

CONTACT

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University of Wisconsin–Madison
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EDUCATION

- **University of Wisconsin–Madison** Madison, WI
Ph.D. in Industrial & Systems Engineering 2022–May 2027 (expected)
– Advisor: Prof. Qiaomin Xie
M.S. in Computer Science 2022–2023
M.A. in Mathematics 2021–2022
- **Nankai University** Tianjin, China
B.S. in Applied Mathematics 2017–2021

RESEARCH INTERESTS

My research develops mathematical foundations for **learning and decision-making in stochastic systems**, combining **applied probability and algorithm design**. My research interests center on two complementary directions:

- **Distributional theory of stochastic algorithms** — Characterizing steady-state distributions, fluctuations, and systematic bias to guide the design of more accurate algorithms for stochastic optimization and reinforcement learning.
- **Learning and adaptation in sequential decision-making** — Developing algorithms that leverage imperfect data to reduce online experimentation and use *satisficing* objectives to avoid unnecessary adaptation, with particular interest in dynamic pricing, resource allocation, and cloud service operations.

At the intersection of these directions, I aim to use distributional analysis to determine how much learning and computation a satisfactory decision requires, particularly in AI-assisted operational systems.

PUBLICATIONS

Journal Publications

1. **Prelimit Coupling and Steady-State Convergence of Constant-Stepsize Nonsmooth Contractive Stochastic Approximation**
Yixuan Zhang, Lucy Huo, Yudong Chen, and Qiaomin Xie.
Operations Research. Accepted for publication.

Conference Publications

1. **Wasserstein- p Central Limit Theorem Rates: From Local Dependence to Markov Chains**
Yixuan Zhang and Qiaomin Xie.
ACM SIGMETRICS, 2026.
– **Best Student Paper Award, ACM SIGMETRICS 2026.**
2. **Contextual Online Pricing with (Biased) Offline Data**
Yixuan Zhang, Ruihao Zhu, and Qiaomin Xie.
Advances in Neural Information Processing Systems (NeurIPS), 2025.
3. **A Piecewise Lyapunov Analysis of Sub-quadratic SGD: Applications to Robust and Quantile Regression**
Yixuan Zhang, Lucy Huo, Yudong Chen, and Qiaomin Xie.
ACM SIGMETRICS, 2025.
4. **The Collusion of Memory and Nonlinearity in Stochastic Approximation with Constant Stepsize**
Lucy Huo, **Yixuan Zhang**, Yudong Chen, and Qiaomin Xie.
Advances in Neural Information Processing Systems (NeurIPS), 2024. **Spotlight.**
5. **Prelimit Coupling and Steady-State Convergence of Constant-Stepsize Nonsmooth Contractive Stochastic Approximation**
Yixuan Zhang, Lucy Huo, Yudong Chen, and Qiaomin Xie.
ACM SIGMETRICS, 2024.

6. **Constant Stepsize Q-learning: Distributional Convergence, Bias and Extrapolation**
Yixuan Zhang and Qiaomin Xie.
Reinforcement Learning Conference (RLC), 2024.

JOURNAL
MANUSCRIPTS
UNDER REVISION

1. **A Unified Lyapunov Analysis for Sub-quadratic SGD: Applications to Robust and Quantile Regression**
Yixuan Zhang, Lucy Huo, and Qiaomin Xie.
– Major revision, *Stochastic Systems*.
2. **Satisficing Regret Minimization under Nonstationarity**
Yixuan Zhang, Ruihao Zhu, and Qiaomin Xie.
– Major revision, *Operations Research*.
– Finalist, INFORMS 2026 Data Mining Society Best Paper Award Competition (Student Track).
3. **Memory, Nonlinearity, and Drift–Contraction in Stochastic Approximation with a Constant Stepsize**
Yixuan Zhang, Lucy Huo, and Qiaomin Xie.
– Major revision, *Mathematics of Operations Research*.

WORKING
PAPERS

1. **Steady-State Convergence of Stochastic Approximation**
Yixuan Zhang and Qiaomin Xie.
– To be submitted to *Operations Research*.
– First Place, ACM SIGMETRICS 2026 Student Research Competition.
2. **Gaussian Approximation in Wasserstein- p : Markovian Martingale Differences and Stochastic Approximation**
Yixuan Zhang and Qiaomin Xie.
– To be submitted to *Mathematics of Operations Research*.
3. **Gaussian Approximation in Wasserstein-1: Local Dependence and Markovian Martingale Differences**
Yixuan Zhang and Qiaomin Xie.
– To be submitted to *Mathematics of Operations Research*.

HONORS AND
DISTINCTIONS

- **Best Student Paper Award, ACM SIGMETRICS** 2026
- **First Place, ACM SIGMETRICS Student Research Competition** 2026
- **Finalist, INFORMS Data Mining Society Best Paper Award Competition (Student Track)** 2026
- **Finalist, NUS Next-Gen Scholar Symposium** 2026
- **Narayan-Chen Family Graduate Student Support Scholarship, University of Wisconsin–Madison** 2026
- **OM Rookiepaloosa, Northwestern University** 2026
- **ISyE–MS&E–IOE Joint Rising Stars, Georgia Tech** 2025

RESEARCH
MENTORSHIP

- **Yanbo Qiao** (Ph.D. student in ISyE, UW–Madison) Sep. 2026–Present
– *Finite-Time Analysis of Quantile TD Learning*
- **Yuqi Zeng** (Undergraduate student, CUHK–Shenzhen) Jan. 2026–Present
– *Quotient-Space Distributional Analysis of Average-Reward TD Learning*
- **Yining Liu** (M.S. student in Mathematics, UW–Madison) Dec. 2025–Present
– *Distributional Analysis of Asynchronous SGD: When Delays Do Not Hurt*

TEACHING

- **Teaching Assistant, University of Wisconsin–Madison**
– ISyE 624: Stochastic Modeling Techniques Spring 2023 and 2025
– ISyE 313: Engineering Economic Analysis Fall 2022
– ISyE 525: Linear Optimization Summer 2021
- **Guest Lecturer, University of Wisconsin–Madison**
– ISyE 624: Stochastic Modeling Techniques Spring 2023 and 2025

TUTORIAL	• Distributional Analysis of Stochastic Algorithms 2025 – ACM SIGMETRICS; 90-minute tutorial.
SELECTED TALKS	• Gaussian Approximation in Wasserstein-p: Markovian Martingale Differences and Stochastic Approximation 2026 – INFORMS Annual Meeting, San Francisco • Satisficing Regret Minimization under Nonstationarity 2026 – INFORMS Annual Meeting (Award Session), San Francisco 2026 – INFORMS Optimization Society Conference, Atlanta 2026 • Steady-State Convergence of Stochastic Approximation 2026 – Analytics for X, National University of Singapore • Wasserstein-p Central Limit Theorem Rates: From Local Dependence to Markov Chains – ACM SIGMETRICS, University of Michigan 2026 – OM Rookiepaloosa, Northwestern University 2026 – NYC Operations Day PhD Colloquium 2026 • Contextual Online Pricing with (Biased) Offline Data 2025 – INFORMS Annual Meeting, Atlanta • A Piecewise Lyapunov Analysis of Sub-quadratic SGD: Applications to Robust and Quantile Regression – INFORMS Applied Probability Society Conference, Atlanta 2025 – ACM SIGMETRICS, Stony Brook University 2025 • Prelimit Coupling and Steady-State Convergence of Constant-stepsize Nonsmooth Contractive SA – ISyE-MS&E-IOE Joint Rising Stars Workshop, Georgia Tech 2025 – INFORMS Annual Meeting, Seattle 2024 – ACM SIGMETRICS, Italy 2024
SERVICES	• Session Chair – INFORMS Annual Meeting 2025 and 2026 – INFORMS Applied Probability Society Conference 2025 • Refereeing – <i>Journals</i>: IEEE Transactions on Information Theory; Mathematics of Operations Research; Physica D: Nonlinear Phenomena. – <i>Conferences</i>: NeurIPS; Reinforcement Learning Conference (RLC).
REFERENCES	• Qiaomin Xie (Assistant Professor) – Department of Industrial and Systems Engineering, University of Wisconsin–Madison – Email: qiaomin.xie@wisc.edu • Yudong Chen (Associate Professor) – Department of Computer Sciences, University of Wisconsin–Madison – Email: yudong.chen@wisc.edu • Ruihao Zhu (Assistant Professor) – Cornell SC Johnson College of Business – Email: ruihao.zhu@cornell.edu