

Quan Xiao | Curriculum Vitae

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EDUCATION

Rensselaer Polytechnic Institute

Troy, NY

Ph.D. of Computer and Systems Engineering (GPA: 4.0/4.0)

Sep. 2021 - (Expected) May 2026

Advisor: Tianyi Chen

University of Science and Technology of China

Hefei, Anhui, China

Bachelor of Statistics

Sep. 2016 - July. 2020

RESEARCH INTEREST

My research explores optimization and machine learning, with a focus on **bilevel optimization** for developing provably efficient algorithms that advance **generative AI models (e.g., LLMs, diffusion models)** and **next-generation AI computing (e.g., analog circuit devices)**. I aim to bridge theory and practice, designing efficient, scalable and hardware-aware optimization methods for a wide range of machine learning applications.

HONORS AND AWARDS

IEEE Signal Processing Society Scholarship	2024
Belsky Award for Computational Sciences and Engineering in RPI	2023
Neural Information Processing Systems Scholar Award	2023
International Conference on Machine Learning Participation Grant	2022
Excellent student scholarship of the University of Science and Technology of China	2017 - 2019

SELECTED PUBLICATIONS (* equal contribution)

- [9] **Quan Xiao**, Hui Yuan, A F M Saif, Gaowen Liu, Ramana Rao Kompella, Mengdi Wang, Tianyi Chen. A First-order Generative Bilevel Optimization Framework for Diffusion Models. *Proc. of International Conference on Machine Learning*, 2025.
- [8] Lisha Chen, **Quan Xiao**, Ellen Hidemi Fukuda, Xinyi Chen, Kun Yuan, Tianyi Chen. Efficient Multi-Objective Learning under Preference Guidance: A First-Order Penalty Approach. *Proc. of International Conference on Machine Learning*, 2025. (**Spotlight, top 2.6%**)
- [7] **Quan Xiao**, and Tianyi Chen. Unlocking Global Optimality in Bilevel Optimization: A Pilot Study. *Proc. of International Conference on Learning Representations*, 2025.
- [6] Han Shen, **Quan Xiao**, and Tianyi Chen. On Penalty-based Bilevel Gradient Descent Method. *Mathematical Programming (Series A)*, 2024.
- [5] Liuyuan Jiang, **Quan Xiao**, Victor M Tenorio, Fernando Real-Rojas, Antonio Marques, Tianyi Chen. A Primal-Dual-Assisted Penalty Approach to Bilevel Optimization with Coupled Constraints. *Proc. of Neural Information Processing Systems*, 2024
- [4] **Quan Xiao**, Songtao Lu, and Tianyi Chen. A Generalized Alternating Method for Bilevel Learning under the Polyak-Łojasiewicz Condition. *Proc. of Neural Information Processing Systems*, 2023.

- [3] **Quan Xiao**, Han Shen, Wotao Yin and Tianyi Chen. Alternating Projected SGD for Equality-constrained Bilevel Optimization. *Proc. of International Conference on Artificial Intelligence and Statistics*, 2023.
- [2] *Momin Abbas, ***Quan Xiao**, *Lisha Chen, Pin-Yu Chen and Tianyi Chen. Sharp-MAML: Sharpness-Aware Model-Agnostic Meta Learning. *Proc. of International Conference on Machine Learning*, 2022.
- [1] Tianyi Chen, Yuejiao Sun, **Quan Xiao**, and Wotao Yin. A Single-Timescale method for stochastic bilevel optimization. *Proc. of International Conference on Artificial Intelligence and Statistics*, 2022. (**Oral, top 2%**)

SLECTED PREPRINTS

- [2] Zhaoxian Wu, **Quan Xiao**, Tayfun Gokmen, Omobayode Fagbohunbe, and Tianyi Chen. Analog In-memory Training on General Non-ideal Resistive Elements: Understanding the Impact of Response Functions. arXiv preprint arxiv:2502.06309, 2025.
- [1] Zhaoxian Wu, **Quan Xiao**, Tayfun Gokmen, Hsinyu Tsai, Kaoutar El Maghraoui, and Tianyi Chen. Pipeline Gradient-based Model Training on Analog In-memory Accelerators. arXiv preprint arxiv:2410.15155, 2024.

PROFESSIONAL EXPERIENCE

- **IBM Thomas J. Watson Research Center**, Yorktown, NY.
 Research intern with mentor: Dr. Debarun Bhattacharjya. May. 2024 - Aug. 2024
Project: Uncertainty quantification and selective generation in large language model.
 - Quantified **uncertainty in LLM** and **developed a selective generation approach based on confidence estimation during the fine-tuning stage**. This method was successfully applied to IBM’s product of LLM-based SQL code generation. Part of the results were submitted to UAI 2025.
- **IBM Thomas J. Watson Research Center**, Yorktown, NY.
 Research intern with mentor: Dr. Songtao Lu. May. 2022 - Aug. 2022
Project: Efficient method for bilevel optimization beyond strong convexity.
 - Developed an efficient method with optimal iteration complexity for bilevel optimization problem with non-strongly-convex lower-level problem. The paper was published by NeurIPS 2023.

INVITED TALK

- **Global Convergence in Bilevel Optimization: A Pilot Study.**
 Conference on Parsimony and Learning (CPAL), Stanford, CA. March. 2025
 Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA. Nov. 2024
- **Efficient Methods for Bilevel Optimization with Polyak-Lojasiewicz Lower-level Problems.**
 Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA. Nov. 2023
- **Solving A Class of Bilevel Optimization Without Lower-level Convexity.**
 SIAM Conference on Optimization (OP23), Seattle, WA. June. 2023

SERVICES

- Reviewer of Proc. of AAAI (’25), AISTATS (’22 – ’25), NeurIPS (’23 – ’25), ICLR (’24 – ’25), ICML (’24 – ’25).
- Reviewer of journal of IEEE Transactions on Signal Processing, IEEE Transactions on Networking.
- Reviewer and Technical Program Committee member of Cross-Community Federated Learning Workshop at MLSys 2022.