Bin Huang

binhuangcn95@gmail.com | Google scholar | Personal website

Expertise: Applications of large language models, retrieval-augmented generation (RAG), and computer vision for power system automation; Substation lifecycle engineering and knowledge preservation; Operations research and data analytics.

Skills: Python: Pytorch, Tensorflow, pandapower, PYPOWER-Dynamics, numpy, pandas, matplotlib, etc.; **Matlab**: Simulink, MATPOWER; **Optimization solvers:** gurobi, mosek, ipopt; **AWS:** Certified Cloud Practitioner, S3, Braket, IAM, SNS; **Linux:** HPC server usage, Slurm, Bash script; SQL; LaTeX; Github.

Education and Experience

Eversource energy, Berlin, U.S. | *Senior Data Scientist*   2023.12–now

Data Science and AI for Electric Utilities

- AI and imagery-based distribution circuit/vegetation inspection automation
- 3D scanning and point cloud automation of utility assets
- Multimodal AI-assisted image understanding and compliance checking
- Audio recognition-based control room compliance inspection
- CustomGPT-based AI assistant
- Azure retrieval-augmented generation and chatbot development
- Automated PSCAD simulation result interpretation

Southern Methodist University, Dallas, U.S. |Electrical Engineering|*Ph.D.*   2019.09 - 2023.10

Advisor: Prof. Jianhui Wang, IEEE Fellow, GPA: 4.0/4.0

Brookhaven National Laboratory, Upton, U.S. |Visiting scholar/Student assistant   2022.06 - 2022.08/2023.06-2023.08, Advisor: Dr. Meng Yue, Dr. Tianqiao Zhao

South China Univ. of Tech., China |Electrical Engineering|*M.Sc.*   2016.09 - 2019.06

Advisor: Prof. Q.H. Wu, IEEE Fellow, GPA: 3.8/4.0

Huazhong Univ. of Sci. and Tech., China |Hydropower Engineering|*B.Sc.*   2012.09 - 2016.06

Advisor: Prof. Qin Hui, GPA: 3.9/4.0

Publications (7 first-authored papers and one patent), Cited 625 times on Google Scholar (dated 07/16/2025), h-index 7

1. **B. Huang**, J. Wang, and X. Huang, "Aligning quantum kernels for detecting false data injection attacks in power systems," *Applied Energy*, p. 127332, 2026. doi:10.1016/j.apenergy.2025.127332. Link

2. **B. Huang**, J. Li, H. Guo, and J. Wang, "Bi-Level Adaptive Storage Expansion Strategy for Microgrids Using Deep Reinforcement Learning," *IEEE Transactions on Smart Grid*, vol. 15, no. 2, pp. 1362–1375, Mar. 2024, doi:10.1109/TSG.2023.3312225. Link

3. **B. Huang** and J. Wang, "Physics-informed Neural Network and its Application on Power System: A Review" . IEEE Trans. on Power Systems. 38(1), 572-588, 2023. Link

4. **B. Huang** and J. Wang, "Deep Reinforcement Learning-based Capacity Scheduling for PV-Battery Storage System," IEEE Trans. on Smart Grid, 12(3), 2272-2283, 2020. Link

5. **B. Huang** and J. Wang, "Adaptive Static Equivalences for Active Distribution Networks with Massive Renewable Energy Integration: A Distributed Deep Reinforcement Learning Approach," *IEEE Transactions on Network Science and Engineering*, vol. 11, no. 6, pp. 5463–5476, Nov.–Dec. 2024, doi:10.1109/TNSE.2023.3272794. Link

6. **B. Huang**, Z. Li, J. H. Zheng, and Q. H. Wu, "Probabilistic active distribution network equivalence with correlated uncertain injections for grid analysis," IET Renewable Power Generation, 14(11), July. 2020. Link

7. **B. Huang**, P. Li, J. H. Zheng, and Q. H. Wu, "A Modified Ward Equivalent Based on Sensitivity Matrices for Static Security Analysis," IEEJ Trans. Electr. Electron. Eng., vol. 13, pp. 1675-1676, May. 2018.

8. **B. Huang**, J. Li, H. Guo, and J. Wang, "Evidential Reasoning for Enhanced Node Selection in Power Network Reduction: a Complex Network Perspective," in *Proc. 2024 IEEE Power & Energy Society General Meeting (PESGM)*, Seattle, WA, USA, Jul. 21–25, 2024, doi:10.1109/PESGM51994.2024.10689175. Link

9. H. Guo, **B. Huang***, and J. Wang, "Probabilistic Load Forecasting for Integrated Energy Systems Using Attentive Quantile Regression Temporal Convolutional Network," *Advances in Applied Energy*, vol. 14, p. 100165, Jul. 2024. doi:10.1016/j.adapen.2024.100165. (*corresponding author*) Link

10. Huang, X., Zhao, T., **Huang, B.**, Zhang, Z. and Yue, M., 2025. Advancing energy system optimization via data-centric task-oriented forecasting: An application in PV-battery operation. Applied Energy, 378, p.124753.

11. Y Ji, X Zhang, X Wang, X Huang, **B Huang,** JH Zheng, Z Li, "An Equivalent Modeling Method for Multiport Area Load Based on the Extended Generalized ZIP Load Model," 2018 International Conference on Power System Technology (POWERCON), Guangzhou, China, 2018, pp. 553-558, doi: 10.1109/POWERCON.2018.8601588.

12. Patent: A probabilistic equivalence modeling method for active distribution networks considering the stochastic nature of new energy sources, China, No. 109687431, July 14, 2019

Reviewer Experience (350 times in total)

IEEE

IEEE Transactions on Neural Networks and Learning Systems x4

IEEE Transactions on Smart Grid x5

IEEE Transactions on Power Systems x19

IEEE Transactions on Sustainable Energy x3

IEEE Transactions on Power Electronics x8

IEEE Transactions on Energy Markets, Policy, and Regulation x1

IEEE Transactions on Industrial Informatics x6

IEEE Transactions on Transportation Electrification x4

IEEE journal of emerging and selected topics in power electronics x2

IEEE Transactions on Network Science and Engineering x1

IEEE Internet of Things Journal x3

IEEE Open Access Journal of Power and Energy x4

IEEE Power & Energy Society General Meeting 2022 x1

IEEE Power & Energy Society General Meeting 2023 x7

IEEE Power & Energy Society General Meeting 2024 x17

IEEE Transmission & Distribution Conference and Exposition 2024 x6

IEEE Energy Conversion Congress & Exposition 2025 x6

IEEE Energy Conversion Congress & Exposition 2024 x6

IEEE Energy Conversion Congress & Exposition 2023 x9

IEEE Transportation Electrification Conference and Expo 2023 x12

IEEE Transportation Electrification Conference and Expo 2024 x8

IEEE Transportation Electrification Conference and Expo 2025 x12

TEXAS POWER AND ENERGY CONFERENCE (TPEC) 2024 x3

TEXAS POWER AND ENERGY CONFERENCE (TPEC) 2025 x7

TEXAS POWER AND ENERGY CONFERENCE (TPEC) 2026 x5

IEEE Transactions on Emerging Topics in Computational Intelligence x2

IEEE Power Engineering Letters x1

Elsevier

International Journal of Electrical Power and Energy Systems x3

Renewable and Sustainable Energy Reviews x14

Knowledge-Based Systems x8

Expert Systems With Applications x16

Energy and AI x22

Energy Reports x23

Electric Power Systems Research x37

Sustainable Energy, Grids and Networks x1

Journal of Energy Storage x2

Neural Networks x1

Sustainable Energy Technologies and Assessments x1

Hindawi

International Transactions on Electrical Energy Systems x3

Springer / ACM / Others

International Journal of Data Science and Analytics x2

Scientific Reports x2

Iranian Journal of Science and Technology, Transactions of Electrical Engineering x2

ACM SIGKDD Conference on Knowledge Discovery and Data Mining 2023 x3

ACM SIGKDD Conference on Knowledge Discovery and Data Mining 2024 x5

ACM SIGKDD Conference on Knowledge Discovery and Data Mining 2025 x2

The Journal of Supercomputing x1

IET Renewable Power Generation x7

IET Generation, Transmission & Distribution x9

CSEE Journal of Power and Energy Systems x1

Journal of Modern Power Systems and Clean Energy x2

Protection and Control of Modern Power Systems x1

Journal of Renewable and Sustainable Energy x1

AASG2024 (5th International Workshop on Autonomous Agents for Social Good) x2

Technologies x1

Energies x1

Information x1

Energy Conversion and Economics x2

National Science Foundation 2024 x5

Entropy x2

Frontiers in Energy Research x3

Frontiers in Computer Science x1

ECE Forum 2025 x1

Journal of Control, Automation and Electrical Systems x1

Commendable Reviewer KDD2025

Voluntary Position

1. Leadership Member on Utility Analytics Institute Grid Analytics Community
2. Review Editor on the Editorial Board of Smart Grid Control (2024–present), Frontiers in Smart Grids
3. Young Editorial Board Member (2025–present), IET Energy Conversion and Economics
4. IEEE PES AMPS-BPSP Task force on Foundation Models for Situational Awareness, Computation, and Analysis

International Conference Organization and Coordination

1. Stage Manager, eGrid 2021 (IEEE PES & PELS 2021 6th Workshop on the Electronic Grid), Nov. 8th to Nov. 10th, 2021, virtual
2. Volunteer, IEEE Power & Energy Society General Meeting 2023, Jul. 16 to Jul. 20, 2023, Orlando, U.S.
3. Volunteer, 2018 International Conference on Power System Technology, Nov. 6th to Nov. 8th, 2018, Guangzhou, China

Invited Talks

1. IEEE PES General Meeting 2025, "Deep Learning Fusion of 2D Images and 3D Point Clouds for Next-Gen Distribution Asset Management" in panel: "Demand-side Flexibility and Grid Interaction: New Energy Solutions for Future Habitats with Urban Distribution Systems"- July 31, 2025, Austin
2. UA Week 2024, "Predictive Analytics and Vegetation Intelligence", Chicago
3. IEEE PES General Meeting 2024, "Imagery and AI Assisted Distribution Systems Inspection and Storm Restoration" Industry Experiences with Grid Edge Technologies Deployment: Trends, Challenges, and Strategies- July 23, 2024, Seattle
4. IEEE PES General Meeting 2024, "Evidential Reasoning for Enhanced Node Selection in Power Network Reduction: a Complex Network Perspective", 2024, Seattle
5. INFORMS Annual Meeting Energy Efficient Vehicle Sharing System Session, "Capacity Scheduling of Battery Storage System for EV Charging and Frequency Regulation: A Proximal Policy Optimization Approach", one of the largest conferences in the field of operations research, Virtual, November 13, 2020.
6. Electric Power Research Institute visiting (Invited by Dr. Ben York), "Detecting False Data Injection Attacks in Smart Grids Using Quantum Embedding Kernels", SMU, May 11, 2023.
7. "Opendss Tutorial", Invited by Dr. Jianhui Wang, Southern Methodist University, Oct 17, 2023.
8. "Introduction to Quantum Computing", Invited by Dr. Meng Yue, Brookhaven National Laboratory, Jun, 2023.
9. "AI Efforts in Eversource", Invited by Dr. Jianhui Wang, Southern Methodist University, April 7, 2025.

Projects

i. **U.S. DOE DE-EE0009337** | *Resilient Community Microgrids with Dynamic Reconfiguration to Serve Critical Loads in the Aftermath of Severe Events, Link*   2021.06-now

1. Developed a **decentralized state estimation** algorithm for community microgrids on **Matlab**. 2. Developed algorithms for handling **bad and missing data in SCADA** systems. Utilized residual statistic metrics and measurement matrix to identify bad data and recover it to normal values. Built a time-series prediction model to construct pseudo-measurements for low-observability. 3. Devised a method to identify **false data injection attacks** on measurement data, leveraging a 1D-CNN **deep learning** algorithm. 4. Conducted rigorous testing and verification on the IEEE 123-node system. The project passed the DOE's quarterly and annual reviews. Maintained consistent communication with the team, providing weekly progress updates and drafting comprehensive quarterly reports.

ii. **Southwest Research Institute 15-R6035** | *Machine Learning-power Battery Storage Modeling and Evaluation for Fast Frequency Regulation Service, Link*   2019.11-2021.06

1. Developed a **battery capacity scheduling** algorithm based on deep reinforcement learning. 2. Devised battery arbitrage and **frequency regulation** provision for **energy and ancillary service markets**. 3. PJM RegD signal for verification.

iii. **Guizhou Power Grid Corp.** | *Hierarchical Multi-Objective Reactive Power Optimization and Decision Making for Large Scale Power Systems*   2016.11-2018.09

Developed a **load-flow** based module on **Matlab** for network reduction (Ward, Extended Ward, REI), which can adaptively reduce the scale of the power system by eliminating the low voltage level buses (scale to 10,000+ buses).

Award

2023 IEEE Transactions on Power Systems Outstanding Papers (first author), Popular Articles at IEEE Transactions on Power Systems (first author, dated 01/12/2024), Highly Cited Papers at Clarivate (top 1%), Frederick E. Terman Engineering Scholastic Award, AWS Cloud Credit for Research, Computational science and engineering fellowship (2022-2023,2023-2024), Research assitanceship (2019-2023), China National Scholarship (2013), Outstanding Graduate (2016), Pan Jia Zheng Hydropower Scholarship (2014)

Fortnightly PUF Top Innnovators in Distributed Energy(2025)