

Project 3: Short Circuit Behavior of Grid-Forming Inverter in an Islanded Microgrid

- Simulated different power system faults in both grid-connected and islanded microgrids. Further, fault characteristics of the GFM inverter are compared to that of the synchronous generator to validate the GFM inverter's limited short circuit capacity
- Designed current limiter and developed a Thevenin equivalent model of the GFM inverter in OpenDSS and conducted a series of fault studies in delta and star-connected islanded microgrids ([slides](#), [poster](#))

Project 4: Guidelines for Modeling Utility Transmission Equipment for Harmonic Studies

- Developed reduced models of FACTS devices ([a](#), [b](#)) and HVDC stations ([c](#), [d](#)) for detailed harmonic analysis in EMTP-RV
- Analysed reactive power compensation capabilities of SVC and STATCOM, and performed short-circuit studies

Project 5: Performance Analysis of Palmer Events Centre (PEC) solar PV System with added Battery Energy Storage (BES)

- Formulated an algorithm in Python to analyze the PV system for constant panel temperature and clear-day sky conditions
- Incorporated the cloud-cover sub-model, panel heat transfer model, and battery storage model to predict the daily performance
- Assisted PEC to choose the most profitable option considering added battery storage, energy buy-back option, etc ([Report](#))

RESEARCH INTERNSHIP PROJECTS

Undergraduate Research Intern, NIT Tiruchirappalli, India

Jan- July 2020

Project: *Protection Scheme for Renewable-dominated Converter-interfaced Weak Power Grid*

- Designed an optimal protection scheme suitable for all operating modes of microgrid along with every type of fault
- Proposed linearized formulation of the relay coordination problem, called convexified linear program using McCormick envelopes, reducing the problem complexity and minimum operating time with better relay setting ([Slides](#))

Visiting Research Scholar, The University of Waterloo, Canada

May- Aug 2019

Project: *Dynamic Modeling and Transient Stability Analysis of Synchro-Converter-Based Hybrid AC-DC Microgrid*

- Implemented novel 'synchro-converter' based controller for islanded hybrid microgrid to provide virtual inertia in weak grid
- Verified the enhanced dynamic performance of the proposed controller in comparison with voltage source converters ([Report](#))

Summer Research Fellow, IIT Bombay, India

May- Aug 2018

Project: *Modeling and Control of DFIG-based Variable Speed Wind Turbine Using Vector Control Method*

- Investigated the operation and control of DFIG wind turbine and established a comprehensive model in MATLAB/Simulink
- Proposed an improved control strategy based on third harmonic injected PWM to generate reference voltages for bi-directional converters, resulting in decoupled control of active and reactive power ([Report](#))

PUBLICATIONS

- B. Mallikarjuna, **D. Chatterjee**, M.J.B Reddy, and D.K. Mohanta. "Real-Time Wide-Area Disturbance Monitoring and Protection Methodology for EHV Transmission lines", *INAE letters* (Springer publication), Vol. 3, no. 2, pp 87-106, June 2018. ([link](#))
- **D. Chatterjee**, N. Barry, and S. Santoso, "Virtually Islanded AC-DC Hybrid Nanogrid for Residential Buildings" in *2023 IEEE Power Engineer Society General Meeting, Orlando, FL, 2023*. (Submitted)
- **D. Chatterjee**, N. Barry, T. Kim, W. Kim, and S. Santoso, "Improving the Voltage Balancing of Grid Forming Inverters in Unbalanced, Islanded Microgrids" in *2023 IEEE Power Engineer Society General Meeting, Orlando, FL, 2023*. (Submitted)
- N. Barry, **D. Chatterjee**, and S. Santoso, "Optimal Power Flow for Unbalanced Three-phase Microgrids Using Interior Point Optimizer, IPOPT," in *2023 IEEE Power Engineer Society General Meeting, Orlando, FL, 2023*. (Submitted)

TEACHING EXPERIENCE

- ECE 394.9-Power Quality and Harmonics (Graduate Level Course) **Aug-Dec 2022**
- ECE 394L-Power System Apparatus and Lab (Graduate Level Course) **Jan-May 2022**

HONORS AND AWARDS

- Wilson-Tayabali Family Fellowship and Jordan Baruch Fellowship, UT Austin **Jan 2023**
- Charles M. Simmons Endowed Presidential Fellowship in Engineering, UT Austin **Jan 2021**
- Rambhadran Narayan Alumni Award and Ramakrishnan Memorial Award, NIT Tiruchirappalli, India **May 2019**
- MITACS Globalink Research Fellowship, Govt. of Canada **Jan 2019**
- Summer Research Fellowship (SRF), Indian Academy of Sciences (IAS), and Indian National Academy of Engineering (INAE) for two consecutive years **May 2018-Aug 2019**
- Mamraj Agarwal National Award, Office of the Governor, West Bengal, India **Aug 2016**
- Kishore Vigyanik Prosthana Yogona (KVPY) fellow, Department of Science and Technology, Govt. of India **Jan 2016**

LEADERSHIP ROLES

Vice President of Research, Longhorn Energy Club (LEC), UT Austin

May 2022-Present

- Facilitate interdisciplinary energy-related research in collaboration with UT Energy Institute and other energy clubs
- Organize weekly energy chats, case competitions, hackathons, and energy week

Delegate, HAPAIR (Harvard Project for Asian and International Relations) College Conference

Dec-Jan 2021

- Among the top 300 delegates selected worldwide out of more than 10,000+ applicants
- Raised the most important economic, political, and social issues facing the Asia-Pacific region and discussed potential solutions

REFEREES

Dr. Brian Johnson

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