VIHAN SHAH

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PROFESSIONAL EXPERIENCE

University of Birmingham *Sep 2025 - Present*
Postdoctoral Researcher
School of Computer Science
Host: Sagnik Mukhopadhyay

EDUCATION

University of Waterloo *Sep 2023 - Sep 2025*
PhD in Computer Science
Cheriton School of Computer Science
Advisor: Sepehr Assadi
Thesis: "Optimal Graph Streaming Algorithms and
Further Advances in Modern Models of Computation"

Rutgers University *Sep 2020 - Sep 2023*
PhD in Computer Science (Master's degree earned en route)
Transferred to University of Waterloo
New Brunswick College of Arts and Sciences
Advisor: Sepehr Assadi

Rutgers University *Sep 2019 - May 2020*
BA in Computer Science
Camden College of Arts and Sciences

Mahindra Ecole Centrale *Aug 2016 - May 2019*
Completed 3 years of B.Tech in Computer Science

RESEARCH INTERESTS

My research lies in **theoretical computer science**, where I mainly study **graph problems** through the lens of **modern models of computation**. My work primarily focuses on **streaming algorithms**, while also extending to sublinear-time, dynamic, and learning-augmented models. I am motivated by challenges posed by massive datasets, and I enjoy uncovering the fundamental trade-offs between computational resources such as space, time, and approximation in these modern models of computation.

CONFERENCE PAPERS

Sublinear-Time Lower Bounds for Approximating Matching Size using Non-Adaptive Queries *SODA 2026*
(solo-authored student work)

An Improved Fully Dynamic Algorithm for Counting 4-Cycles in General Graphs using Fast Matrix Multiplication *PODS 2025*
with Sepehr Assadi

Fully Dynamic Adversarially Robust Correlation Clustering in Polylogarithmic Update Time *AISTATS 2025*
with Vladimir Braverman, Prathamesh Dharangutte, Shreyas Pai and Chen Wang

Space Complexity of Minimum Cut Problems in Single-Pass Streams *ITCS 2025*
with Matthew Ding, Alexandro Garces, Jason Li, Honghao Lin, Jelani Nelson, and David Woodruff

Learning-augmented Maximum Independent Set *APPROX 2024*
with Vladimir Braverman, Prathamesh Dharangutte and Chen Wang

New Lower Bounds in Merlin-Arthur Communication and Graph Streaming Verification *ITCS 2024*
with Prantar Ghosh

Streaming Algorithms and Lower Bounds for Estimating Correlation Clustering Cost *NeurIPS 2023*
with Sepehr Assadi and Chen Wang

Tight Bounds for Vertex Connectivity in Dynamic Streams *SOSA 2023*
with Sepehr Assadi

Generalizing Greenwald-Khanna Streaming Quantile Summaries for Weighted Inputs *ICDT 2023*
with Sepehr Assadi, Nirmit Joshi and Milind Prabhu

Space Optimal Vertex Cover in Dynamic Streams *APPROX 2022*
with Kheeran K. Naidu (student-only paper)

An Asymptotically Optimal Algorithm for Maximum Matching in Dynamic Streams *ITCS 2022*
with Sepehr Assadi

HONORS AND AWARDS

NeurIPS Scholar Award *Oct 2023*

TALKS

University of Warwick, Invited Seminar Talk *Feb 2026*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

University of Liverpool, Invited Seminar Talk *Jan 2026*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

Tata Institute of Fundamental Research, Invited Seminar Talk *Dec 2025*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

University of Bristol, Invited Seminar Talk *Nov 2025*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

University of Waterloo, Invited Seminar Talk *Oct 2025*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

York University, Invited Seminar Talk *Oct 2025*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

University of Toronto, Invited Seminar Talk *Oct 2025*
"Sublinear time lower bounds for approximating matching size using non-adaptive queries"

University of Waterloo, Seminar Talk *Jun 2025*
"An Improved Fully Dynamic Algorithm for Counting 4-Cycles in General Graphs"

Toyota Technological Institute at Chicago, Invited Seminar Talk *Apr 2025*
Young Researcher Seminar Series
"Space Complexity of Minimum Cut Problems in Single-Pass Streams"

University of Waterloo, Seminar Talk *Mar 2025*
"Space Complexity of Minimum Cut Problems in Single-Pass Streams"

Dartmouth College, Invited Seminar Talk *Jan 2025*
"Space Complexity of Minimum Cut Problems in Single-Pass Streams"

Rutgers University, Invited Talk, Reading Group *Jun 2024*
"Learning-augmented Maximum Independent Set"

In addition, I have presented several of my papers at conferences.

EXTERNAL REVIEWER

Symposium on Theory of Computing (STOC) *2022, 2024, 2025*

Symposium on Foundations of Computer Science (FOCS) *2025*

Symposium on Discrete Algorithms (SODA) *2022-2024, 2026*

Innovations in Theoretical Computer Science (ITCS) *2024-2026*

International Colloquium on Automata, Languages, and Programming (ICALP) *2023, 2025*

Symposium on Principles of Database Systems (PODS) *2025*

Symposium on Simplicity in Algorithms (SOSA) *2026*

European Symposium on Algorithms (ESA) *2022-2025*

Symposium on Theoretical Aspects of Computer Science (STACS) *2026*

International Symposium on Algorithms and Computation (ISAAC) *2025*

Symposium on Principles of Distributed Computing (PODC) *2021*

TEACHING AND MENTORING

Directed Reading Program (DRP) *Winter 2024*
Mentor for Women in Mathematics (WiM)
University of Waterloo

Research Experiences for Undergraduates (REU) *Summer 2023*
Mentor along with my advisor Sepehr Assadi
Rutgers University/DIMACS

Guest Lectures on Sublinear and Streaming Algorithms *Summer 2020-2025*
PACT (Program in Algorithmic and Combinatorial Thinking)
Princeton University

Guest Lecture, Randomized Algorithms (CS 761) *Winter 2025*
University of Waterloo

Teaching Assistant, Design and Analysis of Computer *Spring 2021, 2022, Fall 2021*
Algorithms (CS 344)
Rutgers University

Teaching Assistant, Introduction to Discrete *Fall 2020, Summer 2021*
Structures (CS 205)
Rutgers University

Guest Lecture, Design and Analysis of Algorithms (CS 371) *Fall 2019*
Rutgers University–Camden

Teaching Assistant, Discrete Mathematics (PACT) *Summer 2019*
Princeton University

REFERENCES

Sagnik Mukhopadhyay
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University of Birmingham
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Sepehr Assadi
Associate Professor, Faculty of Mathematics Research Chair
University of Waterloo
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University of Bristol
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Sanjeev Khanna
Professor
New York University
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