Xiaojun Dong

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Github Linkedin

Research Interests

My research focuses on **designing and engineering efficient parallel algorithms and data structures** on shared-memory machines. My research on parallel algorithms provides both **strong theoretical guarantees** and **good practical performance** on large-scale real-world applications using performance engineering techniques. My work aims to show that parallel algorithms can be provably fast and scalable.

Education

Expected June 2025 **Ph.D. in Computer Science**, *University of California, Riverside*, Cumulative GPA: 3.94/4.0
Advisors: Prof. Yan Gu and Prof. Yihan Sun

2016 – 2020 **Bachelor in Computer Science**, *Huazhong University of Science and Technology*, Wuhan, China
Outstanding Graduates Award and Outstanding Bachelor Thesis Award

Honors and Awards

2024 **Dissertation Completion Fellowship Award** (four nominations in the CS department), UC Riverside
2024 **Laxmi N. Bhuyan Endowed Fellowship** (two recipients in the CS department), UC Riverside
2024 **Honorable Mention**, Jane Street Graduate Research Fellowship
2023 **Best Paper Award**, *European Symposium on Algorithms (ESA)*
2023 **Best Paper Award**, *ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)*
2023 **Best Student Presentation**, *SIAM Conference on Applied and Computational Discrete Algorithms (ACDA)*
2021 **11th Place**, ICPC Southern California Regional Contest (Rank 11/59), advanced to ICPC North America Division Championships (NADC) for the first time in school history
2020 **Dean's Distinguished Fellowship**, UC Riverside
2019 **Champion**, CCPC Hubei Provincial Contest
2019 **Gold Medal**, ICPC Asia Qingdao Regional Contest (Rank 19/171)
2019 **Gold Medal**, ICPC Asia Nanjing Regional Contest (Rank 31/311)

Publications

In Conference Proceedings

[P8] VLDB'24 **BYO: A Unified Framework for Benchmarking Large-Scale Graph Containers**
Brian Wheatman, Xiaojun Dong, Zheqi Shen, Laxman Dhulipala, Jakub Łącki, Prashant Pandey, and Helen Xu
VLDB Endowment (VLDB), 2024
arXiv Code

[P7] SPAA'24 **Optimal Parallel Algorithms for Dendrogram Computation and Single-Linkage Clustering**
(in alphabetical order) Laxman Dhulipala, Xiaojun Dong, Kishen N Gowda, and Yan Gu
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2024
arXiv Code

[P6] PPoPP'24 **Parallel Integer Sort: Theory and Practice**
Xiaojun Dong, Laxman Dhulipala, Yan Gu, and Yihan Sun
ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2024
arXiv Code

[P5] ESA'23 **Efficient Parallel Output-Sensitive Edit Distance**
(in alphabetical order) Xiangyun Ding, Xiaojun Dong, Yan Gu, Youzhe Liu, and Yihan Sun
European Symposium on Algorithms (ESA), 2023
Best Paper Award
arXiv Code

[P4] SIGMOD'23 **Parallel Strong Connectivity Based on Faster Reachability**
Letong Wang, Xiaojun Dong, Yan Gu, and Yihan Sun
ACM International Conference on Management of Data (SIGMOD), 2023
arXiv Code

[P3] SPAA'23 **High-Performance and Flexible Parallel Algorithms for Semisort and Related Problems**
Xiaojun Dong, Yunshu Wu, Zhongqi Wang, Laxman Dhulipala, Yan Gu, and Yihan Sun
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2023
arXiv Code

[P2] PPoPP'23 **Provably Fast and Space-Efficient Parallel Biconnectivity**
Xiaojun Dong, Letong Wang, Yan Gu, and Yihan Sun
ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2023
Best Paper Award
arXiv Code

[P1] SPAA'21 **Efficient Stepping Algorithms and Implementations for Parallel Shortest Paths**
Xiaojun Dong, Yan Gu, Yihan Sun, and Yunming Zhang
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2021
arXiv Code

Peer-Reviewed Short Publications

[SP6] VLDB-PhD'24 **Parallel Algorithms Can Be Provably Fast and Scalable**
Xiaojun Dong
VLDB Ph.D. Workshop, 2024

[SP5] SPAA'24 **Brief Announcement: PASGAL: Parallel And Scalable Graph Algorithm Library**
(in alphabetical order) Xiaojun Dong, Yan Gu, Yihan Sun, and Letong Wang
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2024
arXiv Code

[SP4] HOPC'24 **Parallel Integer Sort: Theory and Practice (Abstract)**
Xiaojun Dong, Laxman Dhulipala, Yan Gu, and Yihan Sun
ACM Workshop on Highlights of Parallel Computing (HOPC), 2024

[SP3] HOPC'24 **Efficient Parallel Output-Sensitive Edit Distance (Abstract)**
(in alphabetical order) Xiangyun Ding, Xiaojun Dong, Yan Gu, Youzhe Liu, and Yihan Sun
ACM Workshop on Highlights of Parallel Computing (HOPC), 2024

[SP2] HOPC'23 **Parallel Strong Connectivity Based on Faster Reachability (Abstract)**
Letong Wang, Xiaojun Dong, Yan Gu, and Yihan Sun
ACM Workshop on Highlights of Parallel Computing (HOPC), 2023

[SP1] HOPC'23 **Provably Fast and Space-Efficient Parallel Biconnectivity (Abstract)**
Xiaojun Dong, Letong Wang, Yan Gu, and Yihan Sun
ACM Workshop on Highlights of Parallel Computing (HOPC), 2023

Manuscripts

[M3] **Parallel Contraction Hierarchies Can Be Efficient and Scalable**
Zijin Wan, Xiaojun Dong, Letong Wang, Enzuo Zhu, Yan Gu, and Yihan Sun
Under submission

[M2] **Parallel Point-to-Point Shortest Paths and Batch Queries**
Xiaojun Dong, Andy Li, Yan Gu, and Yihan Sun
Under submission

[M1] **Parallel k-Core Decomposition: Theory and Practice**
Youzhe Liu, Xiaojun Dong, Yan Gu, and Yihan Sun
Conditionally Accepted by ACM International Conference on Management of Data (SIGMOD), 2024

Research and Work Experience

2020 – Present **Research Assistant**, *under Prof. Yan Gu and Prof. Yihan Sun*, UC Riverside

- **Large-Scale Parallel Graph Processing:** Proposed and implemented parallel algorithms for large-scale graph processing problems (e.g., connectivity, strongly connected components, biconnected components, and single-source shortest paths). Published several papers in SPAA, PPoPP, and SIGMOD. Our PPoPP'23 paper received the *Best Paper Award*.
- **Sorting Algorithms:** Studied and improved algorithms on sorting-related problems (e.g., semisort, integer sort, and sample sort). Achieved better performance and scalability than the state-of-the-art. Published in SPAA'23 and PPoPP'24.
- **Edit Distance:** Developed parallel algorithms for the edit distance problem in the output-sensitive setting, processing billion-scale strings in under one second. Published in ESA'23 (*Best Paper Award*).

2022 – Present **Visiting Student Researcher**, *under Prof. Laxman Dhulipala*, UMD College Park / Remote

- **Graph Reordering:** Optimized graph reordering algorithms to improve compression ratios and cache locality.
- **Dynamic Graph Containers:** Introduced BYO, a general graph-processing framework with minimal APIs bridging graph algorithms and data structures. Benchmarked performance on 10 graphs with 20 containers. Published in VLDB'24.

2023 – 2024 **Student Researcher**, *Google Research*, Remote

- **Parallel K-Means Library:** Investigated the parallel k-means-++ problem, designed and implemented a new seeding algorithm using C++ with improved theoretical bounds while maintaining competitive SSE costs.

2019 – 2020 **Research Assistant**, *under Prof. Marek Chrobak*, UC Riverside

- **Fence Insertions:** Developed an algorithm to compute minimal fence insertions in a control flow graph, ensuring correct execution dependencies.

2019 – 2020 **Lab Assistant**, *under Prof. Marek Chrobak*, UC Riverside

- **Ship Unloader:** Designed a communication system for automated tripod head movements using C++.
- **Global Navigation Satellite Systems:** Built a C++ client-server system to handle satellite code bias, orbits, clocks, and atmospheric models for precise navigation broadcasts.

Winter 2020 **Software Engineering Intern**, *Momenta*, Suzhou, China

- **Data Filtering:** Processed video timestamps to detect forward collisions or lane departures using Python.

Talks

Parallel Algorithms Can Be Provably Fast and Scalable

2024 ○ *Workshop talk.* Guangzhou, China. VLDB Ph.D. Workshop

PASGAL: Parallel And Scalable Graph Algorithm Library

2024 ○ *Conference talk.* Nantes, France. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)

Parallel Integer Sort: Theory and Practice

2024 ○ *Conference talk.* Edinburgh, UK. ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)

2024 ○ *Oral and poster presentation.* Nantes, France. Highlights of Parallel Computing (HOPC)

High-Performance and Flexible Parallel Algorithms for Semisort and Related Problems

2023 ○ *Conference talk.* Orlando, FL. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)

Provably Fast and Space-Efficient Parallel Biconnectivity

2023 ○ *Conference talk.* Montreal, Canada. ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)

2023 ○ *Oral and poster presentation.* Orlando, FL. Highlights of Parallel Computing (HOPC)

2023 ○ *Oral presentation.* Seattle, WA. SIAM Conference on Applied and Computational Discrete Algorithms (ACDA)

Efficient Stepping Algorithms and Implementations for Parallel Shortest Paths

2023 ○ *Conference talk.* Virtual. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)

Teaching and Mentorship Experience

Teaching Assistant

Winter 2023 **CS214: Parallel Algorithms**, UC Riverside
Fall 2022 **CS218: Design and Analysis of Algorithms**, UC Riverside
Spring 2022 **CS219: Advanced Algorithms**, UC Riverside
Fall 2021 **CS141: Intermediate Data Structures and Algorithms**, UC Riverside
Winter 2021 **CS142: Algorithms Engineering**, UC Riverside

Mentoring Students

2021 – Present **Zijin Wan**, *Ph.D. at UCR*, under Parallel Algorithm Lab
2023 – Present **Youzhe Liu**, *Ph.D. at UCR*, under Parallel Algorithm Lab
2023 – Present **Andy Li**, *Undergraduate at UCR*, under Parallel Algorithm Lab
2024 – Present **Thomas Li**, *Undergraduate at UCR*, under Parallel Algorithm Lab
2022 – 2023 **Ravan Nazaraliyev**, *Ph.D. at UCR*, under International Student Peer Mentor Program
2022 – 2023 **Faisal Ashraf**, *Ph.D. at UCR*, under International Student Peer Mentor Program
2021 **Yuta Nakamura**, *Master at UCR*, under Parallel Algorithm Lab

Community Involvement

2020 - Present **Student Coach**, *Competitive Coding Club at UCR*

- Organize mini-lectures and practice contests every week with 15 participants on average.
- Organizer and/or problems setter of UCR Programming Contest (UCRPC) in 2020-2024.

Professional Services

Web Chair

2025 Symposium on Principles and Practice of Parallel Programming (PPoPP)

Program Committee Member

2024 Highlights of Parallel Computing (HOPC). Workshop at SPAA

External Reviewer

2025 International Symposium on Theoretical Aspects of Computer Science (STACS)
2024 International Conference on Parallel Processing (ICPP)
2024 Symposium on Parallelism in Algorithms and Architectures (SPAA)
2024 International European Conference on Parallel and Distributed Computing (Euro-Par)
2024 Symposium on Algorithm Engineering and Experiments (ALENEX)
2023 International Conference on Parallel Processing (ICPP)
2023 Symposium on Parallelism in Algorithms and Architectures (SPAA)
2023 European Symposium on Algorithms (ESA)
2023 International Conference on Supercomputing (ICS)
2022 Symposium on Experimental Algorithms (SEA)

Artifact Reviewer

2025 Symposium on Principles and Practice of Parallel Programming (PPoPP)
2025 SIGMOD International Conference on Management of Data (SIGMOD)
2025 Symposium on Algorithm Engineering and Experiments (ALENEX)
2024 Symposium on Principles and Practice of Parallel Programming (PPoPP)
2024 SIGMOD International Conference on Management of Data (SIGMOD)