Chandan Chaudhary

PhD Candidate, Electrical & Computer Engineering | Michigan State University

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Engagement

IEEE Student Member | CIGRE Student Member | ESIG Student Member

Research Interests

Power System Reliability & Resilience | Energy Storage Systems | AI/Data Center Load Modeling | Cyber-Physical Power Systems | Probabilistic Methods | Stochastic and Grid Optimization

Education

Doctor of Philosophy in Electrical Engineering (In Progress) Jan. 2024 – Present

College of Engineering, Michigan State University | East Lansing, MI, USA | GPA: **3.937**

Courses: Power System Analysis, Reliability & Stability, Genetic-Algorithm-Based Optimization & Decision Making, Operation of Modern Electric Grids, Linear & Nonlinear Systems, Data-Driven Science & Engineering, Bayesian Statistics

Bachelor of Engineering in Electrical & Electronics Engineering (Power & Control) Aug. 2018 – May 2023

School of Engineering, Kathmandu University | Dhulikhel, Nepal | GPA: **3.93**

Courses: Electrical Machines, Power Systems, Power Electronics, Control Systems & Engineering, Power System Planning & Operation, Industrial Electrification & Control, Engineering Capstone Projects

Technical Skills

Programming		Python, MATLAB/Simulink, OpenDSS, C/C++
Simulation		RTDS, RSCAD, Simulink, DIgSILENT PowerFactory
Optimization		Gurobi, SCIP, Pyomo, Genetic Algorithms
ML / Data		TensorFlow, Scikit-learn, Pandas, NumPy, Jupyter
Tools		LaTeX, Git, MS Office Suite, DIALux
Hardware		RTDS, PLCs, Arduino/Raspberry Pi, Development Boards

Professional Experience

Graduate Research Assistant *ERiSe Research Laboratory, MSU* Jan. 2024 – Present

East Lansing, MI, USA | *Research Focus: Grid Reliability, Resilience & Security; Energy Storage; AI/Data Center Load Modeling*

- Lead research on *Reliability Foundations for Operating Strategies for Long Duration Storage*, contributing to a technical report deliverable for the project sponsor.
- Investigate emerging grid challenges posed by **concentrated large loads** (AI compute clusters and hyperscale data centers), including spatial load correlation, resource adequacy risk, and sub-hourly volatility; contributed multiple publications on data center load modeling and grid impact.
- Serve as a contributing member of the **IEEE PES Task Force for Resilience Metrics**; maintain technical documentation and lead working group contributions.
- Developed probabilistic and Bayesian outage models integrating Eagle-I data (2014–2023) with NWS weather metadata across 50 US states.
- Built a SCIP/Gurobi/CPLEX-based resilience optimization model for networked microgrids with rolling-horizon recovery, black-start support, and critical load prioritization.

- Authored and co-authored **peer-reviewed publications and reports**; presented at IEEE PESGM, PMAPS, NAPS, ICPS, KPEC, CIGRE Grid of the Future, Resilience Week and other conferences.
- Support grant proposal writing and mentor junior researchers within the laboratory.

Teaching Assistant *Electrical & Computer Engineering Department, MSU* Jan.–May 2025; Aug.–Dec. 2025

East Lansing, MI, USA | *Academic Focus: Power Systems Laboratory*

- Instructed and supervised two laboratory sections per week for undergraduate power systems coursework.
- Evaluated lab reports and delivered structured, actionable feedback to improve student performance.
- Collaborated with faculty on course logistics, grading rubrics, and instructional material development.

Research Assistant Intern (R&D) *Sandia National Laboratories* May 2024 – Aug. 2024

Albuquerque, NM, USA | *Research Focus: Grid Reliability, Security, and Energy Storage*

- Surveyed and synthesized reliability assessment methodologies for energy storage systems, to develop an internal technical review used by the research group.
- Developed analytical and Deep Reinforcement Learning models for ESS reliability evaluation within bulk power systems, including two-price Markov models and SOC-based transition matrices.
- Collaborated with Sandia researchers on active R&D tasks in grid reliability and data center review and modeling.

Electrical & Electronics Engineer *Dept. of Electrical & Electronics Engineering, Kathmandu University* Aug.–Dec. 2023

Dhulikhel, Nepal | *Academic Focus: Laboratory development, operation, and maintenance*

- Revitalized the departmental laboratory: audited existing equipment, coordinated repairs, and proposed acquisition of new instruments.
- Prepared laboratory manuals and facilitated academic sessions for undergraduate students.
- Guided final-year students on capstone projects involving circuit design, power systems, and instrumentation.

Research Assistant *Green Hydrogen Lab, Kathmandu University* Jun.–Aug. 2023

Dhulikhel, Nepal | *Research Focus: Nepal Hydrogen Initiative Program (Funded)*

- Executed key deliverables for the **Nepal Hydrogen Initiative Program**, a nationally funded project targeting green hydrogen adoption.
- Prepared and submitted a successful grant proposal to **WWF Nepal** for "*Analyzing the Feasibility of Intelligent Power Management System (IPMS) Implementation for Enhancing Reliability of Existing Charging Stations in Nepal*"; the programme was approved and funded at **NPR 500,000**.
- Redesigned and updated the **Hydrogen Technologies Course** curriculum for undergraduate engineering students.
- Organized knowledge dissemination workshops: *Green Hydrogen for Nepal: Media Perspective* and *Business Development from Renewable Energy*.
- Guided interns and supported patent registration activities within the laboratory.

Intern Research Assistant *Green Hydrogen Lab, Kathmandu University* Jun. 2021 – May 2023

Dhulikhel, Nepal | *Research Focus: Electrical System Analysis in Green Hydrogen Production*

- Designed and validated electrical systems for the green hydrogen laboratory from instrumentation selection, sensor integration, and system commissioning.
- Performed simulations and circuit designs for power management in EVs and hybrid vehicles.
- Conducted research in hydrogen production and end-use applications; contributed to two IOP conference publications.
- Produced outreach materials: technical graphics, manuals, booklets, and video content for the lab.

Awards & Achievements

- **3× Jetson Orin Nano Developer Kits** from **NVIDIA Corporation** – awarded for introducing and prototyping next-generation AI-based projects.
- **5× Zima Board Developer Kits** from **Icewhale Technology** – awarded for enhancing research and project ac-

tivities among students at Kathmandu University.

- **Direct Employment via KU Employment Promotion Program** (one-year position) – secured upon achieving the highest academic standing in the Class of 2018, Electrical & Electronics Engineering, Kathmandu University.
- **Academic Scholarships** for Semesters I, II, III, IV, and VII at **Kathmandu University, Nepal**.
- **Partial Scholarship** for Intermediate Science at **Prasadi Academy, Lalitpur, Nepal**.
- **Merit Certificates** and **Student of the Month** recognition from **Prasadi Academy, Lalitpur, Nepal**.

Selected Projects

Full portfolio: chandanchaudhary.com.np/projects

- Management of Regenerative Braking and Onboard Appliances Control for Electric Vehicles.
- Design and Fabrication of Automatic Voltage Stabilizer using Relay-Based Tap-Changing of Transformer.
- DIALux Lighting Design of a Residential Building.
- Load Flow Analysis of the Power Grid of Province 1, Nepal.
- DTMF-Based Home Automation System without Microcontroller.
- LPG Leakage Detector and Exhaust Circuit without Microcontroller.

Extracurricular Activities & Service

Additional details: Google Drive

- Completed week-long hands-on training in **Real-Time Simulation Studies using RTDS**, organized by **MSU E-Resilience Lab** and **RTDS Technologies, Ametek**. Oct. 20–24, 2025
- Participated in conferences and symposia organized by **IEEE (PESGM, NAPS, ICPS, KPEC)** and the **MSU Graduate Research Symposium**.
- Participated in the **National Renewable Energy and Policy Symposium (NREPS)**. Jul. 30, 2023
- Presented at the **University Scholar Conference**: "*Relative Assessment of Carbon Emissions from Fossil Fuel-Based Vehicles, Battery Electric Vehicles, and Fuel Cell Electric Vehicles.*" May 17–18, 2022
- Runner-Up at **Inter-College Online Presentation Competition**. Aug. 4, 2020
- **Design Lead** at **AAVISHKAR 19**, organized by the **Kathmandu University Robotics Club**. Dec. 9–10, 2019
- Exhibited at the **Seventh National Science Day 2019** Sept. 18, 2019
  Organized by the **Ministry of Education, Science and Technology, Government of Nepal**.

Publications

Books & Book Chapters

[1] **C. Chaudhary**, M. Ben-Idris, and J. Mitra, "From Cyber Attacks to Resilient Operations: Safeguarding the Modern Power Grid," book chapter, *under review*.

[2] A. Bera, J. Mitra, and **C. Chaudhary**, "Grid Energy Storage: Applications, Models, and Emerging Technologies," book chapter, *under review*.

[3] A. Subedi and B. S. Thapa (contributor: **C. Chaudhary**), *Compendium of Fundamentals of Hydrogen Technology*, ISBN 978-9937-14-591-6 (Print); ISBN 978-9937-14-604-3 (Online). [ResearchGate]

[4] **C. Chaudhary**, *The Echo of Still Minds: A Machine Dreams. A Mind Awakens. A World Ends Differently.* (Novel), 2025. [Amazon]

Technical & Task Force Reports

[5] M. Ben-Idris, **C. Chaudhary**, I. Dobson, C. Rieger, A. Ahmad, E. Ciapessoni, A. Pitto, S. Hashemi, M. Panteli, E. Hotchkiss, S. Ekisheva, C. Dent, A. K. Srivastava, M. Abdelmalak, S. Acharya, M. Gautam, S. Datta, A. Abdelkader, J. Mitra, Z. Wang, and H. S. do Nascimento, "Power System Resilience Metrics and Evaluation Methods," *IEEE PES AMPS Committee – RRPA Subcommittee Task Force Technical Report*. doi:10.17023/7e16-km93

Journal Articles

[6] **C. Chaudhary**, A. Abdelkader, M. Ben-Idris, and J. Mitra, "Spatially Correlated Load Dynamics in AI Data-Center-Dominated Grids," *IEEE Transactions on Power Systems, under review*.

[7] A. Bera, **C. Chaudhary**, N. Nguyen, R. Bhargava, and J. Mitra, "Co-Planning of Energy Storage and Transmission for Reliability in Wind-Dominated Power Grids," *IEEE Transactions on Power Systems, submitted, under review*.

[8] **C. Chaudhary**, Y. Pei, M. Ben-Idris, and J. Mitra, "A Bayesian Hierarchical Model for Power System Resilience Assessment," *International Journal of Electrical Power & Energy Systems*, vol. 177, Apr. 2026, Art. no. 111829. doi:10.1016/j.ijepes.2026.111829

[9] **C. Chaudhary**, A. Kshetri, S. L. Shrestha, and K. Chapagain, "Design of Home Automation System using Dual-Tone Multi-Frequency Technique," *Himalayan Journal of Applied Science and Engineering*, vol. 2, no. 2, pp. 46–53, Nov. 2021. doi:10.3126/hijase.v2i2.44116

Conference Papers (selected)

[10] **C. Chaudhary**, A. Abdelkader, Y. Pei, M. Benidris, and J. Mitra, "Spatial Load Correlation in AI Data-Center-Dominated Power Systems," *2026 IEEE Power & Energy Society General Meeting (PES GM)*, Montréal, QC, Canada, Jul. 2026. *Preprint, to appear.* Preprint doi:10.13140/RG.2.2.28516.13442

[11] **C. Chaudhary**, M. Murillo, M. Ben-Idris, J. Mitra, D. Pandit, and A. Bera, "Modal Analysis of Spatial Load Correlation in AI Data Center-Dominated Power Systems," *Proceedings of the IEEE International Conference on Smart Energy Systems and Technologies (SEST)*, 2026. *Preprint, to appear.* Preprint doi:10.13140/RG.2.2.17610.94404

[12] **C. Chaudhary**, A. Abdelkader, M. Ben-Idris, and J. Mitra, "Resource Adequacy Risk in Correlated Large Loads," *2026 International Conference on Probabilistic Methods Applied to Power Systems (PMAPS)*, Salt Lake City, UT, USA, Sept. 21–24, 2026. *Preprint, to appear.* Preprint doi:10.13140/RG.2.2.35227.02087

[13] **C. Chaudhary**, A. Tiwari, Y. Pei, M. Ben-Idris, and J. Mitra, "Detection of Synchronized AI Data Center Load Episodes Using SCADA Telemetry," *Proceedings of the 2026 IEEE Industry Applications Society Annual Meeting (IAS AM)*, Vancouver, BC, Canada, Oct. 4–8, 2026. *To appear.*

[14] A. Tiwari, P. Sherpa, **C. Chaudhary**, M. Benidris, and J. Mitra, "Two-Stage Optimization for Dynamic Line Rating and Energy Storage Deployment," *2026 IEEE Power & Energy Society General Meeting (PES GM)*, Montréal, QC, Canada, Jul. 19–23, 2026.

[15] **C. Chaudhary**, A. Abdelkader, Y. Pei, M. Benidris, and J. Mitra, "Adaptive Energy Storage Coordination for Grid Resilience during Heatwave," *IEEE/PES Transmission and Distribution Conference and Exposition (T&D)*, Chicago, IL, USA, May 4–7, 2026.

[16] Y. Pei, **C. Chaudhary**, A. Abdelkader, M. Benidris, and J. Mitra, "Peak Demand Mitigation with Reinforcement Learning-Enabled Battery Energy Storage Systems," *2026 IEEE/PES Transmission and Distribution Conference and Exposition (T&D)*, Chicago, IL, USA, 2026, pp. 1–5. doi:10.1109/TD48022.2026.11562943

[17] A. Abdelkader, **C. Chaudhary**, Y. Pei, M. Benidris, and J. Mitra, "Two-Stage Optimization Framework for Dynamic Line Rating Implementation," *2026 IEEE/PES Transmission and Distribution Conference and Exposition (T&D)*, Chicago, IL, USA, 2026, pp. 1–5. doi:10.1109/TD48022.2026.11562678

[18] **C. Chaudhary**, A. Abdelkader, M. Benidris, J. Mitra, and C. Singh, "Evaluating Cascading Failure for Grid Resilience under Extreme Weather Events," *2025 11th International Conference on Power Systems (ICPS)*, Hyderabad, India, 2025, pp. 1–6. doi:10.1109/ICPS67276.2025.11364893

[19] **C. Chaudhary**, M. Benidris, and J. Mitra, "Resilience Oriented Optimization for Distributed Energy Storage in Networked Microgrids," *Resilience Week 2025*, National Harbor, MD, USA, Nov. 19–21, 2025. doi:10.1109/RWS66711.2025.11304331

[20] A. Abdelkader, **C. Chaudhary**, M. Benidris, and J. Mitra, "Modeling Cyber-Physical Power System Layers for Reliability Assessment," *North American Power Symposium (NAPS)*, Hartford, CT, USA, Oct. 26–28, 2025. doi:10.1109/NAPS66256.2025.11272199

[21] **C. Chaudhary**, A. Abdelkader, M. Egan, E. Udren, M. Benidris, and J. Mitra, "Impact of Data Center Load Modeling on Power System Stability," *Proceedings of the CIGRE Grid of the Future Symposium (USNC)*, Denver, CO, USA, Nov. 10–13, 2025. [Access Here]

[22] **C. Chaudhary**, M. Benidris, and J. Mitra, "Quantitative Resilience Assessment of Power System in the Presence of Energy Storage," *Kansas Power and Energy Conference (KPEC)*, Manhattan, KS, USA, Apr. 2025. doi:10.1109/KPEC65465.2025.11045040

[23] **C. Chaudhary**, J. Sanchez, K. Deb, M. Benidris, and J. Mitra, "A Multi-Objective Unit Commitment Approach Using Genetic Algorithms," *2024 56th North American Power Symposium (NAPS)*, El Paso, TX, USA, 2024, pp. 1–6. doi:10.1109/NAPS61145.2024.10741726

[24] J. Sánchez, **C. Chaudhary**, A. Abdelkader, M. Benidris, and J. Mitra, "Impact Assessment of Wear-Out Failures in Residential PV Systems," *2024 56th North American Power Symposium (NAPS)*, El Paso, TX, USA, 2024, pp. 1–6. doi:10.1109/NAPS61145.2024.10741771

[25] **C. Chaudhary**, M. Egan, J. Sanchez, M. Benidris, and J. Mitra, "Evaluating Voltage and Frequency Profile of Grid During Extreme Event Using RTDS," *2024 56th North American Power Symposium (NAPS)*, El Paso, TX, USA, 2024, pp. 1–6. doi:10.1109/NAPS61145.2024.10741731

[26] J. Sanchez, **C. Chaudhary**, M. Benidris, and J. Mitra, "Energy Storage Integration for Grid Reliability," *2024 18th International Conference on Probabilistic Methods Applied to Power Systems (PMAPS)*, Auckland, New Zealand, 2024, pp. 1–6. doi:10.1109/PMAPS61648.2024.10667147

[27] **C. Chaudhary**, A. Kshetri, A. Shrestha, A. Bista, and D. Bista, "Design and Fabrication of Automatic Voltage Stabilizer using Relay-Based Tap Changing of Transformer," *Journal of Physics: Conference Series*, vol. 2629, no. 1, p. 012023, Nov. 2023. doi:10.1088/1742-6596/2629/1/012023

[28] A. Shrestha, **C. Chaudhary**, N. Yadav, and B. S. Thapa, "Design and Analysis of Power Converter Topologies in Fuel Cell Applications," *Journal of Physics: Conference Series*, vol. 2629, no. 1, p. 012025, Nov. 2023. doi:10.1088/1742-6596/2629/1/012025

[29] S. Niroula, **C. Chaudhary**, A. Subedi, and B. S. Thapa, "Parametric Modelling and Optimization of Alkaline Electrolyzer for the Production of Green Hydrogen," *IOP Conference Series: Materials Science and Engineering*, vol. 1279, no. 1, p. 012005, 2023. doi:10.1088/1757-899X/1279/1/012005