Zhaolin Ren

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Education

Harvard University 2019 - 2025

- Ph.D. in Applied Mathematics (Advisor: Prof. Na Li)

Stanford University 2014 - 2019

- MS in Statistics
- BS in Mathematics (with Distinction)

Research interest

I am generally interested in learning, optimization, design and control of real-world systems. To achieve this, my research has focused on developing scalable, efficient and theoretically principled toolkits in model-free optimization, and reinforcement learning.

Experience

Mitsubishi Electric Research Laboratories (MERL), Cambridge MA Dec 2025 - now

- Research Scientist

Publications

Preprints and submitted manuscripts

- Xin Chen*, **Zhaolin Ren***, "Regression-Based Single-Point Zeroth-Order Optimization" (2025). (*: equal contribution)
- Ren Liu*, **Zhaolin Ren***, Xinhe Zhang*, Qiang Li, Wenbo Wang, Zuwan Lin, Richard T. Lee, Jie Ding, Na Li, Jia Liu. "An AI-Cyborg system for adaptive intelligent modulation of organoid maturation" (2024). bioRxiv preprint: `https://www.biorxiv.org/content/10.1101/2024.12.07.627355v1`. (*: equal contribution)

Journal publications

- **Zhaolin Ren** and Na Li. "TS-RSR: a provably efficient algorithm for batch Bayesian Optimization". In *SIAM Journal for Optimization* (2025). arXiv preprint: `https://arxiv.org/abs/2403.04764v3`
- **Zhaolin Ren***, Tongzheng Ren*, Haitong Ma, Na Li and Bo Dai. "Stochastic nonlinear control via finite-dimensional spectral dynamic embedding." In *Transactions on Automatic Control* (2025). (*: equal contribution)
- Saba Zerefa, **Zhaolin Ren**†, Haitong Ma, and Na Li. "Distributed Thompson Sampling under constrained communication". In *IEEE Control Systems Letters* (2024). arXiv preprint: `https://arxiv.org/abs/2410.15543`. (†: corresponding author)
- Runyu Zhang, **Zhaolin Ren**, and Na Li. "Gradient play in stochastic games: stationary points, convergence, and sample complexity." In *Transactions on Automatic Control* (2024).
- Yujie Tang, **Zhaolin Ren**, and Na Li. "Zeroth-order feedback optimization for cooperative multi-agent systems." In *Automatica* (2023).

Conference publications

- Haitong Ma, Bo Dai, **Zhaolin Ren**, Yebin Wang, Na Li. "Offline imitation learning upon sub-optimal demonstrations by primal-dual representation". In *IROS* (2025).
- **Zhaolin Ren***, Runyu Zhang*, Dai Bo and Na Li. "Scalable spectral representation for multi-agent reinforcement learning in network MDPs". In *AISTATS* (2025). (*: equal contribution)
- Haitong Ma, **Zhaolin Ren**, Bo Dai and Na Li. "Skill transfer and discovery for sim-to-real learning: A representation-based viewpoint." In *International Conference on Intelligent Robots and Systems (IROS)* (2024).
- Shen Li, Yuyang Zhang, **Zhaolin Ren**, Claire Liang, Na Li, and Julie A Shah. "Enhancing preference-based linear bandits via human response time". In *NeurIPS* (2024).
- **Zhaolin Ren**, Yujie Tang, and Na Li. "Escaping saddle points in zeroth-order optimization: the power of two-point estimators." In *International Conference on Machine Learning (ICML)* (2023).
- **Zhaolin Ren**, Yang Zheng, Maryam Fazel, and Na Li. "On controller reduction in Linear Quadratic Gaussian control with performance bounds." In *Learning for Dynamics and Control Conference* (2023).
- Aoxiao Zhong, Hao He, **Zhaolin Ren**, Na Li, and Quanzheng Li. "FedDAR: Federated domain-aware representation learning." In *International Conference on Learning Representations* (2023).
- **Zhaolin Ren**, Aoxiao Zhong, and Na Li. "LQR with Tracking: A zeroth-order approach and its global convergence." In *American Control Conference (ACC)* (2021).
- **Zhaolin Ren**, Zhengyuan Zhou, Linhai Qiu, Ajay Deshpande, and Jayant Kalagnanam. "Delay-adaptive distributed stochastic optimization." In *Proceedings of the AAAI Conference on Artificial Intelligence* (2020).

Talks and presentations

- "Scalable network representation for network multiagent reinforcement learning"
  American Control Conference Tutorial Session on Structure-Exploiting Reinforcement Learning for Networked System, July 2025
- "Scalable network representation for network multiagent reinforcement learning"
  INFORMS Annual Meeting, Oct. 2024
- "Scalable network representation for network multiagent reinforcement learning"
  Allerton Conference on Communication, Control and Computing, Sep. 2024
- "Minimizing the Thompson Sampling Regret-to-Sigma Ratio (TS-RSR): a provably efficient algorithm for batch Bayesian Optimization"
  Northeast Systems and Control Workshop, May 2024
- "Stochastic nonlinear control via finite-dimensional spectral dynamic embedding."
  IEEE Conference on Decision and Control, Dec. 2023
- "Escaping saddle points in zeroth-order optimization: the power of two-point estimators."
  SIAM Conference on Optimization (OP23), June 2023
- "LQR with Tracking: A Zeroth-order Approach and Its Global Convergence."
  American Control Conference (ACC), May 2021

Teaching and mentoring

- Teaching assistant for Harvard Eng-Sci 150 (Probability with Engineering Applications), Spring 2023
  Teaching evaluation score: 5.0/5.0
- Teaching assistant for Harvard AM 121 (Introduction to Linear Optimization), Fall 2020
  Teaching evaluation score: 4.8/5.0
- Mentored a Harvard undergraduate on their undergraduate thesis on multi-skill representation learning for drones (2024).
- Mentored a first-year PhD student, Saba Zerefa, on her first PhD publication on distributed Bayesian Optimization (2024).
- Mentored a Harvard undergraduate, Victor Qin, on his undergraduate thesis on federated reinforcement learning (2022).

Academic service

- Reviewer for Systems and Control Letters
- Reviewer for Transactions on Automatic Control
- Reviewer for Learning for Dynamics & Control (L4DC)
- Reviewer for NeurIPS