

# Abodh Poudyal

ELECTRICAL ENGINEER | PH.D. STUDENT

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Power Systems Engineer with about 4 years of experience as a researcher at Washington State University and South Dakota State University. I am actively working on the spatiotemporal modeling of extreme weather-related events and its impact on power systems, with a focus on power distribution systems. Additionally, I am also interested in developing risk-driven power distribution planning framework to develop resilience against extreme stochastic events in power distribution systems. I am a quick learner and an enthusiastic and persistent researcher. I have grown my research expertise in several domains such as power distribution modeling and optimization, power system analysis, operations research, machine learning, and high-performance computing.

## Experience

### Washington State University

Pullman, WA

GRADUATE RESEARCH ASSISTANT

August 2020 - Present

- Developing a risk-averse long-term planning model in power distribution systems for resilience against extreme events via stochastic optimization framework.
- Developing an impact assessment framework for combined T&D network using HELICS as a co-simulation platform.
- Mentored two high school interns to develop a framework for analyzing the spatiotemporal impact of extreme events on a power grid.

### Energy System Innovation Center, WSU

Pullman, WA

GRADUATE RESEARCH INTERN

May 2020 - Aug. 2020

- 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 graph theory and search algorithms.
- Got acquainted with distribution system modeling, analysis, and power flow using Open Distribution System Simulator (OpenDSS).

## Education

### Washington State University

Pullman, WA

PH.D. IN ELECTRICAL ENGINEERING (GPA: 4.0 OUT OF 4.0) – Major - Power Systems, Minor - Computer Science

Aug. 2020 - Present

- Research** — *Extreme Events and Impact Modeling towards Risk-Averse Resilience Planning in Power Systems.*

### South Dakota State University

Brookings, SD

M.S. IN ELECTRICAL ENGINEERING (GPA: 4.0 OUT OF 4.0) – Major - Power Systems

Aug. 2018 - Aug. 2020

- Thesis Title** — *Distributed Machine Learning Approach to Fast Frequency Response-based Inertia Estimation in Low Inertia Grids*

## Relevant Projects

### RISK-AVERSE LONG-TERM PLANNING IN POWER DISTRIBUTION SYSTEMS

2021-Present

- Developing a framework that optimizes risk-averse decision making process for long-term planning in power distribution systems.

### SPATIOTEMPORAL HURRICANE AND ITS IMPACT MODEL

2021

- Simulated mathematical model of hurricanes, based on real hurricanes occurred in the past, based on geographical information.
- Quantified spatiotemporal impact of the hurricanes on the power grid.

### MULTI-AREA INERTIA ESTIMATION USING CNN AND FEDERATED LEARNING

2020

- Developed a decentralized data-driven inertia estimation framework that is generator independent and depends only on the local frequency measurements.
- Applied Federated Learning for decentralized estimation that also ensures differential privacy in the power systems — facilitating provisions for cyber security.

## Skills

**Coding Languages** Python, Julia, MATLAB, C, C++, R, CUDA, HTML,  $\LaTeX$

**Development Tools** Matpower, PowerWorld, OpenDSS, GridLAB-D, GridAPPS-D, PyTorch, MPI, Docker

## Publications

- [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*, 2021 (in second round of review).
- [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* (in preparation).
- [J3] S. Paul, **A. Poudyal**, S. Poudel, and A. Dubey, "Resilience Metrics and Planning in Power Distribution Systems: Past and Future Considerations", *Renewable and Sustainable Energy Reviews* (in preparation).
- [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, "Modeling Spatiotemporal Hurricane Events and its Impact on a Power Grid", in *2022 IEEE PES General Meeting* (Submitted).
- [C3] **A. Poudyal** and S. Poudel, "Quantifying Planning-based Resilience in Power Distribution System using Multi-Criteria Decision Making Process", in *International Conference on Probabilistic Methods Applied to Power Systems, PMAPS 2022* (in preparation).