ABODH **POUDYAL**

Senior Software Power Systems Engineer | Electric Power Engineers (EPE)

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Power Systems Engineer with 8+ years of combined experience in research, industry, and software development. Currently Senior Software Power Systems Engineer at EPE, specializing in distribution system modeling, optimization, resilience analysis, and software development. Skilled in power system analysis, operations research, machine learning, data analytics, and high-performance computing. Also serving as a Secretary of the IEEE Modern and Future Distribution Systems Planning Working Group.

Professional Experience

Present – Jul 2025 | **Senior Software Power Systems Engineer, Software Development, EPE, Austin, TX**

- Lead development of a python-based scalable Automated Mitigation Module (AMM) product to streamline thermal and voltage violation management for electric utilities.
- Serve as Power Distribution Systems Subject Matter Expert (SME) for the ENER-i software development team at EPE.
- Facilitate distribution model conversion and validation for utility clients within the ENER-i platform.
- Collaborate with engineers to improve usability and user experience for utility planners.
- Propose and design new software modules for distribution grid analysis and planning.

Python | OpenDSS | GIS | MPI | DuckDB | CYME | Synergi | Windmil | AWS

July 2025 – Mar 2024 | **Researcher III- Systems Engineering, Distribution Edge, NREL, Golden, CO**

- Developed comprehensive resilience assessment framework and quantification metrics for co-operatives and municipal utilities affected by severe weather and wind storms funded through the US DOE Grid Deployment Office (GDO).
- Developing an investment prioritization framework for utilities affected by floods funded through the US DOE GDO.
- Co-developer of energy resilience analysis for power distribution (ERAD) for conducting multi-hazard simulations for the distribution grid.
- Co-led a team in a large-scale resilience and restoration study analyzing the sequential impacts of tropical storms and cyberattacks on the distribution grid, focusing on human impact consequences.
- Lead developer for a Python-based optimization tool, Capacity Expansion Decision Support for Distribution Networks (CADET), that can assist distribution planners in making strategic long-term decisions through optimization of resources.
- Co-led or contributed to projects using CADET for flexible interconnections, microgrid planning, Non-Wire Alternatives (NWA) deferral, right-sizing capacity upgrades via battery energy storage, and power outage restoration.
- Contributed to several open-source tools from NREL, including grid-data-models, shift, infrasys, distribution transformers, and ditto.
- Co-developing a nationwide transformer demand analysis model for present and future stocks of distribution transformers funded through the US DOE Office of Electricity (OE).
- Co-developed a comprehensive distribution planning curriculum and webinar series for US utilities funded through DOE Office of Policy.
- Developed custom distribution model converters to convert specific utility distribution models.

Python | OpenDSS | GIS | MPI | DuckDB | PostgreSQL

May 2024 – Aug 2020 | **Graduate Research Assistant, Washington State University, Pullman, WA**

- Developed a risk-based multi-resource optimization and trade-off analysis framework for large-scale resilience planning of power distribution systems using stochastic dual decomposition algorithms on high-performance computing platforms.
- Developed an impact assessment and resilience planning framework for the electric power grid against extreme weather-related events.
- Worked as a support consultant from WSU for WSU-Restoration application developed in GridAPPS-D, an Advanced Distribution Management System (ADMS) platform developed by Pacific Northwest National Laboratory (PNNL).

Python | Julia | MATLAB | MATPOWER | OpenDSS | GridAPPS-D | GIS | MPI

Dec 2023 – May 2023

Graduate III-Electrical Engineering, National Renewable Energy Laboratory, Golden, CO

- Assisted in developing a learning-based outage prediction model for electric utilities through US Department of Energy : Solar Energy Technology Office (SETO) funded research.
- Major contributor in developing a long-term reconfiguration-based planning model within the North American Energy Resilience Model (NAERM).
- Energy Resilience Analysis for Power Distribution for Los Angeles-100 (LA100) energy study project.

Python | OpenDSS | AWS | Neo4j | GIS | MPI

Aug 2022 – May 2022

Power Distribution Consulting Intern, Hitachi Energy, Raleigh, NC

- Developed an Electric Vehicle (EV) Fleet Assessment Tool for fleet owners, customers, and utilities.
- Worked in a team to create a customer database to analyze and match the needs of equivalent EV fleets with their diesel counterparts.

Python | SQL | CYME | PSS-E

Aug 2020 – May 2020

Graduate Research Intern, Energy System Innovation Center, Pullman, WA

- Familiarized with ADMS via GridAPPS-D platform and distribution system application development using GridAPPS-D on docker containers.
- Implemented linearized power flow algorithms on standard distribution system test cases using conventional graph theory and search algorithms.

Python | OpenDSS | GridAPPS-D | Docker | SparQL | Blazegraph

May 2020 – May 2019

Graduate Research Assistant, South Dakota State University, Brookings, SD

- Developed a decentralized data-driven power system inertia estimation framework using Convolutional Neural Network (CNN) and Federated Learning (FL).
- Analyzed behavior of power system inertia when integrated with a model predictive controller-based virtual inertia unit.

Python | MATLAB | MATLAB Simulink | PowerWorld

May 2019 – Aug 2018

Graduate Teaching Assistant, South Dakota State University, Brookings, SD

- Mentored two undergraduate TAs to conduct effective lab sessions and tutorials.
- Designed electronic circuits (amplifier and oscillator circuits) and lab manual for experiments.

PSPICE | MATLAB

Jul 2018 – May 2017

Electrical Engineer, Upendra Badal International, Kathmandu, Nepal

- Designed low-voltage distribution systems for residential and industrial areas.
- Performed energy auditing and prepared reports on the analysis.

AutoCAD | Dialux | Microsoft Office

May 2017 – Oct 2016

Electrical Engineer, Tripureswar Conductor - Jaya Durge JV, Kathmandu, Nepal

- Conducted distribution planning through GIS surveys and substations designs in rural villages of Nepal, funded through the Asian Development Bank (ADB)
- Site inspection and assessment for ongoing projects in Doti, Kailali, and Dhangadi (Nepal).

AutoCAD | GIS

Education

May 2024 – Aug 2020

Ph.D. in Electrical Engineering , Washington State University, Pullman, WA

- *Resilience Planning and Optimization of Electric Power Systems against Extreme Weather Events*
- Major : Power and Energy Systems (Minor : Computer Science) - GPA : 3.96 out of 4.0
- Advisor : Dr. Anamika Dubey (WSU)

Aug 2020 | M.S. in Electrical Engineering, South Dakota State University, Brookings, SD
Aug 2018 | › *Distributed Machine Learning Approach to Fast Frequency Response-based Inertia Estimation in Low Inertia Grids*
› Major : Power and Energy Systems - GPA : 4.0 out of 4.0
› Advisor : Dr. Timothy M. Hansen (SDSU)

Oct 2016 | B.E. in Electrical Engineering, Tribhuvan University, Lalitpur, Nepal
Nov 2012 | › *Design and Fabrication of a Shunt Active Power Filter for a 3-Phase 4-Wire System Using PQ Theory*
› Major : Power and Energy Systems - GPA : 3.75 out of 4.0
› Advisor : Dr. Netra Prasad Gyawali (TU)

Projects

CADET : Capacity Expansion Decision Support for Distribution Networks — 2024-PRESENT

CADET
I am one of the lead developers of CADET from NREL. CADET assists utility planners in making long-term decisions through the optimization of resources. This tool is currently under development, and we are planning to open-source it soon.

Python | Pyomo | OpenMDAO

NREL Distribution Suites — 2024-PRESENT

github.com/NREL-Distribution-Suites
Contributed to grid-data-models, which is a distribution systems model that is fully validated through pydantic models; infrasys, which is a data store for components and time series; ditto, which converts the distribution systems model from one form to the other, and shift, which can generate realistic synthetic distribution systems model.

Python

Proactive dispatch and Investment Planning in Electric Power Systems — 2023

github.com/abodh/proactive_resilience_planning
This work is completed as a class project for EE 582 Power System Economics and Electricity Markets course. In this project, we formulated a two-stage stochastic planning model for proactive generation dispatch and line hardening investment to enhance the power system's resilience.

Python | MATLAB | MATPOWER | Pyomo

Electric Vehicle Fleet Assessment Tool — 2022

Iberdrola Startup Challenge : EV Fleet Assessment Tool | Tool Details
I was one of the lead developers of this tool for Iberdrola (or Avangrid) as a power consulting intern at Hiatchi Energy. The main aim of this tool is to provide total cost of ownership, charging infrastructure requirements, EV options, available incentives, carbon reduction value, and so forth to the fleet owners compared to their diesel counterparts. The analysis considered utility tariffs, customer load profiles, available diesel fleets, and current feeder conditions.

Python | SQL | CYME

Risk-averse Long-term Planning in Power Distribution Systems — 2021 - 2022

In this project, we developed an optimization framework with risk-driven decisions to facilitate long-term planning in power distribution systems. The main aim here is to improve the long-term resilience of the power distribution system against extreme events while identifying the trade-off between risk-neutral and risk-averse planning solutions.

Python | MATLAB | OpenDSS | Pyomo | Julia

Spatiotemporal Hurricane and its impact model — 2021 - Present

github.com/abodh/SummerInternship2021WSU/tree/main/main_code_abodh
This work is collaborated with high school interns. Here, we simulate spatiotemporal hurricanes and quantify its impact on the power grid. As an extension, we are also working on integrating a distribution grid and analyze the impact of spatiotemporal extreme events through co-simulation.

Python | MATLAB | MATPOWER | CARTOPY | Git

Multi-Area Inertia Estimation using Convolutional Neural Networks and Federated Learning 2019-2020

github.com/abodh/Inertia-Estimation-using-Federated-Learning
github.com/abodh/Neural_Network_Inertia_Estimation

I worked in this project during my masters at SDSU. We developed a decentralized data-driven inertia estimation framework that is generator independent and depends only on the local frequency measurements. We applied Federated Learning for decentralized estimation that also ensures differential privacy in the power systems — facilitating provisions for cyber security.

Python | PyTorch | MATLAB

Comparison of Electricity Cost Forecasting Models 2020

github.com/abodh/Electricity-cost-forecasting-using-machine-learning-and-deep-learning-models

This work is completed as a class project for the course CPT 575 Data Science. I worked on creating the cost forecasting dataset using auxiliary variables such as fuel cost, season, loads, and so forth. Furthermore, I also developed the artificial neural network (ANN) and convolutional neural network (CNN)-based forecasting models for this project.

Python | PyTorch | R | Git

Publications

JOURNALS

[J1] **A. Poudyal**, U. Tamrakar, R. D. Trevizan, R. Fourney, R. Tonkoski, and T. M. Hansen, "Multi-Area Inertia Estimation using Convolutional Neural Networks and Federated Learning", *IEEE Systems Journal*, vol. 16, no. 4, pp. 6401-6412, Dec. 2022.

[J2] **A. Poudyal**, S. Poudel, and A. Dubey, "Risk-Averse Long-term Power Distribution Systems Planning for Resilience to Extreme Weather Events", *IEEE Transactions on Sustainable Energy*, vol. 14, no. 2, pp. 1178 - 1192, Apr. 2023.

[J3] **A. Poudyal**, S. Paul, S. Poudel, A. Dubey, and Z. Wang "Resilience Metrics and Planning in Power Distribution Systems : Past and Future Considerations", *Renewable and Sustainable Energy Reviews*, Vol. 189, Part B, Jan. 2024, 113991.

[J4] **A. Poudyal**, and A. Dubey, "Multi-resource Trade-offs in Resilience Planning Decisions for Power Distribution Systems ", *IEEE Transactions on Industry Applications*, vol. 60, no. 6, pp. 8031-8043, Nov.-Dec. 2024.

[J5] S. Lamichhane, **A. Poudyal**, B. Krishnamoorthy, and A. Dubey, "Scalable Two-Stage Stochastic Optimal Power Flow via Separable Approximation", *IEEE Transactions on Sustainable Energy* (in review).

[J6] **A. Poudyal**, S. Lamichhane, A. Dubey, and J. C. do Prado "Resilience-driven Planning of Electric Power Systems Against Extreme Weather Events ", *International Journal of Electrical Power and Energy Systems* (in review).

[J7] **J. Keen, A. Poudyal** et al., "CADET : A Library and Framework for Creating Distribution Capacity Expansion Planning Tools", in *2026 Power Systems Computation Conference* (in review).

[J8] **A. Poudyal**, S. Poudel, and A. Dubey, "Large Scale Resilience Planning in Distribution Systems Against Extreme Weather Events", (*in preparation*).

CONFERENCES

[C1] **A. Poudyal**, U. Tamrakar, R. D. Trevizan, R. Fourney, R. Tonkoski, and T. M. Hansen, "Convolutional Neural Network-based Inertia Estimation using Local Frequency Measurements", in *2020 52nd North American Power Symposium (NAPS)*, Jun. 2021, pp. 1-6.

[C2] **A. Poudyal**, V. Iyenger, D. G. Camaro, and A. Dubey, "Spatiotemporal Impact Assessment of Hurricanes on Electric Power Systems", in *2022 IEEE PES General Meeting*, Jul. 2022, pp. 1-5. (Selected in the Best Conference Papers Session)

[C3] **A. Poudyal** and S. Poudel, "A Risk-Driven Probabilistic Approach to Quantify Resilience in Power Distribution Systems", in *International Conference on Probabilistic Methods Applied to Power Systems (PMAPS)*, Jun. 2022, pp. 1-6.

[C4] **A. Poudyal**, Charlotte Wertz, Amy Mi Nguyen, Sajjad Uddin Mahmud, Vibha Gunturi, and Anamika Dubey, "Impact Assessment of Hurricanes and Storm Surges in Electric Power Systems ", in *2023 IEEE PES General Meeting*, Jul. 2023, pp. 1-5.

[C5] **A. Poudyal** and A. Dubey, "Understanding Trade-offs in Resilience Planning Decisions for Power Distribution Systems", in *2023 IEEE IAS Annual Meeting*, Oct. 2023, pp. 1-6.

[C6] **A. Poudyal** et al., "Hurricane and Storm Surges-Induced Power System Vulnerabilities and their Socioeconomic Impact", in *2024 IEEE PES General Meeting*, Jul. 2024, pp. 1-5.

TECHNICAL REPORTS AND ARTICLES

[T1] K. McKenna, S. Ann Abraham, W. Wang, **A. Poudyal** et al., "Distribution Transformer Demand : Understanding Demand Segmentation, Drivers, and Management Through 2050", *National Renewable Energy Laboratory*, Nov. 2024.

Programming Skills

Python	●●●●●
MATLAB	●●●●●
SQL	●●●●○
Julia	●●●●○
C/C++	●●●●○
R	●●●○○
CUDA	●●●○○

Power System Tools

- OpenDSS
- CYME, Synergi, Windmil
- PowerWorld, PSSE
- Matlab Simulink
- MATPOWER, Pandapower
- GridAPPS-D

Software

- numpy, pandas, pydantic
- polars, pyarrow, parquet
- pyomo, cvxpy, openmdao
- tensorflow, pytorch, scipy
- duckdb, sqlite
- MPI, openmpi, mpi4py
- Git, CI/CD
- Jira, Confluence

Personal and Professional Activities

Present	Serving as a reviewer for IEEE Transactions in Neural Network and Learning Systems, IEEE Transactions in Smart Grids, IEEE Transactions in Sustainable Energy, Nature Communications, IEEE Systems Journal, IEEE Access, IEEE Transactions on Industrial Applications, International Journal of Electrical Power & Energy Systems, Journal of Modern Power Systems and Clean Energy, Applied Sciences, and IEEE conferences.
2024-Present	Secretary, IEEE Modern and Future Distribution Systems Planning Working Group
2022	Director, Graduate and Professional Students Association (GPSA) Professional Development Initiative (PDI)
2022	Poster presentation at Best Paper Sessions, IEEE Power and Energy Society General Meeting and other IEEE venues

Honors and Awards

2022	**Awardee,** Full scholarship, Grid Science Winter School and Conference, Los Alamos National Laboratory
2022	**Fellow,** E8 Angels
2020 - Present	**Member,** Tau Beta Pi honors society
2012 - 2016	**Mahatma Gandhi Scholar,** achieved due to outstanding performance in high school
2012 - 2016	**Full scholarship,** Bachelor of Electrical Engineering, Tribhuvan University