

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

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%)

PredictRoute: A Network Path Prediction Toolkit. Rachee Singh, David Tench, Phillipa Gill, Andrew McGregor. In *ACM Special Interest Group on Measurement and Evaluation (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%)

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%)

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.

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%) (**32 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%) (**80 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%) (**106 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

Adaptive Quotient Filters Postdoc Symposium speaker, Lawrence Berkeley National Lab. Berkeley, CA.	Feb 2025
Exploring the Landscape of Distributed Graph Sketching SIAM ALENEX25: Symposium on Algorithm Engineering and Experiments. New Orleans, LA.	Jan 2025
External Graph Sketching SIAM DM 2024: Applied and Computational Discrete Algorithms. Spokane, WA.	July 2024
Dynamic Connectivity Sketching Postdoc Symposium speaker, Lawrence Berkeley National Lab. Berkeley, CA.	Feb 2024
Streaming Dynamic Connectivity: To Infinity and Beyond Invited talk. University of Utah. Salt Lake City, UT.	Sept 2023
Streaming Dynamic Connectivity: To Infinity and Beyond Lawrence Berkeley National Lab. Berkeley, CA (virtual).	Feb 2022

Streaming Dynamic Connectivity: To Infinity and Beyond Google NYC Algorithms Seminar. New York City, NY.	April 2022
Streaming Dynamic Connectivity: To Infinity and Beyond SIAM CSE 2023: Emerging Techniques in Scalable Graph Processing. Amsterdam, Netherlands.	Feb 2022
Streaming Dynamic Connectivity: To Infinity and Beyond Dagstuhl 23071: Big Data Algorithms from Theory to Practice. Wadern, Germany.	Feb 2022
Streaming Dynamic Connectivity: To Infinity and Beyond Dagstuhl 22461: Dynamic Graph Algorithms. Wadern, Germany.	Nov 2022
Streaming Dynamic Connectivity: To Infinity and Beyond Invited talk for MIT Fast Code Seminar. Cambridge, MA (virtual).	Sept 2022
Streaming Dynamic Connectivity: To Infinity and Beyond Workshop for Applied and Computational Discrete Algorithms (ACDA) 2022. Aussois, France.	Sept 2022
GraphZeppelin ACM Special Interest Group on Management of Data (SIGMOD) 2022. Philadelphia, PA.	Jun 2022
Semi-Streaming Dynamic Connectivity: To Infinity and Beyond Invited talk for Algorithmic Principles of Computer Systems (APOCS) 2022. Alexandria, VA (virtual).	Jan 2022
Semi-Streaming Dynamic Connectivity: To Infinity and Beyond Invited talk Rutgers University Theory Seminar. New Brunswick, NJ (virtual).	Nov 2021
Maximum Coverage in the Data Stream Model, Parameterized & Generalized International Conference on Database Theory (ICDT) 2021. Nicosia, Cyprus (virtual).	March 2021
Meshing: A Theoretical Approach to “Impossible” Memory Management NSF “Algorithms in the Field” PI meeting. Arlington, VA.	March 2017
Densest Subgraph in Dynamic Graph Streams 2015 Mathematical Foundations of Computer Science conference. Milan, Italy.	Aug 2015

TEACHING

Stony Brook University Course: Algorithms Reading Group Seminar Notes: Lectured on graph streaming & reconstruction methods. Led student discussions on open problems in graph algorithms.	Instructor	Spring 2021
University of Massachusetts Amherst 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.	Teaching Assistant & Lecturer	2017 - 2019
Lehigh University Course: The TRAC Fellows Seminar Notes: A course on research methods, educational technology, writing and communication pedagogy.	Head Co-Instructor	Fall 2013

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

SERVICE

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 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.