

Yan Gu

Tel: 1-412-553-9960

E-mail: ygu@cs.ucr.edu

Homepage: www.cs.ucr.edu/~ygu/

Address:

Winston Chung Hall 335

Riverside, CA 92521

Employment

University of California, Riverside | Jan. 2020 – present

- Assistant Professor, Dept. of Computer Science and Engineering

Massachusetts Institute of Technology | Jan. 2019 – Dec. 2019

- Postdoctoral associate at CSAIL, supervisor: Julian Shun

Carnegie Mellon University | Oct. 2018 – Dec. 2018

- Postdoctoral associate at CSD, supervisor: Guy Blelloch

Education

Ph.D. in Computer Science | Aug. 2012 – Sep. 2018 | Carnegie Mellon University

- Advisor: Professor Guy Blelloch
- Thesis title: *Write-Efficient Algorithms*

Bachelor's in Computer Science | Aug. 2008 – Jul. 2012 | Tsinghua University

- Outstanding Bachelor Thesis Award / Outstanding Graduates Award

Recent Awards (since 2020)

Google Research Scholar Award, 2024

NSF CAREER Award, 2024

Outstanding Paper Award at SPAA 2024

Best Paper Award at ESA 2023

Best Paper Award at PPOPP 2023

Best Paper Runner-Up (Technical Paper) at VLDB 2023

Outstanding Paper Award at SPAA 2020

Selected Publications

For the full publication list including surveys, short papers, and workshop papers, please visit my [\[dblp\]](#) or [\[Google Scholar\]](#) page.

51. Parallel and (Nearly) Work-Efficient Dynamic Programming

Xiangyun Ding, **Yan Gu**, and Yihan Sun.

ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2024.

50. Brief Announcement: PASGAL: Parallel And Scalable Graph Algorithm Library

Xiaojun Dong, **Yan Gu**, Yihan Sun, and Letong Wang.

ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2024.

- 49. Optimal Parallel Algorithms for Dendrogram Computation and Single-Linkage Clustering**
Laxman Dhulipala, Xiaojun Dong, Kishen Gowda, and **Yan Gu**.
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2024.
- 48. Fast and Space-Efficient Parallel Algorithms for Influence Maximization**
Letong Wang, Xiangyun Ding, **Yan Gu**, and Yihan Sun.
Proceedings of the VLDB Endowment, 2024.
- 47. Parallel Integer Sort: Theory and Practice**
Xiaojun Dong, Laxman Dhulipala, **Yan Gu**, and Yihan Sun.
ACM Symposium on Principles and Practice of Parallel Programming (PPoPP), 2024.
- 46. ParlayANN: Scalable and Deterministic Parallel Graph-Based Approximate Nearest Neighbor Search Algorithms**
Magdalen Dobson, Zheqi Shen, Guy Blelloch, Laxman Dhulipala, **Yan Gu**, Harsha Simhadri, and Yihan Sun.
ACM Symposium on Principles and Practice of Parallel Programming (PPoPP), 2024.
- 45. Efficient Parallel Output-Sensitive Edit Distance**
Xiangyun Ding, Xiaojun Dong, **Yan Gu**, Youzhe Liu, and Yihan Sun.
European Symposium on Algorithms (ESA), 2023.
Best Paper Award.
- 44. 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.
- 43. Parallel Longest Increasing Subsequence and van Emde Boas Trees**
Yan Gu, Ziyang Men, Zheqi Shen, Yihan Sun, and Zijin Wan.
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2023.
- 42. A Skew-Resistant Trie for Processing-in-Memory**
Hongbo Kang, Yiwei Zhao, Guy E. Blelloch, Laxman Dhulipala, **Yan Gu**, Charles McGuffey, and Phillip B. Gibbons.
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2023.
- 41. 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.
- 40. Provably Fast and Space-Efficient Parallel Biconnectivity**
Xiaojun Dong, Letong Wang, **Yan Gu**, and Yihan Sun.
ACM Symposium on Principles and Practice of Parallel Programming (PPoPP), 2023.
Best Paper Award.
- 39. PIM-tree: A Skew-resistant Index for Processing-in-Memory**

Hongbo Kang, Yiwei Zhao, Guy Blelloch, Laxman Dhulipala, **Yan Gu**, Charles McGuffey, and Phillip Gibbons.

Proceedings of the VLDB Endowment 16(4), 2022.

Technical Paper Track, Best Paper Runner-Up at VLDB 2023

38. LuisaRender: A High-Performance Rendering Framework with Layered and Unified Interfaces on Stream Architectures

Shaokun Zheng, Zhiqian Zhou, Xin Chen, Difei Yan, Chuyan Zhang, Yuefeng Geng, **Yan Gu**, and Kun Xu. SIGGRAPH Asia 2022 (journal version published in ACM Transactions on Graphics (TOG)).

37. ParGeo: A Library for Parallel Computational Geometry

Yiqiu Wang, Rahul Yesantharao, Shangdi Yu, Laxman Dhulipala, **Yan Gu**, and Julian Shun. European Symposium on Algorithms (ESA), 2022.

36. Parallel Cover Trees and Applications

Yan Gu, Zachary Napier, Yihan Sun, and Letong Wang. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2022.

35. Many Sequential Iterative Algorithms Can Be Parallel and (Nearly) Work-efficient

Zheqi Shen, Zijin Wan, **Yan Gu**, and Yihan Sun. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2022.

34. PaC-trees: Supporting Parallel and Compressed Purely-Functional Collections

Laxman Dhulipala, Guy Blelloch, **Yan Gu**, and Yihan Sun. ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2022.

33. POSTER: ParGeo: A Library for Parallel Computational Geometry

Yiqiu Wang, Shangdi Yu, Laxman Dhulipala, **Yan Gu**, and Julian Shun. ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2022.

32. Analysis of Work-Stealing and Parallel Cache Complexity

Yan Gu, Zachary Napier, and Yihan Sun. ACM-SIAM Algorithmic Principles of Computer Systems (APoCS), 2022.

31. ParChain: A Framework for Parallel Hierarchical Agglomerative Clustering using Nearest-Neighbor Chain

Shangdi Yu, Yiqiu Wang, **Yan Gu**, Laxman Dhulipala, and Julian Shun. Processing of the VLDB Endowment 14(12), 2021.

30. GeoGraph: A Framework for Graph Processing on Geometric Data

Yiqiu Wang, Shangdi Yu, Laxman Dhulipala, **Yan Gu**, and Julian Shun. ACM SIGOPS Operating Systems Review, Vol. 55 Issue 1, pp. 38-46, 2021.

29. The Processing-in-Memory Model

Hongbo Kang, Phillip B. Gibbons, Guy E. Blelloch, Laxman Dhulipala, **Yan Gu**, and Charles McGuffey. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2021.

- 28. Efficient Stepping Algorithms and Implementations for Parallel Shortest Paths**
Xiaojun Dong, **Yan Gu**, and Yihan Sun, Yunming Zhang.
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2021.
arXiv:2105.06145 [cs.DS]
- 27. Fast Parallel Algorithms for Euclidean Minimum Spanning Tree and Hierarchical Spatial Clustering**
Yiqiu Wang, Shangdi Yu, **Yan Gu** and Julian Shun.
ACM International Conference on Management of Data (SIGMOD), 2021.
arXiv:2010.02379 [cs.DS]
- 26. An Experimental Study of a New Parallel Batch-Dynamic Closest Pair Data Structure**
Yiqiu Wang, Shangdi Yu, **Yan Gu** and Julian Shun.
ACM Symposium on Computational Geometry (SOCG), 2021.
arXiv:2010.02379 [cs.DS]
- 25. Parallel In-Place Algorithms: Theory and Practice**
Yan Gu, Omar Obeya, and Julian Shun.
ACM-SIAM Algorithmic Principles of Computer Systems (APoCS), 2021
arXiv:2103.01216 [cs.DC]
- 24. The Read-Only Semi-External Model**
Guy E. Blelloch, Laxman Dhulipala, Phillip B. Gibbons, **Yan Gu**, Charlie McGuffey, and Julian Shun.
ACM-SIAM Algorithmic Principles of Computer Systems (APoCS), 2021.
- 23. Optimal Parallel Algorithms in the Binary-Forking Model**
Guy E. Blelloch, Jeremy T. Fineman, **Yan Gu**, and Yihan Sun.
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2020.
Outstanding Paper Award
arXiv: 1903.04650 [cs.DS]
- 22. Randomized Incremental Convex Hull is Highly Parallel**
Guy E. Blelloch, **Yan Gu**, Julian Shun, and Yihan Sun.
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2020.
- 21. Sage: Parallel Semi-Asymmetric Graph Algorithms for NVRAMs**
Laxman Dhulipala, Charlie McGuffey, Hongbo Kang, **Yan Gu**, Guy E. Blelloch, Phillip B. Gibbons, Julian Shun.
Processing of the VLDB Endowment 13(9), 2020.
Memorable Paper Award Finalist at the Non-Volatile Memories Workshop (NVMW'20)
arXiv: 1910.12310 [cs.DS]
- 20. Theoretically-Efficient and Practical Parallel DBSCAN**
Yiqiu Wang, **Yan Gu**, Julian Shun
ACM International Conference on Management of Data (SIGMOD), 2020.
arXiv: 1912.06255 [cs.DS]
- 19. Improved Parallel Cache-Oblivious Algorithms for Dynamic Programming and Linear Algebra**

Guy E. Blelloch, and **Yan Gu**
ACM-SIAM Algorithmic Principles of Computer Systems (APoCS), 2020.
arXiv: 1809.09330 [cs.DS]

18. Algorithmic Building Blocks for Asymmetric Memories

Yan Gu, Yihan Sun and Guy E. Blelloch
European Symposium on Algorithms (ESA), 2018.
Also, arXiv:1806.10370 [cs.DS]

17. Parallel Write-efficient Algorithms and Data Structures for Computational Geometry

Guy E. Blelloch, **Yan Gu**, Julian Shun and Yihan Sun
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018.
Also, arXiv:1805.05592 [cs.DS]

16. The Parallel Persistent Memory Model

Guy E. Blelloch, Phillip B. Gibbons, **Yan Gu**, Charles McGuffey and Julian Shun
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018.
Also, arXiv:1805.05580 [cs.DS]

15. Implicit Decomposition for Write-Efficient Connectivity Algorithms

Guy E. Blelloch, Jeremy T. Fineman, Phillip B. Gibbons, **Yan Gu**, Charles McGuffey and Julian Shun
IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2018.
arXiv:1710.02637 [cs.DS]

14. Efficient Construction of Probabilistic Tree Embeddings

Guy E. Blelloch, **Yan Gu** and Yihan Sun
International Colloquium on Automata, Languages, and Programming (ICALP), 2017.
arXiv:1605.04651 [cs.DS]

13. Parallel Algorithms with Asymmetric Read and Write Costs

Naama Ben-David, Guy E. Blelloch, Jeremy T. Fineman, Phillip B. Gibbons, **Yan Gu**, Charles McGuffey and Julian Shun
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2016.

12. Parallel Shortest-paths Using Radius Stepping

Guy E. Blelloch, **Yan Gu**, Yihan Sun and Kanat Tangwongsan
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2016.
arXiv:1602.03881 [cs.DS]

11. Parallelism in Randomized Incremental Algorithms

Guy E. Blelloch, **Yan Gu**, Julian Shun and Yihan Sun
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2016.
Journal of the ACM (JACM), 67.5 (2020): 1-27.

10. Efficient Algorithms with Asymmetric Read and Write Costs

Guy E. Blelloch, Jeremy T. Fineman, Phillip B. Gibbons, **Yan Gu** and Julian Shun
European Symposium on Algorithms (ESA), 2016.
Also, arXiv:1511.01038 [cs.DS]

9. A Top-Down Parallel Semisort

Yan Gu, Julian Shun, Yihan Sun and Guy E. Blelloch
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2015.

8. Sorting with Asymmetric Read and Write Costs

Guy E. Blelloch, Jeremy T. Fineman, Phillip B. Gibbons, **Yan Gu** and Julian Shun
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2015.
Also, arXiv:1603.03505 [cs.DS]

7. Sequential Random Permutation, List Contraction and Tree Contraction are Highly Parallel

Julian Shun, **Yan Gu**, Guy E. Blelloch, Jeremy T. Fineman, Phillip B. Gibbons
ACM-SIAM Symposium on Discrete Algorithms (SODA), 2015.

6. Ray Specialized BVH Contraction

Yan Gu, Yong He and Guy E. Blelloch
Pacific Graphics 2015. Computer Graphics Forum 34(7), 309-318.

5. Extending the Graphics Pipeline with Adaptive, Multi-Rate Shading

Yong He, **Yan Gu** and Kayvon Fatahalian
SIGGRAPH 2014. ACM Trans. Graph. 33, 4, Article 142 (2014)

4. Efficient BVH Construction via Approximate Agglomerative Clustering

Yan Gu, Yong He, Kayvon Fatahalian and Guy E. Blelloch
High Performance Graphics 2013.

3. Mixed-Domain Edge-Aware Image Manipulation

Xian-Ying Li, **Yan Gu** and Shi-Min Hu
IEEE Trans. on Image Processing (TIP), 2013, 22(5), pp. 1915-1925.

2. Algorithms on Moving Sensors for Barrier Coverage of a Line Segment and a Simple Circle

Danny Z. Chen, **Yan Gu**, Jian Li and Haitao Wang
SWAT 2012. Discrete & Computational Geometry, 2013, 50(2), pp. 374-408.

1. A Geometric Study of V-style Pop-ups: Theories and Algorithms

Xian-Ying Li, Tao Ju, **Yan Gu**, and Shi-Min Hu
SIGGRAPH 2011. ACM Trans. on Graph. 30, 4, Article 98 (2011).

Grants (more than \$50k)

Google Research Scholar (Efficient Parallel Algorithms for Graph Mining)

- Period: 04/01/2024 – 03/31/2025
- Total amount: \$60,000

CAREER: Efficient Algorithms for Modern Computer Architecture (CCF- 2339310)

- Period: 04/01/2024 – 03/31/2029
- Total amount: \$588,795

AF: Small: New Directions for Parallel Data Structures (CCF-2103483, co-PI)

- PI: Yihan Sun.
- Period: 07/15/2021 – 06/30/2024
- Total amount: \$515,749

Advising

Ph.D. students:

- Xiangyun Ding (co-advised with Yihan Sun)
- Xiaojun Dong (co-advised with Yihan Sun)
- Bo Huang (co-advised with Ahmed Eldawy)
- Zheqi Shen
- Zijin Wan
- Letong Wang (co-advised with Yihan Sun)

Undergraduate students:

- Andy Licheng Li
- Thomax Maxwell Li

Previous students:

- Yuta Nakamura
- Zachary Napier
- Zijin Wan

Ph.D. Dissertation Committees:

- Jinyang Liu (chaired by Zizhong Chen)

Ph.D. Qualifying Committees:

- Jinyang Liu (chaired by Zizhong Chen)
- Zizhe Jian (chaired by Zizhong Chen)

Master's Thesis Committees:

- Vineeth Suvarna (chaired by Zizhong Chen)
- Jordan Kushner (chaired by Marek Chrobak)

Master's Project Committees:

- Alireza Abdoli (chaired by Eamonn Koege)
- Siddharth Shenoy (chaired by Amr Magdy)

Professional Services

UCR Internal

- Student Life Committee, since 2021
- Graduate Student Admission, 2021
- Advisor for the Competitive Coding Club at UCR, since 2021
- Committee for Outreach, Alumni & Careers, since 2022

General Chair for ACM Principles and Practice of Parallel Programming, External (PPoPP) 2025

Publicity Chair for ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), from July 2019

Workshop/Tutorial Chair for ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), from July 2019

Program Committee:

- European Symposium on Algorithms (ESA), Track-B, 2024
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2024
- ACM Principles and Practice of Parallel Programming, External (PPoPP) 2024
- SIAM Symposium on Algorithm Engineering and Experiments (ALENEX) 2024
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2023
- Symposium on Experimental Algorithms (SEA), 2023
- ACM-SIAM Algorithmic Principles of Computer Systems (APoCS) 2023
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2022
- ACM-SIAM Algorithmic Principles of Computer Systems (APoCS) 2022
- ACM Principles and Practice of Parallel Programming, External (PPoPP) 2022
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2020
- IEEE International Parallel & Distributed Processing Symposium (IPDPS) 2020
- ACM-SIAM Algorithmic Principles of Computer Systems (APoCS) 2020
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2019
- IEEE International Parallel & Distributed Processing Symposium (IPDPS) 2019
- Workshop on Advances in Parallel and Distributed Computational Models (APDCM) in IPDPS 2019
- Big Graph Processing (BGP) in ICDCS 2017

Conference reviewer:

SPAA, PPoPP, SODA, FOCS, STOC, ICALP, ESA, IPDPS, SIGMETRIC, ALENEX, SEA, PACT, Euro-Par, SIGGRAPH, Eurographics, Pacific Graphics, High performance Graphics, Fun with algorithms

Journal reviewer:

- TOPC (ACM Transactions on Parallel Computing)
- Parallel Computing
- IJNC (International Journal of Networking and Computing)
- TVCG (IEEE Transactions on Visualization and Computer Graphics)
- Journal of Experimental Algorithmics (JEA)
- Information Processing Letters (IPL)
- PeerJ Computer Science Journal
- CAG (Computers & Graphics)
- JCGT (Journal of Computer Graphics Techniques)
- The Visual Computer
- JOCO (Journal of Combinatorial Optimization)
- Astronomy and Computing
- Transactions on Computers
- International Journal of Parallel Programming

Teaching and Coaching

CS 218: Design and Analysis of Algorithms (Spring 2025)

CS 119L: Algorithmic Programming and Problem Solving (Winter 2025)

CS 119L: Algorithmic Programming and Problem Solving (Fall 2024)

CS 141: Intermediate Data Structures and Algorithms (Fall 2024)

CS 119L: Algorithmic Programming and Problem Solving (Spring 2024)

CS 218: Design and Analysis of Algorithms (Winter 2024)

CS 119L: Algorithmic Programming and Problem Solving (Winter 2024)

CS 219: Advanced Algorithms (Fall 2023)

- Overall: 5.00/5, Effectiveness: 5.00/5

CS 190: Algorithmic Programming and Problem Solving (Fall 2023)

CS 190: Algorithmic Programming and Problem Solving (Spring 2023)

CS 214: Parallel Algorithms (Winter 2023)

- Overall: 4.76/5, Effectiveness: 4.82/5

CS 141: Intermediate Data Structures and Algorithms (Fall 2022, UC-wide strike)

- Overall: 3.87/5, Effectiveness: 4.03/5

CS 218: Design and Analysis of Algorithms (Fall 2022, UC-wide strike)

- Overall: 4.58/5, Effectiveness: 4.58/5

CS 219: Advanced Algorithms (Spring 2022, first offering)

- Overall: 4.67/5, Effectiveness: 4.33/5

CS 142: Algorithm Engineering (Winter 2022)

- Overall: 4.86/5, Effectiveness: 5/5

CS 141: Intermediate Data Structures and Algorithms (Fall 2021, hybrid quarter)

- Overall: 3.99/5, Effectiveness: 4.07/5

CS 218: Design and Analysis of Algorithms (Spring 2021)

- Overall: 4.55/5, Effectiveness: 4.73/5

CS 142: Algorithm Engineering (Winter 2021, first offering)

- Overall: 4.50/5, Effectiveness: 4.67/5

CS 141: Intermediate Data Structures and Algorithms (Fall 2020)

- Overall: 4.00/5, Effectiveness: 4.15/5

CS 260: Algorithm Engineering (aka. How to Write Fast Code) (Spring 2020)

- Overall: 4.80/5, Effectiveness: 4.80/5

Coach for UCR programming team since 2021, assistant Coach for CMU programming team (Jul. 2013 – Aug. 2015), and programming team of Beijing Institute of Technology (Jan. 2010 – Aug. 2010)

- **Highlights of the coached teams:**

- UC Riverside since 2021:

- Ranked 8th at the 2023 Southern California (SoCal) Regional, advanced to the North American Championship (NAC) for the first time (top 4 schools in this region, together with UCLA, UCI, and UCSD)
- 4 teams in the top 30 in 2022 & 2023 Southern California (SoCal) Regional
- Carnegie Mellon University 2013 – 2015:
 - 3 teams in the top 5 at the 2014 East Central North America (ECNA) regional
 - Champion, and 5 teams in the top 10 at the 2013 East Central North America (ECNA) regional
 - 15th at the 2015 World Final
- Beijing Institute of Technology 2010:
 - 7th place (Gold Medal) at the 2010 Asia Regional at Hangzhou, the first Gold Medal in school history