
Employment

- July 2024 - **Associate Professor With Tenure in Electrical Engineering and Computer Science**, *Massachusetts Institute of Technology*, Cambridge, MA
Current
- July 2021 - **Associate Professor Without Tenure in Electrical Engineering and Computer Science**, *Massachusetts Institute of Technology*, Cambridge, MA
June 2024
- July 2018 - **Douglas T. Ross Career Development Professorship of Software Technology**,
June 2021 *Massachusetts Institute of Technology*, Cambridge, MA
- Sept 2017 - **Assistant Professor in Electrical Engineering and Computer Science**, *Massachusetts Institute of Technology*, Cambridge, MA
June 2021
- Aug 2015 - **Miller Postdoctoral Research Fellow**, *University of California, Berkeley*, Berkeley, CA
Aug 2017

Education

- Aug 2009 - **Ph.D. in Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA
May 2015 Thesis: Shared-Memory Parallelism Can Be Simple, Fast, and Scalable
Advisor: Guy Blelloch
Received the ACM Doctoral Dissertation Award
Received the CMU SCS Doctoral Dissertation Award
- Aug 2009 - **M.S. in Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA
Aug 2012
- Aug 2004 - **B.A. in Computer Science**, *University of California, Berkeley*, Berkeley, CA
May 2008 GPA: 3.98/4.0
Ranked 1st in the 2008 graduating class of Computer Science with over 100 students

Awards

- 2023 ACM Paris Kanellakis Theory and Practice Award
- 2023 Allen Newell Award for Research Excellence
- 2022 Best Paper Award at the *ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2022*
- 2021 Google Research Scholar Award
- 2021 Best Paper Award at the *Proceedings of the International Symposium on Code Generation and Optimization (CGO), 2021*
- 2021 ACM SIGMOD Research Highlight Award
- 2020 SoE Ruth and Joel Spira Award for Excellence in Teaching
- 2020 Google Faculty Research Award
- 2019 Distinguished Paper Award at the *ACM SIGPLAN Symposium on Programming Language Design and Implementation (PLDI), 2019*
- 2019 NSF CAREER Award
- 2019 Finalist for Microsoft Research Faculty Fellowship

- 2018 Best Paper Award at the *ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018*
- 2018 DOE Early Career Award
- 2015–2017 Miller Research Fellowship (UC Berkeley)
- 2015 ACM Doctoral Dissertation Award
- 2015 CMU SCS Doctoral Dissertation Award
- 2015 Capocelli Prize for Best Student Paper at the *IEEE Data Compression Conference (DCC), 2015*
- 2013–2014 Facebook Graduate Fellowship
- 2008 UC Berkeley Highest Achievement Award in Computer Science for graduating 1st in the 2008 graduating class of over 100 students

Publications

- [1] Joshua Engels, Benjamin Landrum, Shangdi Yu, Laxman Dhulipala, and Julian Shun. Approximate Nearest Neighbor Search with Window Filters. *Proceedings of the International Conference on Machine Learning (ICML), 2024.*
- [2] Jessica Shi, Laxman Dhulipala, and Julian Shun. Parallel Algorithms for Hierarchical Nucleus Decomposition. *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD), 2024.*
- [3] Quanquan Liu, Julian Shun, and Igor Zablotchi. Parallel k -core Decomposition with Batched Updates and Asynchronous Reads. *Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), pp. 286–300, 2024.*
- [4] Pattara Sukprasert, Quanquan Liu, Laxman Dhulipala, and Julian Shun. Practical Parallel Algorithms for Near-Optimal Densest Subgraphs on Massive Graphs. *Proceedings of the SIAM Meeting on Algorithm Engineering and Experiments (ALENEX), pp. 59–73, 2024.*
- [5] Zhi Wei Gan, Grace Cai, Noble Harasha, Nancy Lynch, and Julian Shun. ParSwarm: A C++ Framework for Evaluating Distributed Algorithms for Robot Swarms. *Proceedings of the Workshop on Advanced Tools, Programming Languages, and Platforms for Implementing and Evaluating Algorithms for Distributed Systems (ApPLIED), Article No. 14, pp. 1–5, 2023.*
- [6] Yihao Huang, Shangdi Yu, and Julian Shun. Faster Parallel Exact Density-Peak Clustering. *Proceedings of the SIAM Conference on Applied and Computational Discrete Algorithms (ACDA), pp. 49–62, 2023.*
- [7] Shangdi Yu and Julian Shun. Parallel Filtered Graphs for Hierarchical Clustering. *Proceedings of the IEEE International Conference on Data Engineering (ICDE), pp. 1967–1980, 2023.*
- [8] Yihao Huang, Claire Wang, Jessica Shi, and Julian Shun. Efficient Algorithms for Parallel Bi-core Decomposition. *Proceedings of the SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS), pp. 17–32, 2023.*
- [9] Jessica Shi, Louisa Huang, and Julian Shun. Parallel Five-Cycle Counting Algorithms. *ACM Journal of Experimental Algorithmics (JEA), Vol. 27, Article No. 4:1, pp. 1–23, 2022. Special Issue of SEA 2021.*

- [10] Laxman Dhulipala, Quanquan Liu, Sofya Raskhodnikova, Jessica Shi, Julian Shun, and Shangdi Yu. Differential Privacy from Locally Adjustable Graph Algorithms: k -Core Decomposition, Low Outdegree Ordering, and Densest Subgraphs. *Proceedings of the IEEE Symposium on Foundations of Computer Science (FOCS)*, pp. 754–765, 2022.
- [11] Yiqiu Wang, Rahul Yesantharao, Shangdi Yu, Laxman Dhulipala, Yan Gu, and Julian Shun. ParGeo: A Library for Parallel Computational Geometry. *Proceedings of the European Symposium on Algorithms (ESA)*, pp. 88:1–88:19, 2022.
- [12] Jessica Shi and Julian Shun. Parallel Algorithms for Butterfly Computations. *Massive Graph Analytics*, pp. 287–330, 2022. (Earlier version appears in APOCS 2020.)
- [13] Quanquan Liu, Jessica Shi, Shangdi Yu, Laxman Dhulipala, and Julian Shun. Parallel Batch-Dynamic Algorithms for k -Core Decomposition and Related Graph Problems. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 191–204, 2022. **Best Paper Award.**
- [14] Tom Tseng, Laxman Dhulipala, and Julian Shun. Parallel Batch-Dynamic Minimum Spanning Forest and the Efficiency of Dynamic Agglomerative Graph Clustering. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 233–245, 2022.
- [15] Jessica Shi, Laxman Dhulipala, and Julian Shun. Theoretically and Practically Efficient Parallel Nucleus Decomposition. *Proceedings of the VLDB Endowment*, 15(3), pp. 583–596, 2022.
- [16] Shangdi Yu, Yiqiu Wang, Yan Gu, Laxman Dhulipala, and Julian Shun. ParChain: A Framework for Parallel Hierarchical Agglomerative Clustering using Nearest-Neighbor Chain. *Proceedings of the VLDB Endowment*, 15(2), pp. 285–298, 2022.
- [17] Siddhartha Jayanti and Julian Shun. Fast Arrays: Atomic Arrays with Constant Time Initialization. *Proceedings of the International Symposium on Distributed Computing (DISC)*, pp. 25:1–25:19, 2021.
- [18] Yiqiu Wang, Shangdi Yu, Laxman Dhulipala, Yan Gu, and Julian Shun. GeoGraph: A Framework for Graph Processing on Geometric Data. *ACM SIGOPS Operating Systems Review*, Vol. 55 Issue 1, pp. 38–46, 2021.
- [19] Jessica Shi, Laxman Dhulipala, and Julian Shun. Parallel Clique Counting and Peeling Algorithms. *Proceedings of the SIAM Conference on Applied and Computational Discrete Algorithms (ACDA)*, pp. 135–146, 2021.
- [20] Ajay Brahmakshatriya, Emily Furst, Victor Ying, Claire Hsu, Changwan Hong, Max Rutenberg, Yunming Zhang, Tommy Jung, Dustin Richmond, Michael Taylor, Julian Shun, Mark Oskin, Daniel Sanchez, and Saman Amarasinghe. Taming the Zoo: A Unified Graph Compiler Framework for Novel Architectures. *Proceedings of the IEEE/ACM International Symposium on Computer Architecture (ISCA)*, pp. 429–442, 2021.
- [21] Louisa Huang, Jessica Shi, and Julian Shun. Parallel Five-Cycle Counting Algorithms. *Proceedings of the International Symposium on Experimental Algorithms (SEA)*, pp. 2:1–2:18, 2021. **Invited to Special Issue.**
- [22] Yiqiu Wang, Shangdi Yu, Yan Gu, and Julian Shun. A Parallel Batch-Dynamic Data Structure for the Closest Pair Problem. *Proceedings of the International Symposium on Computational Geometry (SoCG)*, pp. 60:1–60:16, 2021.

- [23] Yiqiu Wang, Shangdi Yu, Yan Gu, and Julian Shun. Fast Parallel Algorithms for Euclidean Minimum Spanning Tree and Hierarchical Spatial Clustering. *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD)*, pp. 1982–1995, 2021.
- [24] Tom Tseng, Laxman Dhulipala, and Julian Shun. Parallel Index-Based Structural Graph Clustering and Its Approximation. *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD)*, pp. 1851–1864, 2021.
- [25] Ajay Brahmakshatriya, Yunming Zhang, Changwan Hong, Shoaib Kamil, Julian Shun, and Saman Amarasinghe. Compiling Graph Applications for GPUs with GraphIt. *Proceedings of the International Symposium on Code Generation and Optimization (CGO)*, pp. 55–69, 2021. **Best Paper Award.**
- [26] Laxman Dhulipala, Quanquan Liu, Julian Shun, and Shangdi Yu. Parallel Batch-Dynamic k -Clique Counting. *Proceedings of the SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS)*, pp. 129–143, 2021.
- [27] Yan Gu, Omar Obeya, and Julian Shun. Parallel In-Place Algorithms: Theory and Practice. *Proceedings of the SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS)*, pp. 114–128, 2021.
- [28] Guy Blelloch, Laxman Dhulipala, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. The Read-Only Semi-External Model. *Proceedings of the SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS)*, pp. 70–84, 2021.
- [29] Laxman Dhulipala, Guy Blelloch, and Julian Shun. Theoretically Efficient Parallel Graph Algorithms Can Be Fast and Scalable. *ACM Transactions on Parallel Computing (TOPC)*, Vol. 8 Issue 1, Article No. 4, 2021. **Special Issue of SPAA 2018.**
- [30] Erfan Zamanian, Julian Shun, Carsten Binnig, and Tim Kraska. Chiller: Contention-centric Transaction Execution and Data Partitioning for Modern Networks. *ACM SIGMOD Record*, Vol. 50 Issue 1, pp. 15–22, 2021. **2021 ACM SIGMOD Research Highlight Award.** (Earlier and longer version appears in SIGMOD 2020.)
- [31] Changwan Hong, Laxman Dhulipala, and Julian Shun. Exploring the Design Space of Static and Incremental Graph Connectivity Algorithms on GPUs. *Proceedings of the International Conference on Parallel Architectures and Compilation Techniques (PACT)*, pp. 55–69, 2020.
- [32] Laxman Dhulipala, Changwan Hong, and Julian Shun. ConnectIt: A Framework for Static and Incremental Parallel Graph Connectivity Algorithms. *Proceedings of the VLDB Endowment*, 14(4), pp. 653–667, 2020.
- [33] Laxman Dhulipala, Charles McGuffey, Hongbo Kang, Yan Gu, Guy Blelloch, Phillip Gibbons, and Julian Shun. Sage: Parallel Semi-Asymmetric Graph Algorithms for NVRAMs. *Proceedings of the VLDB Endowment*, 13(9), pp. 1598–1613, 2020.
- [34] Guy Blelloch, Yan Gu, Julian Shun, and Yihan Sun. Randomized Incremental Convex Hull is Highly Parallel. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 103–115, 2020.
- [35] Erfan Zamanian, Julian Shun, Carsten Binnig, and Tim Kraska. Chiller: Contention-centric Transaction Execution and Data Partitioning for Modern Networks. *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD)*, pp. 511–526, 2020. **Invited to Best of SIGMOD 2020.**

- [36] Yiqiu Wang, Yan Gu, and Julian Shun. Theoretically-Efficient and Practical Parallel DBSCAN. *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD)*, pp. 2555–2571, 2020.
- [37] Laxman Dhulipala, Jessica Shi, Tom Tseng, Guy Blelloch, and Julian Shun. The Graph Based Benchmark Suite (GBBS). *Proceedings of the Joint Workshop on Graph Data Management Experiences & Systems (GRADES) and Network Data Analytics (NDA)*, pp. 1–8, 2020.
- [38] Joana M. F. da Trindade, Konstantinos Karanasos, Carlo Curino, Samuel Madden, Julian Shun. Kaskade: Graph Views for Efficient Graph Analytics. *Proceedings of the IEEE International Conference on Data Engineering (ICDE)*, pp. 193–204, 2020.
- [39] Julian Shun. Practical Parallel Hypergraph Algorithms. *Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pp. 232–249, 2020.
- [40] Yunming Zhang, Ajay Brahmakshatriya, Xinyi Chen, Laxman Dhulipala, Shoaib Kamil, Saman Amarasinghe, and Julian Shun. Optimizing Ordered Graph Algorithms with GraphIt. *Proceedings of the International Symposium on Code Generation and Optimization (CGO)*, pp. 157–170, 2020.
- [41] Jessica Shi and Julian Shun. Parallel Algorithms for Butterfly Computations. *Proceedings of the SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS)*, pp. 16–30, 2020.
- [42] Julian Shun. Improved Parallel Construction of Wavelet Trees and Rank/Select Structures. *Information and Computation*, 2020. **Special Issue of DCC 2017–2018.**
- [43] Guy Blelloch, Yan Gu, Julian Shun, and Yihan Sun. Parallelism in Randomized Incremental Algorithms. *Journal of the ACM*, Vol. 67 Issue 5, Article No. 27, 2020. (Earlier version appears in SPAA 2016.)
- [44] Laxman Dhulipala, Guy Blelloch, and Julian Shun. Low-Latency Graph Streaming Using Compressed Purely-Functional Trees. *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, pp. 918–934, 2019. **Distinguished Paper Award.**
- [45] Omar Obeya, Endrias Kahssay, Edward Fan, and Julian Shun. Theoretically-Efficient and Practical Parallel In-Place Radix Sorting. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 213–224, 2019. **Invited to Special Issue.**
- [46] Yu Xia, Xiangyao Yu, William Moses, Julian Shun, and Srinivas Devadas. LiTM: A Lightweight Deterministic Software Transactional Memory System. *Proceedings of the International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM)*, pp. 1–10, 2019. Invited to Special Issue.
- [47] Yunming Zhang, Mengjiao Yang, Riyadh Baghdadi, Shoaib Kamil, Julian Shun, and Saman Amarasinghe. GraphIt: A High-Performance Graph DSL. *Proceedings of Object-Oriented Programming, Systems, Languages & Applications (OOPSLA)*, pp. 121:1–121:30, 2018.
- [48] Laxman Dhulipala, Guy Blelloch, and Julian Shun. Theoretically Efficient Parallel Graph Algorithms Can Be Fast and Scalable. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 393–404, 2018. **Best Paper Award. Invited to Special Issue.**

- [49] Guy Blelloch, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. The Parallel Persistent Memory Model. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 247–258, 2018.
- [50] Guy Blelloch, Yan Gu, Julian Shun, and Yihan Sun. Parallel Write-Efficient Algorithms and Data Structures for Computational Geometry. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 235–246, 2018.
- [51] Naama Ben-David, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. Implicit Decomposition for Write-Efficient Connectivity Algorithms. *Proceedings of IEEE International Parallel and Distributed Symposium (IPDPS)*, pp. 711–722, 2018.
- [52] Kimon Fountoulakis, Farbod Roosta-Khorasani, Julian Shun, Xiang Cheng, and Michael Mahoney. Variational Perspective on Local Graph Clustering. *Mathematical Programming, Series B*, Vol. 17, pp. 553–573, 2017.
- [53] Julian Labeit, Julian Shun, and Guy Blelloch. Parallel lightweight wavelet tree, suffix array and FM-index construction. *Journal of Discrete Algorithms*, Vol. 43, pp. 2–17, 2017. **Special Issue of DCC 2016.**
- [54] Laxman Dhulipala, Guy Blelloch, and Julian Shun. Julienne: A Framework for Parallel Graph Algorithms using Work-efficient Bucketing. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 293–304, 2017.
- [55] Julian Shun. Improved Parallel Construction of Wavelet Trees and Rank/Select Structures. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 92–101, 2017. (Journal version in *Information and Computation*, 2020).
- [56] Julian Shun, Farbod Roosta-Khorasani, Kimon Fountoulakis, and Michael Mahoney. Parallel Local Graph Clustering. *Proceedings of the VLDB Endowment*, 9(12), pp. 1041–1052, 2016.
- [57] Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, and Julian Shun. Efficient Algorithms with Asymmetric Read and Write Costs. *Proceedings of the European Symposium on Algorithms (ESA)*, pp. 14:1–14:18, 2016.
- [58] Guy Blelloch, Yan Gu, Julian Shun, and Yihan Sun. Parallelism in Randomized Incremental Algorithms. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 467–478, 2016.
- [59] Naama Ben-David, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. Parallel Algorithms for Asymmetric Read-Write Costs. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 145–156, 2016.
- [60] Julian Labeit, Julian Shun, and Guy Blelloch. Parallel Lightweight Wavelet Tree, Suffix Array and FM-Index Construction. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 33–42, 2016. (Journal version in *Journal of Discrete Algorithms*, 2017).
- [61] Niklas Baumstark, Guy Blelloch, and Julian Shun. Efficient Implementation of a Synchronous Parallel Push-Relabel Algorithm. *Proceedings of the European Symposium on Algorithms (ESA)*, pp. 106–117, 2015.
- [62] Julian Shun. An Evaluation of Parallel Eccentricity Estimation Algorithms on Undirected Real-World Graphs. *Proceedings of the ACM Conference on Knowledge Discovery and Data Mining (KDD)*, pp. 1095–1104, 2015.

- [63] Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, and Julian Shun. Sorting with Asymmetric Read and Write Costs. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 1–12, 2015.
- [64] Yan Gu, Julian Shun, Yihan Sun and Guy Blelloch. A Top-Down Parallel Semisort. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 24–34, 2015.
- [65] Julian Shun and Kanat Tangwongsan. Multicore Triangle Computations Without Tuning. *Proceedings of the IEEE International Conference on Data Engineering (ICDE)*, pp. 149–160, 2015.
- [66] Julian Shun, Laxman Dhulipala, and Guy Blelloch. Smaller and Faster: Parallel Processing of Compressed Graphs with Ligra+. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 403–412, 2015.
- [67] Julian Shun. Parallel Wavelet Tree Construction. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 63–72, 2015. **Capocelli Prize for Best Student Paper.**
- [68] Julian Shun, Yan Gu, Guy Blelloch, Jeremy Fineman, and Phillip Gibbons. Sequential Random Permutation, List Contraction and Tree Contraction are Highly Parallel. *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pp. 431–448, 2015.
- [69] Julian Shun and Guy Blelloch. A Simple Parallel Cartesian Tree Algorithm and its Application to Parallel Suffix Tree Construction, *ACM Transactions on Parallel Computing (TOPC)*, Vol. 1 Issue 1, Article No. 8, 2014. (Earlier version appears in ALENEX 2011.)
- [70] Julian Shun. Fast Parallel Computation of Longest Common Prefixes. *Proceedings of the ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, pp. 387–398, 2014.
- [71] Julian Shun and Guy Blelloch. Phase-concurrent Hash Tables for Determinism. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 96–107, 2014.
- [72] Julian Shun, Laxman Dhulipala, and Guy Blelloch. A Simple and Practical Linear-Work Parallel Algorithm for Connectivity. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 143–153, 2014.
- [73] Aapo Kyrola, Julian Shun, and Guy Blelloch. Beyond Synchronous: New Techniques for External Memory Graph Algorithms. *Proceedings of the International Symposium on Experimental Algorithms (SEA)*, pp. 123–137, 2014.
- [74] Julian Shun, Guy Blelloch, Jeremy Fineman, and Phillip Gibbons. Reducing Contention Through Priority Updates. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 152–163, 2013.
- [75] Julian Shun and Fuyao Zhao (joint first author). Practical Parallel Lempel-Ziv Factorization. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 123–132, 2013.
- [76] Julian Shun and Guy Blelloch. Ligra: A Lightweight Graph Processing Framework for Shared Memory. *Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pp. 135–146, 2013.

- [77] Guy Blelloch, Jeremy Fineman, and Julian Shun. Greedy Sequential Maximal Independent Set and Matching are Parallel on Average, *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 308–317, 2012.
- [78] Julian Shun, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Aapo Kyrola, Harsha Vardhan Simhadri, and Kanat Tangwongsan. Brief Announcement: The Problem Based Benchmark Suite, *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 68–70, 2012.
- [79] Guy Blelloch, Jeremy Fineman, Phillip Gibbons, and Julian Shun. Internally Deterministic Parallel Algorithms Can Be Fast, *Proceedings of the ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pp. 181–192, 2012.
- [80] Guy Blelloch and Julian Shun. A Simple Parallel Cartesian Tree Algorithm and its Application to Suffix Tree Construction, *Proceedings of the SIAM Meeting on Algorithm Engineering and Experiments (ALENEX)*, pp. 48–58, 2011. (Journal version in *ACM Transactions on Parallel Computing*, 2014.)
- [81] David Aldous and Julian Shun. Connected Spatial Networks over Random Points and a Route-Length Statistic, *Statistical Science*, Vol. 25, No. 3, pp. 275–288, 2010.

Books

Julian Shun. Shared-Memory Parallelism Can Be Simple, Fast, and Scalable. *Association for Computing Machinery and Morgan & Claypool*, 2017.

Advising

Postdoctoral Researchers

Changwan Hong (co-advised with Saman Amarasinghe)

Yuanhao Wei

Ph.D. Students

Junhong Lin

Sylvia Zhang (co-advised with Mike Cafarella)

M.Eng. Students

Sam Mitchell

Undergraduate Students

Younghun Roh

High School Students (MIT PRIMES)

Aidan Gao

Alumni

Postdoc

Laxman Dhulipala (now faculty member at University of Maryland)

Yan Gu (now faculty member at UC Riverside)

Quanquan Liu (now faculty member at Yale)

PhD

Siddhartha Jayanti (now at Google Research)

Quanquan Liu (co-advised with Erik Demaine; now faculty member at Yale)

Jessica Shi (now at D. E. Shaw)

Yiqiu Wang (now at Apple)

Shangdi Yu (now at Meta)

Master's, Undergraduate, and High School

Sabiyyah Ali (undergraduate)

Aruzhan Amanbayeva (undergraduate)

Sualeh Asif (undergraduate)

Terryn Brunelle (undergraduate, M.Eng.)

Omer Cerrahoglu (undergraduate)

Dev Chheda (undergraduate)

Alexander Ding (MIT PRIMES)

Edward Fan (undergraduate)

Ho Tin Fan (MIT PRIMES)

Zhi Wei Gan (undergraduate)

Amy Hu (undergraduate, M.Eng.)

Louisa Huang (M.Eng.)

Michael Huang (MIT PRIMES)

Endrias Kahssay (undergraduate, M.Eng.)

Yifan Kang (MIT PRIMES)

Mihir Khambete (undergraduate)

Alvin Lu (MIT PRIMES)

Jamison Meindl (undergraduate)

Omar Obeya (undergraduate, M.Eng.)

Isabelle Quaye (undergraduate)

Steven Raphael (undergraduate)

Bristy Sikder (undergraduate)

Mengyuan Sun (M.Eng., co-advised with Sam Madden)

Tom Tseng (S.M.)

Pranali Vani (undergraduate)

Claire Wang (MIT PRIMES)

Alek Westover (undergraduate)

Daniel Wisdom (undergraduate)

Mengjiao Yang (M.Eng.)

Rahul Yesantharao (M.Eng.)

Shuaicheng Zhang (visiting student)

Yiwei Zhao (visiting student)

Ph.D. Thesis Committee Member

Daniel Anderson (CMU)
Roberto Carrasco (University of Chile)
Stephen Chou (MIT)
Joana M. F. da Trindade (MIT)
Laxman Dhulipala (CMU)
Yan Gu (CMU)
Tim Kaler (MIT)
Justin Kopinsky (MIT)
Tobias Maier (KIT)
Charles McGuffey (CMU)
Pattara Sukprasert (Northwestern)
Helen Xu (MIT)
Yunming Zhang (MIT)

Professional Service

MIT Internal

- EECS Ph.D. Admissions Committee, 2017–Current
- EECS Undergraduate Advisor, 2018–Current
- EECS Graduate Advisor, 2019–Current
- EECS Rising Stars Reviewer, 2020
- EECS Sprows Dissertation Award Committee, 2018
- Research Qualifying Exam (RQE) Committee: Helen Xu, Rio LaVigne, Yilun Zhou, Tim Kaler, Wengong Jin, Peter Li, Jessica Ray, Jialin Ding, Yinzhan Xu, Shyan Akmal, Amartya Shankha Biswas, Sandeep Silwal, Tianhao Huang

Organization

- Co-organizer, Algorithmic Opportunities in the Modern LLM Revolution (STOC Workshop), 2024
- Co-organizer, Simons Institute Workshop on Dynamic Graphs and Algorithm Design, 2023
- Lead Organizer, MIT Fast Code Seminar, 2019–Current
- Co-organizer, SIAM ACDA Online Seminar Series, 2021–Current

Program Committee Chair

- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2023
- SIAM Symposium on Algorithm Engineering and Experiments (ALENEX), 2023 (co-chair)
- High Performance Graph Data Management and Processing Workshop (HPGDMP), 2016 (co-chair)

Steering Committee

- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2023–Current
- SIAM Symposium on Algorithm Engineering and Experiments (ALENEX), 2023–Current

Editorial Board

- Associate Editor, ACM Transactions on Parallel Computing (TOPC), 2018–Current
- Co-Editor, ACM TOPC Special Issue of SPAA 2021
- Reproducibility Referee, ACM Journal of Experimental Algorithmics (JEA), 2019–2023

Publicity Chair

- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2019–2023

Program Committee Member

- IEEE High Performance Extreme Computing (HPEC), 2024
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2024
- Highlights of Parallel Computing (HOPC), 2024
- SIAM Symposium on Simplicity in Algorithms (SOSA), 2024
- IEEE High Performance Extreme Computing (HPEC), 2023
- SIAM Conference on Applied and Computational Discrete Algorithms (ACDA), 2023
- ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2023
- Workshop on Irregular Applications: Architectures and Algorithms (IA³), 2022
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2022
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2022
- International Symposium on Experimental Algorithms (SEA), 2022
- ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2022
- SIAM Symposium on Algorithm Engineering and Experiments (ALENEX), 2022
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2021
- IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2021
- IEEE International Conference on Distributed Computing Systems (ICDCS), 2021
- International Workshop on Graph Data Management Experiences & Systems and Network Data Analytics (GRADES-NDA), 2021
- SIAM Conference on Applied and Computational Discrete Algorithms (ACDA), 2021
- ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2021
- SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS), 2021
- International European Conference on Parallel and Distributed Computing (Euro-Par), 2020
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2020
- ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2020 (External Review Committee)
- ACM SIGMETRICS, 2020
- International Workshop on Graph Data Management Experiences & Systems and Network Data Analytics (GRADES-NDA), 2020
- European Symposium on Algorithms (ESA), 2019
- IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2019
- ACM SIGMETRICS, 2019
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018
- International Symposium on String Processing and Information Retrieval (SPIRE), 2018
- ACM SIGMETRICS, 2018
- ACM SIGMOD, 2018
- IEEE International Conference on High Performance Computing (HiPC), 2017
- High Performance Graph Data Mining and Machine Learning Workshop (HPGDML), 2017
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2016
- ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2016 (External Review Committee)
- High Performance Graph Processing Workshop (HPGP), 2016
- IEEE International Conference on Cloud and Big Data Computing (CBDCOM), 2016
- IEEE International Conference on High Performance Computing (HiPC), 2016
- Conference on Neural Information Processing Systems (NIPS), 2016

Grant Review Panelist

National Science Foundation (NSF) 2019 and 2024, Department of Energy (DOE) 2019–2022

Journal Reviewer

TACO 2014, TALG 2014, JPDC 2014, TOPC 2014, TPDS 2015, TOPC 2015, TOPC 2016, JEA 2016, TOPC 2017, TALG 2018, TOCS 2018, TSC 2018, VLDBJ 2018, TOPC 2018, TOPC 2019, JEA 2020

Conference Reviewer

DCC 2013, Euro-Par 2013, ALENEX 2015, SPAA 2015, SODA 2016, ICDE 2016, ICPP 2016, OSDI 2016, PPOPP 2017, IPDPS 2017, DCC 2017, DISC 2017, PPOPP 2018, LATIN 2018, Euro-Par 2018, ESA 2018, PACT 2019, OOPSLA 2020, SODA 2021, PODC 2021, PPOPP 2024

Teaching Experience

- Spring 2024 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.506: Algorithm Engineering
- Fall 2023 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.122: Design and Analysis of Algorithms
- Spring 2023 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.506: Algorithm Engineering
- Spring 2022 **Instructor**, *MIT*, Cambridge, MA
Instructor for 6.827: Algorithm Engineering
- Fall 2021 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.006: Introduction to Algorithms
- Spring 2021 **Instructor**, *MIT*, Cambridge, MA
Instructor for 6.886: Algorithm Engineering
- Fall 2020 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.006: Introduction to Algorithms
- Spring 2020 **Instructor**, *MIT*, Cambridge, MA
Instructor for 6.886: Algorithm Engineering
- Fall 2019 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.006: Introduction to Algorithms
- Spring 2019 **Instructor**, *MIT*, Cambridge, MA
Instructor for 6.886: Algorithm Engineering
- Fall 2018 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.172: Performance Engineering of Software Systems
- Spring 2018 **Instructor**, *MIT*, Cambridge, MA
Instructor for 6.886: Graph Analytics
- Fall 2017 **Co-Instructor**, *MIT*, Cambridge, MA
Co-Instructor for 6.172/6.871: Performance Engineering of Software Systems
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- Aug 2023 **Instructor**, *MIT Professional Education*
Instructor for Graph Algorithms and Machine Learning
- Aug 2022 **Instructor**, *MIT Professional Education*
Instructor for Graph Algorithms and Machine Learning
- Summer 2021 **Instructor**, *Pioneer Academics*
Instructor for Graph Analytics: Algorithms and Machine Learning
- Aug 2019 **Guest Lecturer**, *MIT Lincoln Laboratory*, Cambridge, MA
Guest Lecturer for Networks: Cyber, Social, Neural
- Spring 2019 **Guest Lecturer**, *MIT*, Cambridge, MA
Guest Lecturer for 6.UAR: Undergraduate Research

- Spring 2017 **Guest Facilitator**, *MIT*, Cambridge, MA
 Guest facilitator and lecturer for 6.S898: Advanced Performance Engineering for Multicore Applications
- Fall 2016 **Guest Lecturer**, *MIT*, Cambridge, MA
 Guest lecturer for 6.172: Performance Engineering of Software Systems
- March 2016 **Tutorial Presenter**, *PPoPP 2016*, Barcelona, Spain
 Presented a 3-hour tutorial on Large-Scale Graph Processing in Shared Memory at the Symposium on Principles and Practice of Parallel Programming (PPoPP), 2016
- Spring 2013, **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA
 Fall 2013 Teaching assistant for Parallel and Sequential Data Structures and Algorithms (15-210; undergraduate-level course). Gave a guest lecture on sequential and parallel hash tables.
- Sept 2012 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA
 Teaching assistant for CMU SCS: Graph Analytics Workshop
- Spring 2012 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA
 Teaching assistant for Introduction to Computer Systems (15-213; undergraduate-level course)
- Spring 2007 **Teaching Assistant**, *University of California, Berkeley*, Berkeley, CA
 Teaching assistant for Structure and Interpretation of Computer Programs (CS 61A; undergraduate-level course)

Talks

Parallel Graph Analytics

- CSAIL Imagination in Action: AI Frontier & Implications, June 2023

Parallel Graph Processing

- CSAIL/USGA Super Compute Day, April 2023

Parallel Batch-Dynamic Graph Algorithms

- University of Utah Data Science Seminar, December 2023
- Simons Institute Workshop on Dynamic Graphs and Algorithm Design, September 2023
- 10th International Congress on Industrial and Applied Mathematics (ICIAM), August 2023
- International Computer Science Institute Seminar, January 2023
- Google Algorithms Seminar, January 2023
- 12th Workshop on Irregular Applications: Architectures and Algorithms (IA³), November 2022
- UC Berkeley BeBOP Group Meeting, November 2022
- Belloch Fest at CMU, October 2022
- 1st ACDA Workshop in Aussois, September 2022
- MIT CSAIL Annual Meeting, June 2022
- DARPA Software Defined Hardware Program Meeting, June 2022
- Emerging Models of Colossal Computation Workshop, May 2022

Parallel Streaming and Batch-Dynamic Graph Processing

- MIT CSAIL PI Lunch, November 2023
- Google Seminar, January 2023

Graph Analytics: Algorithms and Machine Learning

- Citi - MIT Innovation Summer Series, July 2022

GraphIt - A High-Performance DSL for Graph Analytics

- DARPA Software Defined Hardware Program Meeting, July 2022
- Workshop on Large-Scale Graph Processing (SPAA 2022), July 2022
- DOE Programming Systems Research Forum, March 2022
- DOE ASCR X-Stack Meeting, January 2022
- DARPA Software Defined Hardware Program Meeting, May 2019
- Invited Workshop on Compiler Techniques for Sparse Tensor Algebra, January 2019
- Semiconductor Research Corporation (SRC) E-Workshop, November 2018
- Applications Driving Architectures SRC JUMP Center Meeting, October 2018
- DARPA Software Defined Hardware Program Meeting, June 2018
- Applications Driving Architectures SRC JUMP Center Meeting, May 2018

High-Performance Frameworks for Static and Streaming Graph Processing

- Stanford Software Seminar, November 2022
- ADA@IBM Speaker Series, November 2021
- Pacific Northwest National Laboratory Seminar, August 2020
- UC Berkeley BeBOP Group Meeting, June 2020
- First Friday Lunch at MIT CSAIL, December 2019

Scalable Parallel Subgraph Finding and Peeling Algorithms for Financial Network Analysis

- FinTech@CSAIL Annual Meeting, October 2021

Parallel Index-Based Structural Graph Clustering and Its Approximation

- Google Workshop on Scalable Algorithms for Semi-supervised and Unsupervised Learning, October 2021
- Itau Workshop, September 2021
- Dagstuhl Seminar on Scalable Data Structures, February 2021

Design of the Unified GraphIt Compiler

- DARPA Software Defined Hardware Program Meeting, August 2021

Compiling Graph Applications for Diverse Architectures with GraphIt

- Applications Driving Architectures SRC JUMP Center Meeting, May 2021

Compiling Graph Applications for GPUs with GraphIt

- DARPA Software Defined Hardware Program Meeting, April 2021

Theoretically-Efficient and Practical Parallel In-Place Radix Sorting

- MIT Database Seminar, April 2021

Parallel Batch-Dynamic Triangle Counting

- SIAM Conference on Computational Science and Engineering (CSE), March 2021

Parallel Algorithms for Density-Based and Structural Clustering

- Karlsruhe Institute of Technology Guest Lecture, January 2021
- Google Research Algorithms Seminar, January 2021
- Queen's University Belfast DSSC Seminar, January 2021

Low-Latency Graph Streaming Using Compressed Purely-Functional Trees

- Guest lecture in MIT Seminar in Undergraduate Advanced Research, September 2020

Practical Parallel Hypergraph Algorithms

- Symposium on Principles and Practice of Parallel Programming (PPoPP), February 2020

Large-scale Graph Processing

- Bank Negara, August 2020
- Invited Talk at the IEEE High Performance Extreme Computing Conference (HPEC), September 2019

Theoretically Efficient Parallel Graph Algorithms Can Be Fast and Scalable

- Dagstuhl Seminar on High-Performance Graph Algorithms, June 2018
- USC Seminar, May 2018
- Stanford Seminar, May 2018

Large-scale Graph Analytics

- NSF SPX Workshop, June 2019
- Guest lecture in MIT Seminar in Undergraduate Advanced Research, February 2019
- MIT CSAIL Annual Meeting, June 2018
- MIT CSAIL Alliances Annual Meeting, June 2018

Shared-Memory Parallelism Can Be Simple, Fast, and Scalable

- MIT EECS Special Seminar, April 2017
- Yale CS Seminar, March 2017
- UC Davis CS/ECE Seminar, March 2017
- University of Chicago CS Seminar, March 2017
- University of Illinois Urbana-Champaign CS Seminar, February 2017
- University of Maryland College Park CS Seminar, February 2017
- Caltech Frontiers in CMS Symposium, January 2017
- Georgia Tech CSE Seminar, September 2016
- MIT Theory of Computation Seminar, November 2015
- SUNY Stony Brook CS Seminar, May 2015
- Carnegie Mellon University Ph.D. Thesis Defense, April 2015
- Northwestern University EECS Seminar, April 2015
- Indiana University Bloomington CS Seminar, March 2015

Improved Parallel Construction of Wavelet Trees and Rank/Select Structures

- Data Compression Conference (DCC), April 2017

Large-Scale Graph Processing in Shared Memory

- Tutorial at the Networks: Cyber, Social, Neural class at MIT Lincoln Laboratory, August 2019
- Guest lecture in the Advanced Performance Engineering for Multicore Applications (6.S898) course at MIT, February 2017
- Tutorial at the Symposium on Principles and Practice of Parallel Programming (PPoPP), March 2016

Parallel Local Graph Clustering

- MIT EECS Seminar, November 2016
- CMU Systems Design and Implementation (SDI) Seminar, September 2016
- International Conference on Very Large Data Bases (VLDB), September 2016
- UC Berkeley Database Seminar, June 2016
- International Computer Science Institute Lunch Seminar, June 2016
- UC Berkeley AMPLab Retreat, June 2016

Graph Optimization

- Guest lecture in the Performance Engineering of Software Systems course (6.172) at MIT, November 2016

Ligra: A Lightweight Graph Processing Framework for Shared Memory

- ACM San Francisco Bay Area Chapter, July 2016
- Workshop on Algorithms for Modern Massive Data Sets (MMDS), June 2016
- Stanford CS Seminar, June 2016
- Stanford Software Seminar, January 2016
- UC Berkeley AMPLab Seminar, December 2015
- Keynote talk at the High Performance Graph Mining (HPGM) Workshop, August 2015
- UC San Diego CSE Seminar, January 2015
- Georgia Tech CSE Seminar, October 2014
- UCLA CS Seminar, October 2014
- University of Washington CSE Seminar, October 2014
- CMU Systems Design and Implementation (SDI) Seminar, October 2014
- Intel Labs, Hillsboro, September 2014
- Intel Labs, Santa Clara, January 2014
- UC Berkeley ASPIRE Seminar, October 2013
- Facebook, October 2013
- Symposium on Principles and Practice of Parallel Programming (PPoPP), February 2013

Parallelism in Randomized Incremental Algorithms

- Symposium on Parallelism in Algorithms and Architectures (SPAA), July 2016

Models and Algorithms with Asymmetric Read and Write Costs

- UC Berkeley Benchmarking and Optimization (BeBOP) Seminar, October 2015

A Simple Parallel Cartesian Tree Algorithm and its Application to Parallel Suffix Tree Construction

- UC Berkeley Cloud Computing and Networking Seminar, September 2015
- Microsoft Research, Beijing, July 2011
- CMU Theory Lunch, February 2011
- Meeting on Algorithm Engineering and Experiments (ALENEX), January 2011

An Evaluation of Parallel Eccentricity Estimation Algorithms on Undirected Real-World Graphs

- Conference on Knowledge Discovery and Data Mining (KDD), August 2015
- UC Berkeley AMPLab Seminar, August 2015

Multicore Triangle Computations Without Tuning

- International Conference on Data Engineering (ICDE), April 2015

Smaller and Faster: Parallel Processing of Compressed Graphs with Ligra+

- Data Compression Conference (DCC), April 2015

Parallel Wavelet Tree Construction

- Data Compression Conference (DCC), April 2015

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

- CMU Theory Lunch, January 2015
- Symposium on Discrete Algorithms (SODA), January 2015

Large-Scale Parallel Graph Algorithms

- University of Maryland (College Park) CS Seminar, December 2014

Fast Parallel Computation of Longest Common Prefixes

- International Conference for High Performance Computing, Networking, Storage and Analysis (SC), November 2014

Beyond Synchronous Computation: New Techniques for External Memory Graph Algorithms

- Symposium on Experimental Algorithms (SEA), June 2014

Phase-concurrent Hash Tables for Determinism

- Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2014

Sequential and Parallel Hash Tables

- Guest lecture in the Parallel and Sequential Data Structures and Algorithms course (15-210) at CMU, November 2013

Greedy Sequential Maximal Independent Set and Matching are Parallel on Average

- UC Berkeley Theory Lunch, March 2016
- Nanjing University Seminar, January 2014
- MIT EECS Seminar, July 2013
- Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2012
- CMU Theory Lunch, February 2012

Reducing Contention Through Priority Updates

- Symposium on Parallelism in Algorithms and Architectures (SPAA), July 2013

Practical Parallel Lempel-Ziv Factorization

- Data Compression Conference (DCC), March 2013

Brief Announcement: The Problem Based Benchmark Suite

- Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2012

Internally Deterministic Parallel Algorithms Can Be Fast

- CMU SCS Student Seminar Series, March 2012
- Symposium on Principles and Practice of Parallel Programming (PPoPP), February 2012

Panelist

Workshop on Large-Scale Graph Processing (SPAA 2022), July 2022

MIT Academic Job Search Seminar, November 2021

Moore's Law Panel - CSAIL Alliances Annual Meeting, June 2021

Applications Driving Architectures (ADA) Symposium, May 2021

Applications Driving Architectures (ADA) Symposium, October 2018

MIT Academic Job Search Seminar, December 2020

High Performance Graph Mining (HPGM) Workshop, August 2015