Xiaoyang Lu

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Education

Illinois Institute of Technology Chicago, IL
Ph.D. in Computer Science
Advisor: *Professor Xian-He Sun* Aug 2017 – May 2024
Thesis: *Utilizing Concurrent Data Accesses for Data-Driven and AI Applications*

New York University New York, NY
M.S. in Computer Engineering Aug 2015 – May 2017

Zhejiang University Hangzhou, China
B.E. in Electronic Science and Technology Aug 2011 – July 2015

Research Experience

Research Assistant Professor June 2024 – Present
Illinois Institute of Technology Chicago, IL

- Conduct comprehensive research in memory-centric computer architectures and scalable memory systems, focusing on optimizing high-performance computing systems.
- Explore and develop hardware/software co-designed accelerators for machine learning workloads, achieving significant improvements in data access speeds and computational efficiency.
- Investigate and implement processing-in-memory (PIM) architectures to minimize data movement and maximize computational speed, enhancing system performance.
- Direct and supervise PhD research, mentoring students in advancing the field of computer architecture and high-performance computing.

Research Assistant Jan 2020 – May 2024
Illinois Institute of Technology Chicago, IL

- Focused on memory performance optimizations, developing sophisticated models and pioneering machine learning-assisted architectural innovations.
- Designed and implemented intelligent frameworks aimed at enhancing cache performance, focusing on efficiency and innovative design principles.
- Mentored multiple graduate students, guiding their research projects and fostering both their academic development and practical engineering skills.

Research Aide May 2020 – Aug 2020
Argonne National Laboratory Lemont, IL

- Conducted comprehensive performance testing on disaggregated memory systems, identifying key areas for improvement.
- Developed and refined performance models for disaggregated memory systems, enhancing predictive accuracy and system efficiency.
- Quantified and mitigated interference in disaggregated memory systems, ensuring optimal operation and reliability.

Conference Publications

- [**IPDPS 2026**] I/O-Aware PIM Acceleration for Long-Sequence LLM Inference with Hybrid Sparse Attention

  Xiaoyang Lu, Lihan Hu, Hongrui Huang, Peng Jiang, Xian-He Sun

  In the Proceedings of the 40th IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2026

- [**ASPLOS 2026**] I/O Analysis is All You Need: An I/O Analysis for Long-Sequence Attention

  Xiaoyang Lu, Boyu Long, Xiaoming Chen, Yinhe Han, Xian-He Sun

  In the Proceedings of the 31st International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2026

- [**DATE 2026**] Zion: A Comprehensive, Adaptive, and Lightweight Hardware Prefetcher
  Vadim Biryukov, **Xiaoyang Lu**, Zirui Liu, Kaixiong Zhou, Xian-He Sun
  In the Proceedings of the Design, Automation, and Test in Europe (DATE), 2026
- [**MICRO 2025**] COSMOS: RL-Enhanced Locality-Aware Counter Cache Optimization for Secure Memory
  Haoran Geng, **Xiaoyang Lu**, Yuezhi Che, Ziang Tian, Dazhao Cheng, Xian-He Sun, Michael Niemier, X. Sharon Hu
  In the Proceedings of the 58th International Symposium on Microarchitecture (MICRO), 2025
- [**GLSVLSI 2025**] Concurrency-Aware Cache Miss Cost Prediction with Perceptron Learning
  Yuping Wu, **Xiaoyang Lu**, Xiaoming Chen, Yinhe Han, Xian-He Sun
  In the Proceedings of the 35th Great Lakes Symposium on VLSI (GLSVLSI), 2025
- [**ICCD 2024**] AceMiner: Accelerating Graph Pattern Matching using PIM with Optimized Cache System
  Liang Yan, **Xiaoyang Lu**, Xiaoming Chen, Sheng Xu, Xingqi Zou, Yinhe Han, Xian-He Sun
  In the Proceedings of the 42nd International Conference on Computer Design (ICCD), 2024
- [**ASPLOS 2024**] ACES: Accelerating Sparse Matrix Multiplication with Adaptive Execution Flow and Concurrency-Aware Cache Optimizations
  Xiaoyang Lu, Boyu Long, Xiaoming Chen, Yinhe Han, Xian-He Sun
  In the Proceedings of the 29th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024
- [**HPCA 2024**] CHROME: Concurrency-Aware Holistic Cache Management Framework with Online Reinforcement Learning
  Xiaoyang Lu, Hamed Najafi, Jason Liu, Xian-He Sun
  In the Proceedings of the 30th International Symposium on High-Performance Computer Architecture (HPCA), 2024
- [**HPCA 2023**] CARE: A Concurrency-Aware Enhanced Lightweight Cache Management Framework
  Xiaoyang Lu, Rujia Wang, Xian-He Sun
  In the Proceedings of the 29th International Symposium on High-Performance Computer Architecture (HPCA), 2023
- [**WSC 2022**] A Generalized Model For Modern Hierarchical Memory System
  Hamed Najafi, **Xiaoyang Lu**, Jason Liu, Xian-He Sun
  In the Proceedings of the Winter Simulation Conference (WSC), 2022
- [**ICCD 2021**] Premier: A Concurrency-Aware Pseudo-Partitioning Framework for Shared Last-Level Cache
  Xiaoyang Lu, Rujia Wang, Xian-He Sun
  In the Proceedings of the 39th International Conference on Computer Design (ICCD), 2021
- [**ISLPED 2021**] CoPIM: A Concurrency-Aware PIM Workload Offloading Architecture for Graph Applications
  Liang Yan, Mingzhe Zhang, Rujia Wang, Xiaoming Chen, Xingqi Zou, **Xiaoyang Lu**, Yinhe Han, Xian-He Sun
  In the Proceedings of the International Symposium on Low Power Electronics and Design (ISLPED), 2021
- [**ICCD 2020**] APAC: An Accurate and Adaptive Prefetch Framework with Concurrent Memory Access Analysis
  Xiaoyang Lu, Rujia Wang, Xian-He Sun
  In the Proceedings of the 38th International Conference on Computer Design (ICCD), 2020

Journal Publications

- [**TCAD 2025**] ProMiner: Enhancing Locality, Parallelism, and Offloading for Graph Mining on Processing-in-Memory Systems
  Liang Yan, **Xiaoyang Lu**, Sheng Xu, Xiaoming Chen, Xingqi Zou, Yinhe Han, Xian-He Sun
  IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), 2025

- **[CAL 2025]** Pyramid: Accelerating LLM Inference with Cross-Level Processing-in-Memory
  Liang Yan, **Xiaoyang Lu**, Xiaoming Chen, Yinhe Han, Xian-He Sun
  IEEE Computer Architecture Letters (CAL), 2025, 24(1): 121-124
- **[JCST 2023]** The Memory-Bounded Speedup Model and its Impacts in Computing
  Xian-He Sun, **Xiaoyang Lu**
  Journal of Computer Science and Technology (JCST), 2023, 38(1): 64-79

Teaching Experience

Guest Lecture Jan 2022 – Present
Illinois Institute of Technology Chicago, IL

- Spring 2025 CS 550 Advanced Operating Systems, "Data-Centric Optimizations for LLM".
- Fall 2024 CS 546 Parallel and Distributed Processing, "Introduction of Parallel Processing".
- Spring 2022 CS 570 Advanced Computer Architecture, "GPU Architectures".

Teaching Assistant Aug 2017 – May 2022
Illinois Institute of Technology Chicago, IL

- Assisted in teaching five graduate courses at Illinois Institute of Technology, each with 9-60 students, covering topics such as Java Programming (CS 401), Software Engineering (CS 487), Advanced Operating Systems (CS 550), Parallel and Distributed Processing (CS 546), and Advanced Computer Architecture (CS 570).
- Developed and prepared comprehensive course materials, including laboratory experiments, lectures, exams, homework, and practice problems.
- Led weekly lab sessions and problem-solving discussions for groups of up to 30 students, enhancing their understanding and application of course materials.
- Supervised and guided students in final projects, provided detailed feedback, and graded exams and weekly homework assignments.

Mentoring Experience

- 2025-Present Max Han, undergraduate student at UIUC, Hardware-Assisted OS Primitive.
- 2025-2026 Belthangady Akash Vi Narayana Pai, master student at Illinois Tech, Near Memory Processing.
- 2025-2026 Hongrui Huang, master student at Columbia University, Accelerator for LLM Serving.
- 2024-Present Lihan Hu, PhD student at University of Iowa, Infrastructure for Efficient LLM Serving.
- 2023-Present Haoran Geng, PhD student at University of Notre Dame, Architecture for Secure Memory.
- 2023-Present Vadim Biryukov, PhD student at Illinois Tech, Hardware Prefetcher for Data-Intensive Workloads.

Academic Honors and Awards

- 2024 DAC PhD Forum Travel Award
- 2024 Illinois Institute of Technology Computer Science Department Best Student Paper Award (2023-2024)
- 2024 Illinois Institute of Technology College of Computing Best Poster Award
- 2024 ASPLOS Student Travel Award
- 2023 Top 100 Chips Achievements (2022-2023)
- 2023 HPCA Student Travel Award
- 2015 New York University Scholarship
- 2015 Zhejiang University Excellent Bachelor Thesis Award

PROFESSIONAL SERVICE

Editor

- Guest Editor, IEEE Internet of Things Journal, Special Issue on Integrated Sensing, Memory, Communication, and Computation for Large-Scale AI Based IoT Systems, 2026.

Conference Committee Service

- Chips To Systems Conference (DAC), Technical Program Committee Member, 2026
- Conference on Machine Learning and Systems (MLSys), External Review Committee Member, 2026
- European Conference on Computer Systems (EuroSys), Shadow Program Committee Member, 2026
- IEEE Cloud Summit, Technical Program Committee Member, 2026
- IEEE International Conference on Computer Design (ICCD), Program Committee Member, 2025

Invited Reviewer for Journals & Transactions

- Device
- Future Generation Computer Systems (FGCS)
- IEEE Transactions on Computers (TC)
- IEEE Transactions on Consumer Electronics (TCE)
- IEEE Transactions on Industrial Informatics (TII)
- IEEE Transactions on Network Science and Engineering (TNSE)
- IEEE Transactions on Parallel and Distributed Systems (TPDS)
- Journal of Systems Architecture (JSA)
- Memories - Materials, Devices, Circuits and Systems (MEMORI)
- Microprocessors and Microsystems (MICPRO)
- Simulation: Transactions of the Society for Modeling and Simulation International