DAVID TENCH

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EDUCATION

Ph.D., U. of Massachusetts, Amherst, Dept. of Computer Science **August 2020**
Research Areas: Algorithms (randomized, approximation, graph, streaming), systems applications
Dissertation: "Algorithms for Massive, Expensive, or Otherwise Inconvenient Graphs"

M.S., U. of Massachusetts, Amherst, Dept. of Computer Science **February 2018**
Thesis: "MESH: Compacting Memory Management for C/C++ Applications"

B.S., Lehigh University, Department of Mathematics **May 2013**

EMPLOYMENT & AFFILIATIONS

Lawrence Berkeley National Lab, Grace Hopper Postdoctoral Fellow **2023 - present**
Rutgers University, Postdoctoral Associate (NSF Computing Innovation Fellow) **2021 - 2023**
University of Massachusetts Amherst, Research Assistant **2014 - 2020**
Lehigh University, President's Scholar **2014**
Lehigh University, South Mountain College Undergraduate Researcher **Summer 2013**
Lehigh University, TRAC (Technology, Research, and Communication) Fellow **2011 - 2013**

RESEARCH INTERESTS

I build systems that increase the scale at which we can tackle fundamental computational problems. I develop memory-hierarchy-aware algorithms for handling enormous datasets with limited space with a focus on overcoming the practical limitations of the theoretical state-of-the-art. Solving these limitations requires new algorithmic insights and careful engineering, but the reward is massively scalable systems.

PEER-REVIEWED PUBLICATIONS

The Case for External Graph Sketching. Michael A. Bender, Martín Farach-Colton, Riko Jacob, Hanna Komlós, David Tench, and Evan T. West. In *Proceedings of the Conference on Applied and Computational Discrete Algorithms (ACDA) 2025*. Montreal, Canada. July 2025.

Exploring the Landscape of Distributed Graph Sketching. David Tench, Evan West, Kenny Zhang, Michael Bender, Daniel Delayo, Martin Farach-Colton, Gilvir Gill, Tyler Seip, Victor Zhang. In *SIAM Symposium on Algorithm Engineering and Experiments (ALENEX) 2025*. New Orleans, LA. January 2025. (Accept rate 34%).

Adaptive Quotient Filters Richard Wen, Hunter McCoy, David Tench, Guido Tagliavini, Michael A Bender, Alex Conway, Martin Farach-Colton, Rob Johnson, Prashant Pandey. In *ACM Special Interest Group on Management of Data (SIGMOD) 2025*. Berlin, Germany. June 2025. (Round 1 accept rate 17%).

GraphZeppelin: How to Find Connected Components (Even When Graphs Are Dense, Dynamic, and Massive) David Tench, Evan West, Victor Zhang, Michael A Bender, Abiyaz Chowdhury, Daniel Delayo, J Ahmed Dellas, Martín Farach-Colton, Tyler Seip, Kenny Zhang. In *ACM Transactions on Database Systems (TODS) 2023*.

GraphZeppelin: Storage-Friendly Sketching for Connected Components on Dynamic Graph Streams. David Tench, Evan West, Victor Zhang, Michael A Bender, Abiyaz Chowdhury, J Ahmed Dellas, Martin Farach-Colton, Tyler Seip, Kenny Zhang. In *ACM Special Interest Group on Management of Data (SIGMOD) 2022*. Philadelphia, PA. June 2022. (Accept rate 29.3%) (**9 citations**)

PredictRoute: A Network Path Prediction Toolkit. Rachee Singh, David Tench, Phillipa Gill, Andrew McGregor. In *ACM Special Interest Group on Measurement and Evalution (SIGMETRICS) 2021*. Beijing, China. June 2021. Also appears in *Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS) 2021*. (Accept rate 17%) (**15 citations**)

Maximum Coverage in the Data Stream Model: Parameterized and Generalized. Andrew McGregor, David Tench, Hoa Vu. In *International Conference on Database Theory (ICDT) 2021*. Nicosia, Cyprus. March 2021. (Accept rate 31.9%) (**8 citations**)

Mitigating False Positives in Filters: to Adapt or to Cache? Michael Bender, Ratish Das, Martín Farach-Colton, Tianchi Mo, David Tench, Yung Ping Wang. In *SIAM Symposium on Algorithmic Principles of Computer Systems (APOCS) 2021*. Alexandria, VA (remote). January 2021. (**7 citations**)

MESH: Compacting Memory Management for Unmanaged Languages. Bobby Powers, David Tench, Emery Berger, Andrew McGregor. In *ACM Programming Languages Design and Implementation (PLDI) 2019*. Phoenix, AZ. June 2019. (Accept rate 27%) (**36 citations**)

Vertex & Hyperedge Connectivity in Graph Streams. Sudipto Guha, Andrew McGregor, David Tench. In *ACM Principles of Database Systems (PODS) 2015*. Melbourne, Australia. June 2015. (Accept rate 25%) (**89 citations**)

Densest Subgraph in Dynamic Graph Streams. Andrew McGregor, David Tench, Sofya Vorotnikova, Hoa Vu. In *Mathematical Foundations of Computer Science (MFCS) 2015*. Milan, Italy. August 2015. (Accept rate 35%) (**119 citations**)

GRANTS AWARDED

Adventures in Flatland: Algorithms for Modern Memories. June 2021 - June 2023.
Senior Scientist. NSF Medium Collaborative Research grant; Award #2106827.

AWARDS

Grace Hopper Postdoctoral Fellowship, Lawrence Berkeley National Lab 2023 - 2025
CRA/CCC/NSF Computing Innovation Fellowship 2021 - 2023
President's Scholarship, Lehigh University 2014
Lemon Prize for Undergraduate Research, Eckardt Honors Society, Lehigh University 2013
TRAC Fellowship & Mentor Fellowship, Lehigh University 2011, 2013
Williams Writing Prize, Lehigh University 2011
Dean's List, Lehigh University 2009 - 2013

PRESENTATIONS

The Case for External Graph Sketching Jul 2025
SIAM Conference on Applied and Computational Discrete Algorithms (ACDA) 2025. Montreal, Canada.

Streaming Spectral Sparsification for Protein Family Identification Jul 2025
SIAM Conference on Applied and Computational Discrete Algorithms (ACDA) 2025. Montreal, Canada.

Adaptive Quotient Filters Feb 2025
Postdoc Symposium speaker, Lawrence Berkeley National Lab. Berkeley, CA.

Exploring the Landscape of Distributed Graph Sketching Jan 2025
SIAM ALENEX25: Symposium on Algorithm Engineering and Experiments. New Orleans, LA.

External Graph Sketching July 2024
SIAM DM 2024: Applied and Computational Discrete Algorithms. Spokane, WA.

Dynamic Connectivity Sketching Feb 2024
Postdoc Symposium speaker, Lawrence Berkeley National Lab. Berkeley, CA.

Streaming Dynamic Connectivity: To Infinity and Beyond Sept 2023
Invited talk. University of Utah. Salt Lake City, UT.

Streaming Dynamic Connectivity: To Infinity and Beyond Feb 2022
Lawrence Berkeley National Lab. Berkeley, CA (virtual).

Streaming Dynamic Connectivity: To Infinity and Beyond April 2022
Google NYC Algorithms Seminar. New York City, NY.

Streaming Dynamic Connectivity: To Infinity and Beyond Feb 2022
SIAM CSE 2023: Emerging Techniques in Scalable Graph Processing. Amsterdam, Netherlands.

Streaming Dynamic Connectivity: To Infinity and Beyond Feb 2022
Dagstuhl 23071: Big Data Algorithms from Theory to Practice. Wadern, Germany.

Streaming Dynamic Connectivity: To Infinity and Beyond Nov 2022
Dagstuhl 22461: Dynamic Graph Algorithms. Wadern, Germany.

Streaming Dynamic Connectivity: To Infinity and Beyond Sept 2022
Invited talk for MIT Fast Code Seminar. Cambridge, MA (virtual).

Streaming Dynamic Connectivity: To Infinity and Beyond Sept 2022
Workshop for Applied and Computational Discrete Algorithms (ACDA) 2022. Aussois, France.

GraphZeppelin Jun 2022
ACM Special Interest Group on Management of Data (SIGMOD) 2022. Philadelphia, PA.

Semi-Streaming Dynamic Connectivity: To Infinity and Beyond Jan 2022
Invited talk for Algorithmic Principles of Computer Systems (APOCS) 2022. Alexandria, VA (virtual).

Semi-Streaming Dynamic Connectivity: To Infinity and Beyond Nov 2021
Invited talk Rutgers University Theory Seminar. New Brunswick, NJ (virtual).

Maximum Coverage in the Data Stream Model, Parameterized & Generalized March 2021
International Conference on Database Theory (ICDT) 2021. Nicosia, Cyprus (virtual).

Meshing: A Theoretical Approach to "Impossible" Memory Management March 2017
NSF "Algorithms in the Field" PI meeting. Arlington, VA.

Densest Subgraph in Dynamic Graph Streams Aug 2015
2015 Mathematical Foundations of Computer Science conference. Milan, Italy.

TEACHING

Stony Brook University Instructor Spring 2021
Course: Algorithms Reading Group Seminar
Notes: Lectured on graph streaming & reconstruction methods. Led student discussions on open problems in graph algorithms.

University of Massachusetts Amherst Teaching Assistant & Lecturer 2017 - 2019
Courses: Advanced Algorithms (Fall 2018 & Fall 2019), Algorithms for Data Science (Spring 2018), Artificial Intelligence (Spring 2017), Reasoning Under Uncertainty (Fall 2017)
Notes: Gave guest lectures, held office hours, designed & graded assignments, led discussion sections for listed courses at the undergraduate, Masters, and PhD levels.

Lehigh University Head Co-Instructor Fall 2013
Course: The TRAC Fellows Seminar
Notes: A course on research methods, educational technology, writing and communication pedagogy.

MENTORING

Mentor to 2 Summer PhD Interns Berkeley Lab, summer 2024
Mentor to 9 Grad, 8 Undergrad Students UC Davis, Stony Brook & Rutgers, 2020 - present
Master's Thesis Defense Committee Member Stony Brook, 2021
PhD Student Peer Mentor UMass, Fall 2019
Mentor to an REU Student UMass, Summer 2017
TRAC Fellow & Mentor Fellow Lehigh, Fall 2011 - Spring 2014

SERVICE

Program Committee Member 2026
For SIAM Symposium on Algorithm Engineering and Experiments (ALENEX) 2026.

Program Committee Member 2025
For SIAM Conference on Applied and Computational Discrete Algorithms (ACDA) 2025.

Program Committee Member 2023
For European Symposium on Algorithms (ESA) 2023.

Program Committee Member 2023
For Symposium on Parallel Algorithms and Architectures (SPAA) 2023.

Program Committee Member 2021
For SIAM Conference on Applied and Computational Discrete Algorithms (ACDA) 2021.

UMass CS Graduate Representative 2018
Advocated for grad students in faculty meetings, interviewed 40 candidates for faculty positions.

UMass CICS student-run diversity and inclusion event organizer 2018
Organized student programs to discuss gendered harassment in STEM workplaces.

Peer Reviewer 2015 - present
For DISC 2025, ICPP 2024, Algorithmica 2024, SODA 2024, ESA 2021, ICPP 2021, MFCS 2021, PODC 2020, SODA 2020, FOCS 2019, SODA 2019, STACS 2018, SODA 2018, WSDM 2016, and STOC 2015.