XIN CHEN

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Research Interests

Intersection of control, machine/reinforcement learning, and optimization for human-cyber-physical systems, with particular applications to smart power and energy systems; distributed algorithms; grid decarbonization.

Appointments

08/2023 – Present	Assistant Professor Texas A&M University, Department of Electrical and Computer Engineering
07/2022 – 06/2023	Postdoctoral Associate Massachusetts Institute of Technology, MIT Energy Initiative
02/2022 – 02/2023	Chief Research Scientist Singularity Energy, Inc., MA, US
02/2022 – 06/2022	Postdoctoral Fellow Harvard University, School of Engineering and Applied Sciences
05/2021 – 08/2021	Intern Researcher Siemens Technology, Autonomous System and Control Group, NJ, US

Education

09/2017 – 01/2022	Ph.D. in Electrical Engineering Harvard University, School of Engineering and Applied Sciences
09/2018 – 07/2019	Harvard Graduate Consortium Program on Energy and Environment Harvard University Center for the Environment
09/2015 – 07/2017	M.S. in Electrical Engineering Tsinghua University, Department of Electrical Engineering
09/2011 – 07/2015	B.S. in Engineering & B.S. in Economics Tsinghua University, Department of Engineering Physics (Energy Experimental Class) Tsinghua University, School of Economics and Management

Selected Honors and Awards

2024	IEEE Transactions on Smart Grid Top-5 Outstanding Paper (the 3rd paper, out of over a thousand articles published in TSG in 2020-2022), IEEE TSG Editorial Board
2024	2024 Research Collaboration Award, Texas A&M Engineering Experiment Station (TEES), with the award prize of $2,500
2024	Honored to be interviewed by IEEE Control Systems Magazine, with the article "Xin Chen [Ph.D.s in Control]" featuring my Ph.D. research and experience
2023	Our team "TIM-GO" ranked the 2nd place in the Department of Energy (DOE) ARPA-E Grid Optimization (GO) Competition Challenge 3, with the total prize of $595k
2023	IEEE PES Outstanding Doctoral Dissertation Award (one of four in 2020-2022), IEEE Power & Energy Society (PES) Education Committee

2023	Best Research Award (one of two, out of over 100 participants), with the Grid Edge Grand Prize of $5,000, in IEEE PES Grid Edge Technologies Conference and Exposition 2023
2021	Outstanding Student Paper Award (one of three, out of over 1700 submitted papers), in the IEEE 60th Conference on Decision and Control (CDC)
2019	Award of Distinction in Teaching, Harvard University
2018	Best Student Paper Award Finalist (one of two, out of over 500 submitted papers), in 2018 IEEE Conference on Control Technology and Applications (CCTA)
2017	Outstanding Master Graduate, Tsinghua University, Beijing, China
2017	Outstanding Master Thesis Award, Tsinghua University, Beijing, China
2016	Best Conference Paper Award (top 5% of over 1600 submitted papers), in 2016 IEEE Power & Energy Society (PES) General Meeting

Professional Services

- **Conference Committee and Organizer**:

2024	Chair for the Multiscale Energy Systems session in 2024 Texas A&M Conference on Energy
2024	Committee for the "3-Minute Ph.D. Dissertation Challenge" in 2025 IEEE PES Grid Edge Technologies Conference & Exposition
2023	Technical Program Committee for the workshop "Learning and Optimization for Power Distribution System Resilience" at the IEEE SmartGridComm 2023
2023	Technical Program Committee for 14th ACM International Conference on Future Energy Systems (ACM e-Energy 2023)
2023	Chair for the session "Advanced Learning and Optimization for Carbon-neutral Electricity" in 2023 INFORMS Annual Meeting
2022	Chair for the session "Stochastic Derivative-free Optimization" in 2022 International Conference on Continuous Optimization (ICCOPT)
2021	Chair for the session "Data-driven Optimization and Control for Power Systems" in 2021 INFORMS Annual Meeting

- **Reviewer for Journals**: IEEE Transactions on Smart Grid, IEEE Transactions on Power Systems, IEEE Transactions on Control of Network Systems, Automatica, IEEE Transactions on Automatic Control, IEEE Transactions on Sustainable Energy, IET Generation Transmission & Distribution, IET Renewable Power Generation, Systems & Control Letters, International Journal of Electrical Power & Energy Systems, IEEE Control Systems Letters, IEEE Transactions on Energy Markets, Policy, and Regulation, Proceedings of the IEEE, CSEE Journal of Power and Energy Systems, etc.
- **Reviewer for Conferences**: IEEE Conference on Decision and Control, American Control Conference, International Conference on Machine Learning (ICML), Conference on Neural Information Processing Systems (NeurIPS), IEEE PES General Meeting, IEEE Conference on Control Technology and Applications, IEEE International Conference on SmartGridComm, Learning for Dynamics and Control (L4DC) Conference, European Control Conference, International Conference on Future Energy Systems (ACM e-Energy), etc.

Teaching

- ECEN 615: Methods of Electric Power System Analysis (Instructor), TAMU, 2024 Fall
- ECEN 340: Electric Energy Conversion (Instructor), TAMU, 2023 Fall, 2024 Spring

- ECEN 689: Advanced Optimization (Guest Lecturer), TAMU, 2024 Spring
- ECEN 403: Hornor-Electrical Design Lab I (Instructor), TAMU, 2024 Fall
- ECEN 681: Power and Energy Seminar (Instructor), TAMU, 2024 Fall
- ES 155: Systems and Control (Teaching Fellow), Harvard University, 2018 Fall, 2019 Fall

Advising

- **PhD Students Advising**:

  Xiaoyang Wang, 2024 - present, TAMU

- **Master Students Advising**:

  Yashas Krishnamoorthy (co-advise with Prof. Thomas Overbye), 2024 - present, TAMU

  Joe Nasser (co-advise with Prof. Thomas Overbye), 2024 - present, TAMU

  Yash Dode, 2024, TAMU

- **Undergraduate Research Advising**:

  Alexander Mandanis, 2024 - present, TAMU

  Junsu Yeo, 2024, TAMU,

  Vera Zhou, 2022, Harvard University, Utility maximization and dynamic pricing for demand response

  Yutong Nie (co-advised with Prof. Na Li), 2020, Zhejiang University, Online user learning and selection via contextual multi-armed bandits

  Darell Hwang, and Victor Qin (co-advised with Prof. Na Li), 2019, Harvard University, Online trajectory tracking with predictions and implementation on two-wheel robots

- **Ph.D. Dissertation Committee**:

  Mingda Yang, Texas A&M University, 2024, Image-Based PV Soiling Quantification and Defect Detection Using Machine Learning

- **Ph.D. Qualifying Exam Committee**:

  Ali Shawartamimi, Texas A&M University, July 2024

  Ali Nasser, Texas A&M University, July 2024

  Irfan Ullah, Texas A&M University, February 2024

Publications (Citations: 1500+, h-index:13, i-10 index:16, from Google Scholar in Nov. 2024)

- **Preprints**:

[P5] Xiaoyang Wang, and **Xin Chen**, "Distributed Coordination of Grid-Forming and Grid-Following IBRs for Optimal Frequency Control in Power Systems", 2024.

[P4] Shengyi Wang, Liang Du, and **Xin Chen**, "Bayesian Active Learning-Based Soft Data Space Calibration for System-Wise Aggregate Flexibility Characterization", 2024.

[P3] Subir Majumder, **Xin Chen**, and Le Xie, "Filter-Based Zeroth-Order Methods for Model-Free Voltage Control in Realistic Distribution Grids", 2023.

[P2] **Xin Chen**, Andy Sun, Wenbo Shi, and Na Li, "Carbon-Aware Optimal Power Flow", arXiv:2308.03240, 2023.

[P1] **Xin Chen**, Jorge I. Poveda, and Na Li, "Model-Free Feedback Constrained Optimization via Projected Zeroth-Order Dynamics", arXiv:2206.11123, 2022.

- **Journal Articles**:

[J14] **Xin Chen**, Hungpo Chao, Wenbo Shi, and Na Li, "Towards Carbon-Free Electricity: A Flow-Based Framework for Power Grid Carbon Accounting and Decarbonization", accepted to IET Energy Conversion and Economics, 2024.

[J13] **Xin Chen**, Jorge I. Poveda, and Na Li, "Continuous-Time Zeroth-Order Dynamics with Projection Maps: Model-Free Feedback Optimization with Safety Guarantees", accepted to IEEE Transactions on Automatic Control, 2024.

[J12] **Xin Chen**, "Enhance Low-Carbon Power System Operation via Carbon-Aware Demand Response", IET Energy Internet, e12004, Oct. 2024.

[J11] **Xin Chen**, "Xin Chen [Ph.D.s in Control]," IEEE Control Systems Magazine, vol. 44, no. 2, pp. 110-112, April 2024.

[J10] **Xin Chen**, Guannan Qu, Yujie Tang, Steven Low, and Na Li "Reinforcement Learning for Selective Key Applications in Power Systems: Recent Advances and Future Challenges," IEEE Transactions on Smart Grid, vol. 13, no. 4, pp. 2935-2958, July 2022. (**IEEE Transactions on Smart Grid Top-5 Outstanding Papers in 2020-2022**)

[J9] **Xin Chen**, Yingying Li, Jun Shimada, and Na Li, "Online Learning and Distributed Control for Residential Demand Response," IEEE Transactions on Smart Grid, vol. 12, no. 6, pp. 4843-4853, Nov. 2021.

[J8] **Xin Chen**, Yutong Nie, and Na Li, "Online Residential Demand Response via Contextual Multi-Armed Bandits," IEEE Control Systems Letters, vol. 5, no. 2, pp. 433-438, Apr. 2021.

[J7] **Xin Chen**, and Na Li, "Leveraging Two-Stage Adaptive Robust Optimization for Power Flexibility Aggregation," IEEE Transactions on Smart Grid, vol. 12, no. 5, pp. 3954-3965, Sept. 2021.

[J6] **Xin Chen**, Changhong Zhao, and Na Li, "Distributed Automatic Load Frequency Control with Optimality in Power Systems," IEEE Transactions on Control of Network Systems, vol. 8, no. 1, pp. 307-318, Mar. 2021.

[J5] **Xin Chen**, Emiliano Dall'Anese, Changhong Zhao, and Na Li, "Aggregate Power Flexibility in Unbalanced Distribution Systems," IEEE Transactions on Smart Grid, vol. 11, no. 1, pp. 258-269, Jan. 2020.

[J4] **Xin Chen**, Wenchuan Wu, and Boming Zhang, "Robust Capacity Assessment of Distributed Generation in Unbalanced Distribution Networks Incorporating ANM Techniques," IEEE Transactions on Sustainable Energy, vol. 9, no. 2, pp. 651-663, Apr. 2018.

[J3] Chenhui Lin, Wenchuan Wu, **Xin Chen**, and Weiye Zheng, "Decentralized Dynamic Economic Dispatch for Integrated Transmission and Active Distribution Networks Using Multi-parametric Programming," IEEE Transactions on Smart Grid, vol. 9, no. 5, pp. 4983-4993, Sept. 2018.

[J2] **Xin Chen**, Wenchuan Wu, Boming Zhang, Chenhui Lin, "Data-driven DG Capacity Assessment Method for Active Distribution Networks," IEEE Transactions on Power Systems, vol. 32, no. 5, pp. 46-57, Sept. 2017.

[J1] **Xin Chen**, Wenchuan Wu, and Boming Zhang, "Robust Restoration Method for Active Distribution Networks," IEEE Transactions on Power Systems, vol. 31, no. 5, pp. 4005-4015, Sept. 2016.

- **Machine Learning Conference Publications**:

[CM2] **Xin Chen**, Yujie Tang, and Na Li, "Improve Single-Point Zeroth-Order Optimization Using High-Pass and Low-Pass Filters", 39th International Conference on Machine Learning (ICML), Baltimore, MD, USA, 2022.

[CM1] Yingying Li, **Xin Chen**, and Na Li, "Online Optimal Control with Linear Dynamics and Predictions: Algorithms and Regret Analysis", 33rd Conference on Neural Information Processing Systems (NeurIPS), Canada, 2019.

- **Power & Control Conference Publications**:

[C6] **Xin Chen**, I-Hong Hou,"Contextual Restless Multi-Armed Bandits with Application to Demand Response Decision-Making", 63rd IEEE Conference on Decision and Control (CDC), Milan, Italy, 2024.

[C5] **Xin Chen**, Jorge I. Poveda, and Na Li, "Safe Model-Free Optimal Voltage Control via Continuous-Time Zeroth-Order Methods," 60th IEEE Conference on Decision and Control (CDC), Austin, Texas, USA, 2021. (**Outstanding Student Paper Award**)

[C4] **Xin Chen**, Yutong Nie, and Na Li, "Online Residential Demand Response via Contextual Multi-Armed Bandits," 59th IEEE Conference on Decision and Control (CDC), Jeju Island, Korea, 2020.

[C3] **Xin Chen**, and Na Li, "Exponential Stability of Primal-Dual Gradient Dynamics with Non-Strong Convexity," 2020 American Control Conference (ACC), Denver, USA, pp. 1612-1618, 2020.

[C2] **Xin Chen**, Changhong Zhao, and Na Li, "Distributed Automatic Load-Frequency Control with Optimality in Power Systems," 2018 IEEE Conference on Control Technology and Applications (CCTA), Copenhagen, Denmark, pp. 24-31, 2018. (**Best Student Paper Award Finalist**)

[C1] **Xin Chen**, Wenchuan Wu, and Boming Zhang, "A Robust Approach for Active Distribution Network Restoration Based on Scenario Techniques Considering Load and DG Uncertainties," IEEE Power and Energy Society General Meeting (PESGM), Boston, MA, USA, 2016. (**Best Conference Paper Award**)

Chapter in Book

[B2] **Xin Chen**, Guannan Qu, Yujie Tang, Steven Low, Na Li, "Reinforcement Learning for Decision-Making and Control in Power Systems," Chapter in *Women in Power: Research and Development Advances in Electric Power Systems*, Springer International Publishing, July 2023.

[B1] **Xin Chen**, Wenchuan Wu, "Network Reconfiguration and Restoration for Active Distribution Networks," Chapter in *Active Distribution Network Analysis, Operation and Control*, Science Press, China, 2016.

Patents

- US Patent US11824360B2, Apparatus and method for optimizing carbon emissions in a power grid. Wenbo Shi, **Xin Chen**, and Na Li. Date of Patent: Nov. 21, 2023.
- US Patent US2017/0070044A1. Robust restoration method for active distribution network. Wenchuan Wu, …, **Xin Chen**, et al. Publication date: Mar. 9, 2017.
- Chinese Patent CN106169750B. A method for calculating total supply capability of active distribution network based on second-order cone relaxation. Wenchuan Wu, …, **Xin Chen**, et al. Granted date: Oct. 19, 2018.
- Chinese Patent CN106099984B. A data-driven method for evaluating the capacity of distributed generation in active distribution network. Wenchuan Wu, …, **Xin Chen**, et al. Granted date: Oct. 19, 2018.

- Chinese Patent CN105140917B. Robust restoration method for active distribution network under uncertainty. Wenchuan Wu, …, **Xin Chen**, et al. Granted date: May 10, 2017.

Invited Talks

10/2024	MIT Workshop "Enabling cyber-resilient distribution systems with edge inverter-based resources" Distributed data-driven coordinated control for IBR-rich power systems
09/2024	The Universal Interoperability for Grid-Forming Inverters (UNIFI) Consortium Seminar Distributed data-driven coordinated control for IBR-rich power systems
09/2024	National Renewable Energy Laboratory: The 7th Workshop on Autonomous Energy Systems Online learning for residential demand response via advanced multi-armed bandits
09/2024	Eaton Corporate Research and Technology Division - Eaton Research Lab (ERL) Scalable data-driven decision-making for sustainable power systems
06/2024	Institute for Mathematical and Statistical Innovation (IMSI): Architecture of Green Energy Systems Flow-based carbon footprint calculation and management in electric power systems
05/2024	IEEE Webinar: 2023 Top 5 Papers of the IEEE Transactions on Smart Grid Reinforcement learning for power systems decision-making: Recent advances and future challenges
04/2024	Energy & Power Research Day, TEES Smart Grid Center Optimal grid planning for high renewable penetration: A case study on ERCOT
04/2024	Graduate Seminar in Department of Computer Science and Engineering, TAMU Scalable data-driven decision-making for sustainable power and energy systems
11/2023	Smart Grid Center Webinar, Texas A&M Engineering Experiment Station Pave the way towards carbon-free electric power systems
10/2023	Energy & Power Group (EPG) Seminar, Texas A&M Flow-based carbon accounting and emission management in electric power systems
10/2023	2023 INFORMS Annual Meeting, Phoenix, AZ, US Carbon-aware optimal power flow
09/2023	Information Science and Learning Systems (ISLS) Seminar, Texas A&M Scalable data-driven decision-making for smart autonomous power and energy systems
07/2023	2023 IEEE PES General Meeting, Orlando, FL, US Distributed data-driven decision-making for sustainable power systems
04/2023	2023 IEEE PES Grid Edge Technologies Conference and Exposition, San Diego, CA, US Distributed data-driven decision-making for sustainable power systems
03/2023	University of Pennsylvania, Department of Electrical and Systems Engineering Scalable data-driven decision-making for smart autonomous power and energy systems
01/2023	Rutgers University, Department of Industrial and Systems Engineering Scalable data-driven decision-making for smart autonomous power and energy systems
01/2023	Purdue University, Elmore Family School of Electrical and Computer Engineering Scalable data-driven decision-making for smart autonomous power and energy systems
12/2022	Texas A&M University, Department of Electrical and Computer Engineering Scalable data-driven decision-making for smart autonomous power and energy systems
12/2022	Iowa State University, Department of Electrical and Computer Engineering Scalable data-driven decision-making for smart autonomous power and energy systems
10/2022	2022 INFORMS Annual Meeting, Indianapolis, IN, US Reinforcement learning for decision-making and control in power systems

10/2022	New York Scientific Data Summit (NYSDS) 2022, US Online learning and distributed control for residential demand response
07/2022	International Conference on Continuous Optimization (ICCOPT) 2022, Bethlehem, PA, US Leverage high-pass and low-pass filters to improve single-point zeroth-order optimization
07/2022	39th International Conference on Machine Learning (ICML), Baltimore, MD, USA Improve single-point zeroth-order optimization using high-pass and low- pass filters
07/2022	2022 IEEE PES General Meeting, Denver, CO, US Tutorial: Distributed model-free optimal voltage control
03/2022	Center for Intelligent and Networked Systems, Tsinghua University, China Model-free control and optimization using zeroth-order methods
03/2022	SEAS Research Showcase - Lightning Talks, Harvard University, MA, US The future of smart power and energy system
12/2021	60th Conference on Decision and Control (CDC), Austin, Texas, US Safe model-free optimal voltage control via continuous-time zeroth-order methods
10/2021	2021 INFORMS Annual Meeting, Anaheim, California, US Model-free optimal voltage control in distribution systems
06/2021	Siemens Technology, Autonomous System and Control Research Group, NJ, US Real-time feedback optimal voltage control
12/2020	59th Conference on Decision and Control (CDC), Jeju Island, Korea Online residential demand response via contextual multi-armed bandit
07/2020	2020 American Control Conference (ACC), Denver, CO, US Exponential stability of primal-dual gradient dynamics with non-strong convexity
08/2018	2nd IEEE Conference on Control Technology and Applications, Copenhagen, Denmark Distributed automatic load-frequency control with optimality in power systems
07/2016	2016 IEEE PES General Meeting, Boston, MA, US Robust restoration approach for active distribution network based on scenario techniques