



## Huacheng Yu

Assistant Professor

[Department of Computer Science](#)  
[Princeton University](#)

Email: yuhch123#gmail#com

Office: 35 Olden St, Office 310

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[Research](#) / [Teaching](#) / [Service](#) / [CV](#) / [Google scholar](#)

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I am an assistant professor in the [Department of Computer Science](#) at [Princeton University](#). I was an associate research scholar in the department of computer science at Princeton University from 2019 to 2021. Prior to Princeton, I was a postdoc in the [Theory of Computation](#) group at Harvard University hosted by [Jelani Nelson](#) and [Madhu Sudan](#). I did my PhD at Stanford University, where I was fortunate to have [Ryan Williams](#) and [Omer Reingold](#) as my advisers. Prior to that, I received my bachelor's degree from [Yao Class](#) at Tsinghua University. My main research interests include data structures and streaming algorithms, and I am also interested in other directions in theory, including communication complexity and graph algorithms.

## Research

- [Strong XOR Lemma for Communication with Bounded Rounds](#)

Huacheng Yu.

To appear in the IEEE Symposium on Foundations of Computer Science (FOCS 2022).

[abstract](#) [arXiv](#)

- **[Optimal Bounds for Approximate Counting](#)**

Jelani Nelson, and Huacheng Yu.

In the Symposium on Principles of Database Systems (PODS 2022).

**PODS Best paper award.**

[abstract](#) [arXiv](#)

- **[Near-Optimal Two-Pass Streaming Algorithm for Sampling Random Walks over Directed Graphs](#)**

Lijie Chen, Gillat Kol, Dmitry Paramonov, Raghuvansh Saxena, Zhao Song, and Huacheng Yu.

In the International Colloquium on Automata, Languages and Programming (ICALP 2021).

[abstract](#) [arXiv](#)

- **[Almost Optimal Super-Constant-Pass Streaming Lower Bounds for Reachability](#)**

Lijie Chen, Gillat Kol, Dmitry Paramonov, Raghuvansh Saxena, Zhao Song, and Huacheng Yu.

In the ACM Symposium on Theory of Computing (STOC 2021).

**Invited to the special issue of SIAM Journal on Computing (SICOMP).**

[abstract](#) [arXiv](#)

- **[Tight Distributed Sketching Lower Bound for Connectivity](#)**

Huacheng Yu.

In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2021).

[abstract](#) [arXiv](#)

- **[Multi-Pass Graph Streaming Lower Bounds for Cycle Counting, MAX-CUT, Matching Size, and Other Problems](#)**

Sepehr Assadi, Gillat Kol, Raghuvansh R. Saxena, and Huacheng Yu.

In the IEEE Symposium on Foundations of Computer Science (FOCS 2020).

[abstract](#) [arXiv](#)

- **[Fast Software Cache Design for Network Appliances](#)**

Dong Zhou, Huacheng Yu, Michael Kaminsky, and David Andersen.

In 2020 USENIX Annual Technical Conference (USENIX ATC'20).

[abstract](#)

- **[Succinct Filters for Sets of Unknown Sizes](#)**

Mingmou Liu, Yitong Yin, and Huacheng Yu.

In the International Colloquium on Automata, Languages and Programming (ICALP 2020).

[abstract](#) [arXiv](#)

- **[Nearly Optimal Static Las Vegas Succinct Dictionary](#)**

Huacheng Yu.

In the ACM Symposium on Theory of Computing (STOC 2020).

**Invited to the special issue of SIAM Journal on Computing (SICOMP).**

[abstract](#) [arXiv](#)

- **[Lower Bound for Succinct Range Minimum Query](#)**

Mingmou Liu, and Huacheng Yu.

In the ACM Symposium on Theory of Computing (STOC 2020).

[abstract](#) [arXiv](#)

- **[Faster Update Time for Turnstile Streaming Algorithms](#)**

Josh Alman, and Huacheng Yu.

In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2020).

[abstract](#) [arXiv](#)

- **[How to Store a Random Walk](#)**

Emanuele Viola, Omri Weinstein, and Huacheng Yu.

In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2020).

[abstract](#) [arXiv](#)

- **[Optimal Succinct Rank Data Structure via Approximate Nonnegative Tensor Decomposition](#)**

Huacheng Yu.

In the ACM Symposium on Theory of Computing (STOC 2019).

[abstract](#) [arXiv](#)

- **[Pruning based Distance Sketches with Provable Guarantees on Random Graphs](#)**

Hongyang Zhang, Huacheng Yu, and Ashish Goel.

In the Web Conference (WWW 2019).

[abstract](#) [arXiv](#)

- **[Optimal Lower Bounds for Distributed and Streaming Spanning Forest Computation](#)**

Jelani Nelson, and Huacheng Yu.

In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2019).

[abstract](#) [arXiv](#) [errata](#)

- **[Fillable Arrays with Constant Time Operations and A Single Bit of Redundancy](#)**

Jacob Teo Por Loong, Jelani Nelson, and Huacheng Yu.

manuscript.

[abstract](#) [arXiv](#)

- **[Crossing the Logarithmic Barrier for Dynamic Boolean Data Structure Lower Bounds](#)**

Kasper Green Larsen, Omri Weinstein, and Huacheng Yu.

In the ACM Symposium on Theory of Computing (STOC 2018).

**Invited to the special issue of SIAM Journal on Computing (SICOMP).**

[abstract](#) [arXiv](#)

- [\*\*Cell-Probe Lower Bounds from Online Communication Complexity\*\*](#)  
Josh Alman, Joshua R. Wang, and Huacheng Yu.  
In the ACM Symposium on Theory of Computing (STOC 2018).  
[abstract](#) [arXiv](#)
- [\*\*DecreaseKeys are Expensive for External Memory Priority Queues\*\*](#)  
Kasper Eenberg, Kasper Green Larsen, and Huacheng Yu.  
Presented at MASSIVE 2016.  
In the ACM Symposium on Theory of Computing (STOC 2017).  
[abstract](#) [arXiv](#)
- [\*\*Beating Brute Force for Systems of Polynomial Equations over Finite Fields\*\*](#)  
Daniel Lokshtanov, Ramamohan Paturi, Suguru Tamaki, Ryan Williams, and Huacheng Yu.  
In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2017).  
[abstract](#)
- [\*\*Amortized Dynamic Cell-Probe Lower Bounds from Four-Party Communication\*\*](#)  
Omri Weinstein, and Huacheng Yu.  
In the IEEE Symposium on Foundations of Computer Science (FOCS 2016).  
[abstract](#) [arXiv](#)
- [\*\*Cell-Probe Lower Bounds for Dynamic Problems via a New Communication Model\*\*](#)  
Huacheng Yu.  
In the ACM Symposium on Theory of Computing (STOC 2016).  
[abstract](#) [arXiv](#)
- [\*\*An Improved Combinatorial Algorithm for Boolean Matrix Multiplication\*\*](#)  
Huacheng Yu.  
In the International Colloquium on Automata, Languages, and Programming (ICALP 2015).  
**Best student paper award for Track A.**  
**Invited to the special issue of Information and Computation.**  
**Invited presentation at HALG 2016.**  
[abstract](#) [arXiv](#)
- [\*\*Matching Triangles and Basing Hardness on an Extremely Popular Conjecture\*\*](#)  
Amir Abboud, Virginia Vassilevska Williams, and Huacheng Yu.  
In the ACM Symposium on Theory of Computing (STOC 2015).  
**Invited to the special issue of SIAM Journal on Computing (SICOMP).**  
[abstract](#)
- [\*\*More Applications of the Polynomial Method to Algorithm Design\*\*](#)  
Amir Abboud, Ryan Williams, and Huacheng Yu.  
In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2015).

[abstract](#)

- [Finding Four-Node Subgraphs in Triangle Time](#)

Virginia Vassilevska Williams, Joshua R. Wang, Ryan Williams, and Huacheng Yu.  
In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2015).

[abstract](#)

- [Finding Orthogonal Vectors in Discrete Structures](#)

Ryan Williams, and Huacheng Yu.

In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2014).

[abstract](#)

- [On a Conjecture of Butler and Graham](#)

Tengyu Ma, Xiaoming Sun, and Huacheng Yu.

Designs, Codes and Cryptography 69(3), 265--274 (2013).

[abstract](#) [arXiv](#)

- [A New Variation of Hat Guessing Games](#)

Tengyu Ma, Xiaoming Sun, and Huacheng Yu.

In the International Computing and Combinatorics Conference (COCOON 2011).

[abstract](#) [arXiv](#)

## Teaching

- Fall 2022: [Advanced Algorithm Design](#)
- Fall 2021: [Streaming and Sketching Algorithms](#)

## Service

I am/was on the STOC 2023, [ESA 2021](#), [STOC 2021](#), [FOCS 2019](#), [ISAAC 2018](#), [COCOON 2017](#) and [COCOA 2017](#) PC.

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Last update: 2022/9. Template adapted from [Danqi Chen](#)'s.