Zhenyi Yuan

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Education

University of California, San Diego — La Jolla, USA
Ph.D. in Engineering Sciences (Mechanical Engineering) — Oct. 2020 – June 2025 (Expected)
Advisor: Jorge Cortés

Harbin Institute of Technology, Honors School — Harbin, China
B.S. + M.S. in Control Science and Engineering — Sept. 2014 – July 2020
Advisor: Ligang Wu

Research Interests

- Machine Learning with Provable Guarantees
- Control and Learning for DERs in Power Systems
- Data-Driven Methods for Control and Optimization
- Distributed Control and Optimization over Networks

Publications

Book Chapters

(B-1) **Z. Yuan**, G. Cavraro, and J. Cortés, "Learning stable Volt/Var controllers in distribution grids," *Big Data Application in Power Systems (Second Edition)*, ed. R. Arghandeh and Y. Zhou, Elsevier Science, Netherlands, 2024.

Journal Papers

(J-9) **Z. Yuan**, J. Feng, Y. Shi, and J. Cortés, "Stability constrained voltage control in distribution grids with arbitrary communication infrastructures," *IEEE Transactions on Smart Grid*, 2025. Submitted.

(J-8) **Z. Yuan**, G. Cavraro, A. S. Zamzam, and J. Cortés, "Unsupervised learning for equitable DER control," *Electric Power Systems Research*, 234: 110634, 2024.

(J-7) Z. Sun*, **Z. Yuan***, C. Zhao, and J. Cortés, "Learning decentralized frequency controllers for energy storage systems," *IEEE Control Systems Letters*, 7: 3459-3464, 2023.

(J-6) **Z. Yuan**, G. Cavraro, and J. Cortés, "Constraints on OPF surrogates for learning stable local Volt/Var controllers," *IEEE Control Systems Letters*, 7: 2533-2538, 2023.

(J-5) **Z. Yuan**, G. Cavraro, M. K. Singh, and J. Cortés, "Learning provably stable local Volt/Var controllers for efficient network operation," *IEEE Transactions on Power Systems*, 39(1): 2066-2079, 2024.

(J-4) **Z. Yuan**, C. Zhao, and J. Cortés, "Reinforcement learning for distributed transient frequency control with stability and safety guarantees," *Systems & Control Letters*, 185: 105753, 2024.

(J-3) **Z. Yuan** and J. Cortés, "Data-driven optimal control of bilinear systems," *IEEE Control Systems Letters*, 6: 2479-2484, 2022.

(J-2) **Z. Yuan**, Y. Xiong, G. Sun, J. Liu, and L. Wu, "Event-triggered quantized communication-based consensus in multi-agent systems via sliding mode," *IEEE Transactions on Cybernetics*, 52(5): 3925-3935, 2022.

(J-1) **Z. Yuan**, Y. Tian, Y. Yin, S. Wang, J. Liu, and L. Wu, "Trajectory tracking control of a four Mecanum wheeled mobile platform: An ESO-based sliding mode approach," *IET Control Theory & Applications*, 14(3): 415-426, 2020.

Conference Proceedings

(C-5) Z. Xiong, **Z. Yuan**, K. Miao, H. Wang, J. Cortés, and A. Papachristodoulou "Data-enabled predictive control for nonlinear systems based on a Koopman bilinear realization," in *IEEE Conference on Decision and Control (CDC)*, Rio de Janeiro, Brazil, Dec. 2025. Submitted.

(C-4) **Z. Yuan**, G. Cavraro, A. S. Zamzam, and J. Cortés, "Unsupervised learning for equitable DER control," in *Power Systems Computation Conference (PSCC)*, Paris-Saclay, France, Jun. 2024.

(C-3) Z. Sun*, **Z. Yuan***, C. Zhao, and J. Cortés, "Learning decentralized frequency controllers for energy storage systems," in *American Control Conference (ACC)*, Toronto, Canada, Jul. 2024.

(C-2) **Z. Yuan**, G. Cavraro, and J. Cortés, "Constraints on OPF surrogates for learning stable local Volt/Var controllers," in *IEEE Conference on Decision and Control (CDC)*, Marina Bay Sands, Singapore, Dec. 2023.

(C-1) G. Cavraro, **Z. Yuan**, M. K. Singh, and J. Cortés, "Learning local Volt/Var controllers towards efficient network operation with stability guarantees," in *IEEE Conference on Decision and Control (CDC)*, Cancún, Mexico, Dec. 2022.

Project Experiences

CoDERMS: Coordinated Distributed Energy Resources Management System — TotalEnergies, USA
Collaborative Project Participant — Nov. 2023 – June 2025

- Develop scalable distributed control algorithms for optimal Plug-in EV charging
- Develop virtual battery models that characterize the flexibility of virtual power plants

ACE: Asynchronous Control and Estimation for Distributed Energy Resources — NREL, USA
Subcontract Graduate Student — Oct. 2021 – Oct. 2023

- Design provably reliable and efficient voltage controllers using machine learning
- Publish book chapter, journal & conference papers ([B-1,J-5,J-6,J-8,C-1,C-2,C-4])
- Give academic talks/posters at international conferences & universities

Selected Awards

- Outstanding Talk Award, Zhejiang University (2022)
- First-class Postgraduate's Scholarship, Ministry of Education (2018, 2019)
- Yingcai Honorable Graduate, Harbin Institute of Technology (2018)
- Second-class People's Scholarship, Harbin Institute of Technology (2017)
- First Prize (Jiangxi Division), Chinese Chemistry Olympiad (2011)

Invited Talks

Learning for Control with Performance Guarantees: Applications to Power Networks — Dec. 2024
Automatic Control Laboratory, ETH Zürich (Hosted by Prof. Florian Dörfler) — Zürich, Switzerland

Stability Constrained Voltage Control in Distribution Grids — July 2024
Department of Automation, Shanghai Jiao Tong University (Hosted by Prof. Zhaojian Wang) — Shanghai, China

Unsupervised Learning for Equitable DER Control — June 2024
23rd Power Systems Computation Conference — Paris, France

Constraints on OPF Surrogates for Learning Stable Local Volt/Var Controllers — Dec. 2023
62nd IEEE Conference on Decision and Control — Singapore

Data-driven Learning and Control: Performance Guarantees and Applications to Power Systems — Sept. 2023
SONIC Lab, The Chinese University of Hong Kong (Hosted by Prof. Changhong Zhao) — Hong Kong

Data-driven Learning and Control: Performance Guarantees and Applications to Power Systems — Sept. 2023
SAS Lab, UC San Diego (Hosted by Prof. Sylvia Herbert) — San Diego, USA

Safe Learning for Control in Power Networks — Dec. 2022
National Academic Forum on Swarm Intelligent Unmanned Systems, Zhejiang University — Hangzhou, China

Professional Services

Reviewer for Journals & Conferences:

- IEEE Transactions on Automatic Control; IEEE Transactions on Power Systems; IEEE Transactions on Network Science and Engineering; IEEE Transactions on Cybernetics; IEEE Control Systems Letters; IEEE Robotics and Automation Letters; Systems & Control Letters; International Journal of Robust and Nonlinear Control; Electric Power Systems Research; IET Control Theory & Applications, etc.
- IEEE Conference on Decision and Control (CDC); American Control Conference (ACC); IEEE Conference on Control Technology and Applications (CCTA); Power Systems Computation Conference (PSCC); Learning for Dynamics & Control Conference (L4DC), etc.

Professional Memberships:

- IEEE Graduate Student Member; IEEE CSS Member; IEEE PES Member

References Available to Contact

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Changhong Zhao, Assistant Professor
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The Chinese University of Hong Kong, Hong Kong
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Yuanyuan Shi, Assistant Professor
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