Qian Zhang

Ph.D. Candidate, Electrical Engineering

John A. Paulson School of Engineering and Applied Sciences, Harvard University

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Education

Harvard University — **Allston, MA**
Ph.D., Electrical Engineering, School of Engineering and Applied Sciences — *Aug 2024 – May 2027 (expected)*
Advisor: Le Xie

Texas A&M University — **College Station, TX**
Doctoral student, Electrical and Computer Engineering — *Aug 2022 – May 2024*
Transferred to Harvard University with advisor

Zhejiang University — **Hangzhou, China**
M.S., Electrical Engineering — *Sep 2019 – Jun 2022*
Advisor: Deqiang Gan
B.Eng. with Honors, Electrical Engineering — *Sep 2015 – Jun 2019*

Research Interests

Areas: Power Systems, Electricity Market Design, Simulation-Based Optimization, Agentic AI.

Topics: Probabilistic Reliability Assessment, Capacity Market Design, Capacity Accreditation Computation; Receding Horizon Optimization, Flexibility Ramp Products Design and Pricing; Agentic AI for Power Grids, Benchmark Design; Public Consent, Stakeholder Governance in RTOs.

Research Experience and Collaborations

ISO New England — **Remote**
Student Researcher | *Supervisor: Xiaochuan Luo* — *Oct 2025 – May 2027*
Generative AI-enabled framework for dynamic security assessment in transmission planning.

The Brattle Group — **Boston, MA**
Summer Associate | *Supervisor: Samuel A. Newell, Kathleen Spees* — *Jun 2026 – Aug 2026*
Integrated resource planning and agentic AI for grid modeling.

Midcontinent Independent System Operator — **Remote**
Student Researcher | *Supervisor: Congcong Wang, Long Zhao* — *May 2024 – Apr 2025*
Evaluation and redesign of ramp flexibility markets.

ISO New England — **Holyoke, MA**
Research Intern | *Supervisor: Feng Zhao* — *Jun 2024 – Aug 2024*
Battery storage capacity accreditation in electricity capacity markets.

Alibaba Cloud — **Hangzhou, China**
Research Intern — *May 2021 – Sep 2021*
Total cost of ownership modeling for data center life-cycle management.

Awards and Honors

2026	Quantum Alliance Fellowship, anchored by Eric and Wendy Schmidt
2026	Salata Travel Grant, The Salata Institute at Harvard University
2023, 2024	Thomas W. Powell '62 and Powell Industries Inc. Fellowship, Texas A&M University
2023	Second Place, Texas Entrepreneurship Exchange for Energy (TEX-E) Bootcamp Pitch
2022	Ph.D. Merit Fellowship, Texas A&M University
2019	Outstanding Graduate of Zhejiang Province
2019	Outstanding Graduate Thesis, Zhejiang University
2018	UHV Scholarship for Excellent Students

Open-Source Software and Community

As Founder

PowerAgent — founder and student lead of an open-source community for large language models and agentic AI in power systems, launched April 2025 under the Power and AI Initiative at Harvard SEAS. The PowerAgent community has connected engineers and researchers worldwide, with **800+** engagements and more than **6,000** package downloads. Collaborators and users include ERCOT, ISO New England, MISO, and EPRI: the roadmap was presented to the ERCOT Board of Directors, and PowerMCP and PowerSkills were tutorialized at the Harvard workshop on foundation models for the grid.

The PowerAgent community has secured more than **$250,000** in computing and token credits through programs offered by NVIDIA, AWS, OpenAI, and Anthropic. These relationships provide a foundation for sustaining multi-agent experimentation, shared engineering knowledge infrastructure, and safety evaluation.

PowerMCP — Model Context Protocol servers connecting AI agents to power-system simulators and analysis tools.

PowerFM — open-source foundation models and datasets for power and energy applications.

PowerWF — reusable agentic workflows for power-system analysis and operations.

PowerSkills — domain-specific tool instructions and engineering playbooks for power-system AI agents.

PowerAgentBench — benchmarks for evaluating AI agents in steady-state and dynamic studies through physical validation.

As Core Contributor

PowerIO — compiler infrastructure for power system models, written in Rust.

Tellegen — browser-based optimal power flow, power-flow analysis, and sensitivity visualization.

HOPE — Holistic Optimization Program for Electricity, a Julia capacity-expansion and operations model.

Talks and Presentations

Invited Talks and Presentations

Oct 2026 *PowerAgentBench: Benchmarking Agentic AI in Power System Steady-State and Dynamic Studies*
2026 North American Power Symposium, Michigan Technological University, Houghton, MI

Jun 2026 *Comparative Assessment of Look-Ahead Economic Dispatch and Ramp Products for Grid Flexibility*
Oral presentation, 24th Power Systems Computation Conference, Limassol, Cyprus

Jun 2026 *From AI Agents to Market Agents: Rethinking Power System Operations, Planning, and Electricity Markets*
Invited talk, Appian Way Energy Partners, Cambridge, MA

Jun 2026 ***From ELCC to MRI: A Gradient-Based View of Capacity Accreditation and the Challenge of Energy Storage***
Invited talk, EPRI ISO/RTO Working Group Meeting on Capacity Accreditation Methods

May 2026 *Modeling Coincident Peak Pricing in Electricity Markets: Challenges and Peak Shaving Effectiveness*
Lightning talk, Harvard ECE Research Day, Allston, MA

May 2026 ***Data Infrastructure Sharing, Access, and Requirements in the Era of Agentic AI***
Invited talk and panelist, Control Room of the Future Testbed (CROFT) Workshop, U.S. Department of Energy, Office of Electricity

Apr 2026 *A Roadmap Toward Agentic Intelligence in Power Systems*
Oral presentation, Eversource and Harvard Power and AI Team Meeting, Cambridge, MA

Apr 2026 *Harvard–MISO Study: Look-Ahead Dispatch versus Ramping Products*
Contributed talk; joint panel presentation with MISO, Solar Net Ramp, Storage, and Stability Workshop

Dec 2025 ***A Roadmap Toward Agentic Intelligence in Power Systems***
Invited talk, ERCOT Board of Directors, Technology and Security Committee; and ERCOT staff meeting, Austin, TX

Sep 2025 *PowerAgent: A Roadmap Toward Agentic Intelligence in Power Systems*
Invited talk, 4th Workshop on Foundation Models for the Electric Grid, RWTH Aachen University, Aachen, Germany

Dec 2023 *Scenario-based Uncertainty Optimization in Power Systems*
Invited talk, ISO New England, Advanced Technology Solutions Group, Holyoke, MA

Tutorials and Guest Lectures

Oct 2026 *Power System Simulation with Agentic AI: Software Automation and Behavioral Modeling*
Guest lecture, ES 215: Physical and Economical Operations of Sustainable Energy Systems, Harvard University

Mar 2026 *Plug-and-Play: Connect PowerMCP and PowerSkills to Your LLM*
Tutorial, 5th Workshop on Foundation Models of the Electric Grid, Harvard University, Allston, MA

Feb 2026 *Opportunities and Challenges of Agentic AI in Power Systems*
Guest lecture, ECE 285: Agentic AI and LLMs for Smart Grids, University of California San Diego

Poster Presentations

Oct 2026 ***Building the Decision Infrastructure for the AI-Era Grid***
Invited poster presentation
Integration of Artificial Intelligence in the Electricity System Workshop
***National Academies of Sciences, Engineering, and Medicine,* Washington, DC**

Oct 2026 *PowerAgentBench-SS: A Benchmark for Agentic AI in Power System Steady-State Studies*
2026 North American Power Symposium, Michigan Technological University, Houghton, MI

Oct 2026 *Lost Opportunity Costs Under Ramp Stress: A Comparison of Ramp-Product Dispatch and Look-Ahead Economic Dispatch*
2026 North American Power Symposium, Michigan Technological University, Houghton, MI

Sep 2026 *Building the Decision Infrastructure for the AI-Era Grid*
Sustainable Compute & AI Infrastructure (SCAI) Research Symposium at UMass Amherst

2025–2026 ***PowerAgent: A Roadmap Toward Agentic Intelligence in Power Systems***
Harvard Power and AI Initiative Research Summit (May 2026)
IEEE PES Transmission & Distribution Conference and Exposition, Chicago, IL (May 2026)
CERAWeek by S&P Global, Houston, TX (Mar 2026)
Agentic AI Summit, Berkeley RDI, University of California, Berkeley (Aug 2025)
Harvard Power and AI Symposium (May 2025)

Jul 2025 *Accelerating Chance-Constrained SCED via Scenario Compression*
IEEE PES General Meeting, Austin, TX

Jul 2024 *The Transmission Value of Energy Storage*
IEEE PES General Meeting, Seattle, WA

Jul 2023 *Scenario-based Economic Dispatch Under Conditional Wind Power Forecast Error*
IEEE PES General Meeting, Orlando, FL

Teaching

Harvard University

Co-designed Harvard's **first** two power system engineering courses, co-taught selected class sessions, led laboratory sessions, and organized field trips.

Spring 2026 Teaching Fellow, **ES 145**: Modern Electric Power Systems
Instructor: Le Xie

Fall 2025 Teaching Fellow, **ES 215**: Physical and Economical Operations of Sustainable Energy Systems
Instructor: Le Xie

Texas A&M University

Summer 2024 Teaching Assistant, **ICPE 637**: Data Science for Power Systems

Professional and Executive Education

Supported professional and executive training for power systems engineers, energy traders, managers, and policymakers.

May 2025 Teaching Assistant, *Power Systems and Artificial Intelligence: An Introduction*
Harvard SEAS Professional Education short course (instructors: Le Xie, Minlan Yu)

Mar 2024 Teaching Assistant, *Introduction of Artificial Intelligence in Power Systems*
Texas A&M Smart Grid Center three-day short course (instructor: Le Xie)

Advising

- **Aidan Looney**, M.S. Data Science, Harvard SEAS (2025–)
  Co-author on three papers on ramp products and look-ahead dispatch pricing; one accepted at NAPS 2026.
- **Skyler Liu**, M.S./M.B.A., Harvard SEAS and Harvard Business School (2025–)
  Agentic AI for interconnection studies, building on the PowerAgent stack; selected for the 2026 HBS Rock Venture Catalyst fellowship.
- **Karina Chung**, Harvard College, Computer Science and Statistics (2025–2026)
  First place, Mind2Market Demo Day (Dec 2025), following the Harvard Grid Applied AI Incubator.
- **Samuel Chung**, Harvard College (2025–2026)
  Co-author, *IEEE Energy Sustainability Magazine* article on the data-center transition.

- **Maanas Goel**, B.S.E./M.S.E. Electrical Engineering, University of Pennsylvania (Summer 2025)
  Contributor to PowerMCP; Best Paper Award, Apple Modeling and Simulation Conference 2026.
- **Anindita Samanta**, M.S. Electrical Engineering, Texas A&M University (2023–2024)
  Co-author, IEEE TPEC 2024; now Senior Electrical Engineer, Technip Energies.

Proposal Writing

2025– **Student Lead, Power and AI Initiative at Harvard SEAS**
Helps design the **Industry Affiliate Program** and membership policies, and manages proposal development for shared research priorities and the specific needs of individual industry partners. Designs and maintains the initiative's website and helps organize the annual research summit and seminar series.

Technical proposal contributor to the following submissions.

2026 **U.S. Department of Energy Genesis Mission — Phase II Proposal**
Revolutionizing Grid Planning Workflows to Support Large Load Growth.
Contributed to Harvard's technical narrative on agentic AI workflows for grid planning and large-load integration. Proposed total project budget: $10 million over three years.

2026 **Harvard Frontiers Fund — Ascend Proposal**
The Cost of Inaction: Agentic AI for Accelerating Electricity Grid Policy and Engineering Design.
Assisted the PI in drafting the research narrative for an agentic AI framework connecting grid engineering, electricity markets, and governance.

2025 **NSF Science and Technology Centers — Preliminary Proposal**
Sustainable Electrification in the Era of AI (SEER).
Assisted the PI in drafting an interdisciplinary center proposal integrating AI-enabled energy systems, sustainable computing, materials innovation, and climate modeling.

2024 **ARPA-E Vision OPEN — Concept Paper**
ES4T: Energy Storage Equivalent for Transmission Expansion.
Assisted the PI in drafting the concept paper on storage dispatch and market mechanisms to enhance transmission capability. Requested federal funding: $4 million, with $1 million in cost sharing.

Service

Community and Professional Service

2025– Founder, PowerAgent open-source community
2025– Student Organizer, Power and AI Initiative at Harvard SEAS
2026 Member, Blueprint by The Engine at MIT
2025–2026 Member, Harvard Climate Leaders Program
2024 Committee member, IEEE Texas Power and Energy Conference (TPEC)
2023 Coordination volunteer, IEEE PES General Meeting
2018–2020 President and co-founder, Zhejiang University Arm Club (sponsored by Arm Company)

Peer Review

Journals and Magazines

IEEE Transactions on Power Systems
IEEE Transactions on Energy Markets, Policy and Regulation
IEEE Transactions on Industrial Informatics
IEEE Transactions on Transportation Electrification

IEEE Transactions on Network Science and Engineering
IEEE Power Engineering Letters
IEEE Systems Journal
IEEE Power and Energy Magazine
IEEE Energy Sustainability Magazine
Applied Energy
Journal of Energy Storage
Electric Power Systems Research
Sustainable Energy, Grids and Networks
Journal of Modern Power Systems and Clean Energy
ACM SIGENERGY Energy Informatics Review

Conferences IEEE PES General Meeting · IEEE PES T&D Conference · IEEE Texas Power and Energy Conference · North American Power Symposium

Media Coverage and Public Writing

2026 Sylvan Energy Analytics, "A novel method for direct calculation of marginal ELCCs from optimization-based resource adequacy models"

2025 Salata Institute for Climate and Sustainability at Harvard, "How AI can accelerate energy grid expansion and reduce your bill"

2025 Harvard SEAS News, "AI for power, and power for AI"

Publications

Bold denotes the author · † denotes a mentored student

Preprints and Working Papers

[W6] **Qian Zhang**, Aidan Looney†, Chao Tian, Xu Andy Sun, and Le Xie, "Duration-Aware Ramp Adequacy Screening," 2026, arXiv: 2609.40013, Submitted to *IEEE Transactions on Energy Markets, Policy and Regulation*.

[W5] Aidan Looney†, **Qian Zhang**, and Le Xie, "Locational Marginal Pricing for Adaptive Robust Look-Ahead Dispatch with Causal Affine Recourse," 2026, arXiv: 2609.05156, Submitted to *IEEE Transactions on Power Systems*.

[W4] Riccardo Mansutti, Andrea Pomarico, Robert Jakob, **Qian Zhang**, Alberto Berizzi, and Kevin O'Sullivan, "RestoreBench: Can AI Agents Restore Power Flow Convergence?" 2026, arXiv: 2609.00384.

[W3] Stephen Ansolabehere, Leah Stein, Le Xie, and **Qian Zhang**, "Voting Patterns in RTOs," 2026, Working paper.

[W2] Stephen Ansolabehere, **Qian Zhang**, and Le Xie, "A Framework of Engineering-Public Consent Co-design of Data Center Development: What, Why, and How," 2026, Working paper.

[W1] **Qian Zhang** and Deqiang Gan, "A Gronwall Inequality Based Approach to Transient Stability Assessment for Power Grids," 2023, arXiv: 2311.02231.

Journal and Magazine Articles

[J13] **Qian Zhang**, Feng Zhao, Gord Stephen, Chanan Singh, and Le Xie, "A Gradient-Based Capacity Accreditation Framework in Resource Adequacy: Formulation, Computation, and Practical Implications," *IEEE Transactions on Power Systems*, 2026, arXiv: 2601.22087, Accepted for publication.

[J12] Le Xie, Dongjoo Kim, **Qian Zhang**, Grant Ruan, and Paul L. Joskow, "Large-Scale Data Center Integration in Power Systems: Uncertainty and Multi-Scale Variation," *Proceedings of the IEEE*, 2026, Accepted for publication.

[J11] **Qian Zhang**, Feng Zhao, Tongxin Zheng, and Le Xie, "Reformulating Energy Storage Capacity Accreditation Problem with Marginal Reliability Impact," *IEEE Transactions on Energy Markets, Policy and Regulation*, 2026, *Early access*.

[J10] **Qian Zhang**, Sadie Zhao, Lucy Diao, Conleigh Byers, Yiling Chen, Derya Cansever, and Le Xie, "Modeling Coincident Peak Pricing in Electricity Markets: Challenges and Peak Shaving Effectiveness," *IEEE Transactions on Energy Markets, Policy and Regulation*, vol. 4, no. 3, pp. 449–460, Sep. 2026.

[J9] **Qian Zhang**, Samuel Chung[†], and Le Xie, "From Crypto Mining to Artificial Intelligence Training: Economic Drivers and Grid Impacts of the Data Center Transition," *IEEE Energy Sustainability Magazine*, vol. 2, no. 3, pp. 56–64, Aug. 2026.

[J8] Le Xie, **Qian Zhang**, Minlan Yu, Paul L. Joskow, and Chanan Singh, "Crucial Role of Foundation Models in Enhancing the Interaction of AI and Power Systems: Achieving Integrated Frameworks," *IEEE Energy Sustainability Magazine*, vol. 2, no. 1, pp. 22–28, Feb. 2026.

[J7] Zhenyao Li, Shengwen Liao, **Qian Zhang**, Xuechun Zhang, and Deqiang Gan, "On the Input–Output Monotonicity of Voltage Dynamics of Power Systems with Grid-Forming Converters," *International Journal of Electrical Power & Energy Systems*, vol. 172, p. 111196, Nov. 2025.

[J6] **Qian Zhang** and Le Xie, "PowerAgent: A Road Map Toward Agentic Intelligence in Power Systems: Foundation Model, Model Context Protocol, and Workflow," *IEEE Power and Energy Magazine*, vol. 23, no. 5, pp. 93–101, Sep. 2025, (Selected as a Most Popular Article).

[J5] Le Xie, **Qian Zhang**, Lang Tong, Joost Vlassak, and Minlan Yu, "Boosting Grid Throughput for a Sustainable Energy Future: The Role of AI and Advanced Materials," *IEEE Energy Sustainability Magazine*, vol. 1, no. 2, pp. 8–16, Aug. 2025.

[J4] **Qian Zhang**, P. R. Kumar, and Le Xie, "An Average Power-Based Planning Framework of Transmission Expansion: A New Role for Energy Storage," *IEEE Open Access Journal of Power and Energy*, vol. 12, pp. 122–134, Mar. 2025.

[J3] **Qian Zhang** and Le Xie, "Accelerating Chance-Constrained SCED via Scenario Compression," *IEEE Transactions on Power Systems*, vol. 40, no. 2, pp. 1880–1890, Mar. 2025.

[J2] Le Xie, Subir Majumder, Tong Huang, **Qian Zhang**, Ping Chang, David J. Hill, and Mohammad Shahidehpour, "The Role of Electric Grid Research in Addressing Climate Change," *Nature Climate Change*, vol. 14, no. 9, pp. 909–915, Sep. 2024.

[J1] **Qian Zhang**, Apurv Shukla, and Le Xie, "Efficient Scenario Generation for Chance-Constrained Economic Dispatch Considering Ambient Wind Conditions," *IEEE Transactions on Power Systems*, vol. 39, no. 4, pp. 5969–5980, Jul. 2024.

Refereed Conference Papers

[C11] Samuel Talkington, Frederik Geth, **Qian Zhang**, Le Xie, and Skyler Liu[†], "Interactive Power Flow in the Browser," *ACM Conference on Digital Transformation (DXConf 2026)*, 2026.

[C10] **Qian Zhang**, Le Xie, Long Zhao, and Congcong Wang, "Comparative Assessment of Look-Ahead Economic Dispatch and Ramp Products for Grid Flexibility," *Proc. 24th Power Systems Computation Conference (PSCC)*, (Limassol, Cyprus), Jun. 2026, presented at PSCC 2026, Limassol, Cyprus; published in *Electric Power Systems Research*, vol. 262, art. 113530, Jan. 2027.

[C9] Aidan Looney[†], **Qian Zhang**, and Le Xie, "Lost Opportunity Costs Under Ramp Stress: A Comparison of Ramp-Product Dispatch and Look-Ahead Economic Dispatch," *Proc. 58th North American Power Symposium (NAPS)*, (Houghton, MI, USA), Oct. 2026, arXiv: 2608.07739.

[C8] **Qian Zhang**, Andrea Pomarico, Costas Mylonas, Magda Foti, Alberto Berizzi, and Le Xie, "PowerAgentBench-Dyn: A Benchmark for Agentic AI in Power System Dynamic Studies," *Proc. 58th North American Power Symposium (NAPS)*, (Houghton, MI, USA), Oct. 2026, arXiv: 2606.20401.

[C7] Costas Mylonas, Magda Foti, Andrea Pomarico, Matheus Duarte, **Qian Zhang**, and Emmanouel Varvarigos, "PowerAgentBench-SS: A Benchmark for Agentic AI in Power System Steady-State Studies," *Proc. 58th North American Power Symposium (NAPS)*, (Houghton, MI, USA), Oct. 2026, arXiv: 2606.18789.

[C6] Apurv Shukla, **Qian Zhang**, and Le Xie, "Sample Complexity of Chance Constrained Optimization in Dynamic Environment," *Proc. American Control Conference (ACC)*, (Toronto, ON, Canada), Jul. 2024.

[C5] Anindita Samanta[†], **Qian Zhang**, and Le Xie, "Prediction of Cryptocurrency Mining Load Tripping Through Learning-Based Fault Classification," *Proc. IEEE Texas Power and Energy Conference (TPEC)*, (College Station, TX, USA), Feb. 2024.

[C4] **Qian Zhang**, Minquan Chen, Wenqing Hao, Zhenyao Li, and Deqiang Gan, "Analysis on Dynamic Voltage of Renewable Energy Generators During Post-Fault Recovery Based on Monotone Control Theory," *Proc. International Conference on Power System Technology (POWERCON)*, Dec. 2021, pp. 1155–1160.

[C3] Wenqing Hao, **Qian Zhang**, Xueyi Wang, and Deqiang Gan, "Network-Based Spectral Analysis of Power Systems with Renewable Energy Penetration," *Proc. International Conference on Power System Technology (POWERCON)*, Dec. 2021, pp. 1652–1658.

[C2] **Qian Zhang**, Wenqing Hao, Deqiang Gan, and Minquan Chen, "Voltage Estimation of Distribution Network Based on Mean Impedance Method," *Proc. IEEE Sustainable Power and Energy Conference (iSPEC)*, Nov. 2020, pp. 1921–1926.

[C1] Wenqing Hao, **Qian Zhang**, Deqiang Gan, and Minquan Chen, "Voltage Stability Analysis Method of Distributed Photovoltaic Integration Based on Improved V-Q Sensitivity," *Proc. IEEE Sustainable Power and Energy Conference (iSPEC)*, Nov. 2020, pp. 1907–1913.