QIANZHI ZHANG

Ezra SYSEN Postdoctoral Fellow⋄ System Engineering, Cornell University
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EDUCATION

Iowa State University **Ames, IA, USA**
Ph.D., Electrical Engineering *Sept. 2017 - May 2022*
Dissertation: "Multi-Agent Optimization and Learning Methods for Sustainable, Smart and Resilient Power Distribution Systems and Microgrids".
Committee: Profs. Zhaoyu Wang, James McCalley, Venkataramana Ajjarapu, Ian Dobson, and Chao Hu.

Arizona State University **Tempe, AZ, USA**
M.Sc., Electrical Engineering *Aug. 2012 - Dec. 2014*
Dissertation: "Optimal Substation Ground Grid based on Genetic Algorithm and Pattern Search".
Committee: Profs. Daniel J. Tylavsky, John Undrill, and Raja Ayyanar.

Shandong University of Technology **Zibo, Shandong, China**
B.Sc., Electrical Engineering *Sept. 2008 - July 2012*

WORK EXPERIENCE

University of Alabama **Tuscaloosa, AL, USA**
Assistant Professor *Aug. 2023-Present*

Cornell University **Ithaca, NY, USA**
Ezra SYSEN Postdoctoral Fellow *Jun. 2022-Jul. 2023*

University of Utah **Salt Lake City, UT, USA**
Teaching Assistant *Aug. 2016-Aug. 2017*

Huadian Electric Power Research Institute **Hangzhou, Zhejiang, China**
Distributed Energy Resource Engineer *May. 2015-May. 2016*

SUMMARY OF RESEARCH INTERESTS AND WORKS

- Multi-Agent Safe Reinforcement Learning for Power and Energy Management in Microgrids
- Distributed Optimization for Volt/Var Control in Power Distribution Systems
- Pre-Event Preparation and Post-Event Restoration in Resilient Power Distribution Systems
- Impacts of Large-Scale Transportation Electrification on Power System Planning and Operation

PUBLICATION

Journal Paper

[J17] **Q. Zhang**, J. Yan, H. Gao and F. You, "A Systematic Review on Power Systems Planning and Operations Management with Grid Integration of Transportation Electrification at Scale," Advances in Appl. Energy, accepted for publication.

[J16] N. Shi, R. Cheng, L. Liu, Z. Wang, and **Q. Zhang** "Data-Driven Affinely Adjustable Robust Volt/VAr Control," IEEE Trans. Smart Grid, accepted for publication.

[J15] **Q. Zhang**, F. Bu, Y. Guo and Z. Wang, "Tractable Data Enriched Distributionally Robust Chance-Constrained Conservation Voltage Reduction," IEEE Trans. Power Systems, accepted for publication.

[J14] J. Huang, **Q. Zhang**, and F. You, "Impacts of Battery Energy Storage Technologies and Renewable Integration on the Energy Transition in the New York State," Advances in Appl. Energy, accepted for publication.

[J13] Z. Ma, **Q. Zhang** and Z. Wang, "Safe and Stable Secondary Voltage Control of Microgrids based on Explicit Neural Networks," IEEE Trans. Smart Grid, accepted for publication.

[J12] R. Cheng, Y. Guo, Z. Wang, **Q. Zhang** "Online Voltage Control for Unbalanced Distribution Networks Using Projected Newton Method", IEEE Trans. Power Systems, vol. 37, no. 6, pp. 4747-4760, Nov. 2022.

[J11] **Q. Zhang**, Z. Wang, S. Ma and A. Arif "Stochastic Pre-Event Preparation for Enhancing Resilience of Distribution Systems," Renewable and Sustainable Energy Reviews, vol. 152, pp. 111636, Dec. 2021.

[J10] Y. Guo, **Q. Zhang**, Z. Wang, "Cooperative Peak Shaving and Voltage Regulation in Unbalanced Distribution Feeders", IEEE Trans. Power Systems, vol. 36, no. 6, pp. 5235-5244, Nov. 2021.

[J9] **Q. Zhang**, Y. Guo, Z. Wang and F. Bu, "Distributed Optimal Conservation Voltage Reduction in Integrated Primary-Secondary Distribution Systems", IEEE Trans. Smart Grid, vol. 12, no. 5, pp. 3889-3900, Sept. 2021.

[J8] **Q. Zhang**, Z. Ma, Y. Zhu, and Z. Wang, "A Two-Level Simulation-Assisted Sequential Distribution System Restoration Model with Frequency Response Constraints", IEEE Trans. Smart Grid, vol. 12, no. 5, pp. 3835-3846, Sept. 2021.

[J7] **Q. Zhang**, K. Dehghanpour, Z. Wang, F. Qiu and D. Zhao, "Multi-Agent Safe Policy Learning for Power Management of Networked Microgrids", IEEE Trans. Smart Grid, vol. 12, no. 2, pp. 1048-1062, March 2021.

[J6] **Q. Zhang**, K. Dehghanpour, Z. Wang, and Q. Huang, "A Learning-Based Power Management Method for Networked Microgrids Under Incomplete Information", IEEE Trans. Smart Grid, vol. 11, no. 2, pp. 1193-1204, March. 2020.

[J5] **Q. Zhang**, K. Dehghanpour, and Z. Wang, "Distributed CVR in Unbalanced Distribution Systems With PV Penetration", IEEE Trans. Smart Grid, vol. 10, no. 5, pp. 5308-5319, Sept. 2019.

[J4] **Q. Zhang** and M. Sahraei-Ardakani, "Distributed DCOPF With Flexible Transmission", Electric Power Systems Research, vol. 154, pp. 37-47, Jan. 2018.

[J3] J. Zhang and **Q. Zhang**, "Derivation and Conformity Measurement of A Popular Explicit Analytic Borowy 2C PV Module Model", Journal of Modern Power Systems and Clean Energy, vol. 2, no. 4, pp. 431-437, Dec. 2014.

[J2] **Q. Zhang**, N. Wang, J. Zhang and B. Zhao, "Parameter Scheme Design and Analysis of Power Generation Model in Grid-Oriented Energy Data Acquisition and Supervisory System for Grid-Connected Photovoltaic Power Plant", Power System and Clean Energy, vol. 27, no. 10, pp. 76-81, Nov. 2011.

[J1] J. Zhang, **Q. Zhang**, N. Wang, L. Zheng and X. Xie, "Power Generation Model and Its Parameter Calibration for Grid-Connected Photovoltaic Power Plant Energy Data Acquisition and Supervisory System", Automation of Electric Power Systems, vol. 35, no. 13, pp. 22-26, July 2011.

Conference Paper

[C13] N. Shi, R. Cheng, Z. Wang and **Q. Zhang**, "Analyzing Impact of BESS Allocation on Hosting Capacity in Distribution Networks", 2022 North American Power Symposium (NAPS), Salt Lake City, UT, 2022.

[C12] Y. Yuan, **Q. Zhang**, K. Dehghanpour, F. Bu and Z. Wang, "Smart Meter Data Compression and Reconstruction Using Deep Convolutional Autoencoders", 2021 North American Power Symposium (NAPS), Phoenix, AZ, 2021.

[C11] Q. Xu, J. Zhang, Y. Sun, L. Zhang and **Q. Zhang**, "BESS Configuration for Power Shortage of Regional Power System by Slice Cutting Approach", The Purple Mountain Forum on Smart Grid Protection and Control, 2020.

[C10] Y. Xuan, J. Zhang and **Q. Zhang**, "Combinational Linear Programming Approach for Daily Optimal Operation of Customers With DG/ESS Under TOU Pricing for Customer EMS Software Applications", 2018 IEEE Innovative Smart Grid Technologies-Asia (ISGT Asia), Singapore, 2018.

[C9] **Q. Zhang** and M. Sahraei-Ardakani, "Impacts of Communication Limits on Convergence of Distributed DCOPF With Flexible Transmission", 2017 North American Power Symposium (NAPS), Morgantown, WV, 2017.

[C8] Y. Chen, J. Zhang, Q. Han, C. Guo and **Q. Zhang**, "Message Flow Modeling Analysis and Application for Digital Substation Process Layer Network", 2017 IEEE 7th Annual International Conference on Cyber Technology in Automation, Control, and Intelligent Systems, Honolulu, HI, 2017.

[C7] J. Zhang, Y. Chen, N. Jin, L. Hou and **Q. Zhang**, "OPNET-Based Simulation Modeling and Analysis of DoS Attack for Digital Substation", 2017 IEEE PES General Meeting (PESGM), Chicago, IL, 2017.

[C6] X. Wu, **Q. Zhang** and J. He, "Substation Grounding System Optimization With Utilizing A Novel MATLAB Application", 2016 IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC), Xi'an, 2016.

[C5] **Q. Zhang** and X. Wu, "Software Development of Optimal Substation Ground Grid Design Based on Genetic Algorithm and Pattern Search", 2014 North American Power Symposium (NAPS), Pullman, WA, 2014.

[C4] J. Zhang and **Q. Zhang**, "High-Rise Building Mini-Hydro Pumped-Storage Scheme With Shanghai Jinmao Tower as A Case Study", 2014 IEEE PES General Meeting (PESGM), National Harbor, MD, 2014.

[C3] J. Zhang and **Q. Zhang**, "Feasibility and Simulation Study of High-Rise Building Microgrid With PV and Mini-Hydro Pumping", 2013 IEEE PES General Meeting (PESGM), Vancouver, BC, 2013.

[C2] **Q. Zhang**, J. Zhang and C. Guo, "Photovoltaic Plant Metering Monitoring Model and Its Calibration and Parameter Assessment", 2012 IEEE PES General Meeting (PESGM), San Diego, CA, 2012.

[C1] W. Fang, J. Zhang, B. Hu, **Q. Zhang** and X. Ha, "Graphics and Data Web Publishing for Local Thermal Power Plant Management Information System", 2011 International Conference on Multimedia Technology, Hangzhou, 2011.

In Progress Paper

[J1] **Q. Zhang**, Y. Liu, F. You and H. Gao, "It Takes More Than Electric Vehicles – Bottlenecks in Power Transmission Grids for Achieving New York State's Transportation Electrification Ambition," under review, Appl. Energy.

PROJECT

Optimal Operation and Impact Assessment of Distributed Wind for Improving Efficiency and Resilience of Rural Electricity Systems
U.S. Department of Energy, Wind Energy Technologies Office

Major contribution
04/01/2020-05/31/2022

Data-Driven Voltage VAR Optimization Enabling Extreme Integration of Distributed Solar Energy
National Science Foundation
Major contribution
08/15/2019-07/31/2022

A Data-driven Multi-timescale Predictive, Proactive, and Recovery Optimization Framework for Solar Energy Integrated Resilient Distribution Grid
U.S. Department of Energy, Solar Energy Technologies Office - Subcontract from Argonne National Laboratory
Participation
10/01/2018-03/31/2020

Leverage Conservation Voltage Reduction for Energy Efficiency, Demand Side Control and Stability Enhancement in Integrated Transmission and Distribution System
Power Systems Engineering Research Centers
Major contribution
06/30/2016-08/31/2018

Optimal Substation Ground Grid Design Based on Genetic Algorithm and Pattern Search: Software development and application
Salt River Project
Major contribution
08/01/2013-12/31/2014

TEACHING EXPERIENCE

EE 653, Power Distribution System Modeling, Optimization and Simulation — **Iowa State University**
Teaching Assistant — *Fall 2019*

EE 555, Advanced Energy Distribution Systems — **Iowa State University**
Teaching Assistant — *Spring 2019*

EE 2210/00, Electrical Engineering for Non-majors/Civil — **University of Utah**
Teaching Assistant — *Fall 2016-Spring 2017*

AWARD

- Ezra SYSEN Post-Doc Fellowship, Cornell University, 2022
- Outstanding Reviewer, IEEE Trans. Power Systems, 2022
- Outstanding Reviewer (Top 5), IEEE Trans. Smart Grid, 2021
- Outstanding Reviewer, IEEE Open Access Journal of Power and Energy, 2021
- Outstanding Reviewer, IEEE Trans. Power Systems, 2019
- Outstanding Reviewer, International Journal of Electrical Power and Energy Systems, 2018

SKILL

- Power System Modeling
- Optimization
- Machine Learning

- Multi-Agent Control Framework
- Software Skills: Matlab, GAMS, AMPL, Python, OpenDSS, Powerworld

SERVICE

Peer Reviewer

- *Journals:* IEEE Transactions on Smart Grid, IEEE Transactions on Power Systems, IEEE Transactions on Power Delivery, IEEE Transactions on Industrial Informatics, IEEE Access, IEEE Systems Journal, IEEE Industry Application Society Publications, International Journal of Electrical Power and Energy Systems, IEEE Open Access Journal of Power and Energy, Journal of Modern Power System and Clean Energy, International Transactions of Electrical Energy System, IET Smart Grid, Energy Strategy Reviews, Energy Sources Part A: Recovery, Utilization, and Environmental Effects, Journal of Mathematics
- *Conference:* 2022 Power&Energy Society General Meeting (PESGM), 2022 Power&Energy Society Transmission and Distribution (T&D), 2022 IEEE Innovative Smart Grid Technology Conference, 2021 Power&Energy Society General Meeting (PESGM), 2021 IEEE Innovative Smart Grid Technology Conference, 2020 Power&Energy Society General Meeting (PESGM), 2017 North American Power Symposium (NAPS)

TALK

- 2020 IEEE Innovative Smart Grid Technology Conference (Washington, DC), Panel: Learning-based Decision Making for Power System Operation, *Learning Smart Meter Data for Enhancing Distribution Grid Observability*, February 20, 2020.
- 2020 IEEE Innovative Smart Grid Technology Conference (Washington, DC), Panel: Multi-Timescale Operation and Optimization of Power Grid with High Renewable Penetrations, *Learning-based Optimal Operation of Networked Microgrids*, February 18, 2020.
- 2020 IEEE Innovative Smart Grid Technology Conference (Washington, DC), Panel: Definition, Planning and Operation of Resilient Electric Grids, *Data-Driven Resilience Modeling in Distribution Grids*, February 18, 2020.
- 2019 IEEE Innovative Smart Grid Technology Conference (Washington, DC), Panel: Artificial Intelligence in Power System Operation and Planning, *Data-Driven and Machine Learning-based Power Distribution Grid Operation*, February 18, 2019.
- Power Systems Engineering Research Center Industry Advisory Board Meeting (Wichita, KS), *Leverage Conservation Voltage Reduction for Energy Efficiency, Demand Side Control and Stability Enhancement in Integrated Transmission and Distribution Systems*, May 16-18, 2018.
- Power Systems Engineering Research Center Industry Advisory Board Meeting (Phoenix, AZ), *Leverage Conservation Voltage Reduction for Energy Efficiency, Demand Side Control and Stability Enhancement in Integrated Transmission and Distribution Systems*, December 6-8 , 2017.
- 49th North American Power Symposium (Morgantown, WV), *Impacts of Communication Limits on Convergence of Distributed DCOPF with Flexible Transmission*, September 17-19, 2017.
- 46th North American Power Symposium (Pullman, WA), *Software Development of Optimal Substation Ground Grid Design Based on Genetic Algorithm and Pattern Search*, September 7-9, 2014.