Huacheng Yu

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POSITIONS

Princeton University *2021.9-present*
Assistant Professor in the Computer Science Department

Princeton University *2019.9-2021.9*
Associate Research Scholar in the Computer Science Department

Harvard University *2017.8-2019.8*
Postdoc Researcher in the Theory of Computation group
Hosted by Jelani Nelson and Madhu Sudan

EDUCATION

Stanford University *2012-2017*
Ph.D. in Computer Science
Advised by Ryan Williams and Omer Reingold

Tsinghua University *2008-2012*
Special Pilot CS Class, supervised by Andrew Yao
Bachelor of Engineering in Computer Science and Technology

PAPERS

- Lijie Chen, Gillat Kol, Dmitry Paramonov, Raghuvansh Saxena, Zhao Song, and Huacheng Yu. *Near-Optimal Two-Pass Streaming Algorithm for Sampling Random Walks over Directed Graphs.*
In the International Colloquium on Automata, Languages and Programming (ICALP 2021).

- Lijie Chen, Gillat Kol, Dmitry Paramonov, Raghuvansh Saxena, Zhao Song, and Huacheng Yu. *Almost Optimal Super-Constant-Pass Streaming Lower Bounds for Reachability.*
In the ACM Symposium on Theory of Computing (STOC 2021).
Invited to the special issue of SIAM Journal on Computing (SICOMP).

- Jelani Nelson, and Huacheng Yu. *Optimal Bounds for Approximate Counting.*
manuscript.

- Huacheng Yu. *Tight Distributed Sketching Lower Bound for Connectivity.*
In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2021).

- Sepehr Assadi, Gillat Kol, Raghuvansh R. Saxena, and Huacheng Yu. *Multi-Pass Graph Streaming Lower Bounds for Cycle Counting, MAX-CUT, Matching Size, and Other Problems.*
In the IEEE Symposium on Foundations of Computer Science (FOCS 2020).

- Dong Zhou, Huacheng Yu, Michael Kaminsky, and David Andersen. *Fast Software Cache Design for Network Appliances.*
  In 2020 USENIX Annual Technical Conference (USENIX ATC'20).

- Mingmou Liu, Yitong Yin, and Huacheng Yu. *Succinct Filters for Sets of Unknown Sizes.*
  In the International Colloquium on Automata, Languages and Programming (ICALP 2020).

- Huacheng Yu. *Nearly Optimal Static Las Vegas Succinct Dictionary.*
  In the ACM Symposium on Theory of Computing (STOC 2020).
  Invited to the special issue of SIAM Journal on Computing (SICOMP).

- Mingmou Liu, and Huacheng Yu. *Lower Bound for Succinct Range Minimum Query.*
  In the ACM Symposium on Theory of Computing (STOC 2020).

- Josh Alman, and Huacheng Yu. *Faster Update Time for Turnstile Streaming Algorithms.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2020).

- Emanuele Viola, Omri Weinstein, and Huacheng Yu. *How to Store a Random Walk.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2020).

- Huacheng Yu. *Optimal Succinct Rank Data Structure via Approximate Nonnegative Tensor Decomposition.*
  In the ACM Symposium on Theory of Computing (STOC 2019).

- Hongyang Zhang, Huacheng Yu, and Ashish Goel. *Pruning based Distance Sketches with Provable Guarantees on Random Graphs.*
  In the Web Conference (WWW 2019).

- Jelani Nelson, and Huacheng Yu. *Optimal Lower Bounds for Distributed and Streaming Spanning Forest Computation.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2019).

- Jacob Teo Por Loong, Jelani Nelson, Huacheng Yu. *Fillable Arrays with Constant Time Operations and A Single Bit of Redundancy.* manuscript.

- Kasper Green Larsen, Omri Weinstein, and Huacheng Yu. *Crossing the Logarithmic Barrier for Dynamic Boolean Data Structure Lower Bounds.*
  In the ACM Symposium on Theory of Computing (STOC 2018).
  Invited to the special issue of SIAM Journal on Computing (SICOMP).

- Josh Alman, Joshua R. Wang, and Huacheng Yu. *Cell-Probe Lower Bounds from Online Communication Complexity.*
  In the ACM Symposium on Theory of Computing (STOC 2018).

- Kasper Eenberg, Kasper Green Larsen, and Huacheng Yu. *DecreaseKeys are Expensive for External Memory Priority Queues.*
  In the ACM Symposium on Theory of Computing (STOC 2017).

- Daniel Lokshtanov, Ramamohan Paturi, Suguru Tamaki, Ryan Williams, and Huacheng Yu. *Beating Brute Force for Systems of Polynomial Equations over Finite Fields.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2017).

- Omri Weinstein, and Huacheng Yu. *Amortized Dynamic Cell-Probe Lower Bounds from Four-Party Communication.*
  In the IEEE Symposium on Foundations of Computer Science (FOCS 2016).

- Huacheng Yu. *Cell-probe Lower Bounds for Dynamic Problems via a New Communication Model.*
  In the ACM Symposium on Theory of Computing (STOC 2016).

- Huacheng Yu. *An Improved Combinatorial Algorithm for Boolean Matrix Multiplication.*
  In the International Colloquium on Automata, Languages, and Programming (ICALP 2015).
  Co-winner of the best student paper award for Track A.
  Invited to the special issue of Information and Computation.

- Amir Abboud, Virginia Vassilevska Williams, and Huacheng Yu. *Matching Triangles and Basing Hardness on an Extremely Popular Conjecture.*
  In the ACM Symposium on Theory of Computing (STOC 2015).
  Invited to the special issue of SIAM Journal on Computing (SICOMP).

- Amir Abboud, Ryan Williams, and Huacheng Yu. *More Applications of the Polynomial Method to Algorithm Design.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2015).

- Virginia Vassilevska Williams, Joshua R. Wang, Ryan Williams, and Huacheng Yu. *Finding Four-Node Subgraphs in Triangle Time.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2015).

- Ryan Williams, and Huacheng Yu. *Finding Orthogonal Vectors in Discrete Structures.*
  In the ACM-SIAM Symposium on Discrete Algorithms (SODA 2014).

- Tengyu Ma, Xiaoming Sun, and Huacheng Yu. *On a conjecture of Butler and Graham.*
  Designs, Codes and Cryptography 69(3), 265–274 (2013).

- Tengyu Ma, Xiaoming Sun, and Huacheng Yu. *A New Variation of Hat Guessing Games.*
  In the Annual International Computing and Combinatorics Conference (COCOON 2011).

AWARDS AND HONORS

- Co-winner of the best student paper award for Track A at ICALP 2015.
- Gold Medal of Yao Award (1 awarded in Yao class every year), Tsinghua University, 2011.
- 1st place in the 20th International Olympiad in Informatics (IOI 2008).
- Papers invited to special issues:

  - Lijie Chen, Gillat Kol, Dmitry Paramonov, Raghuvansh Saxena, Zhao Song, and Huacheng Yu. *Almost Optimal Super-Constant-Pass Streaming Lower Bounds for Reachability.* Invited to the special issue of SIAM Journal on Computing on STOC 2021.

  - Huacheng Yu. *Nearly Optimal Static Las Vegas Succinct Dictionary.* Invited to the special issue of SIAM Journal on Computing on STOC 2020.

  - Kasper Green Larsen, Omri Weinstein, and Huacheng Yu. *Crossing the Logarithmic Barrier for Dynamic Boolean Data Structure Lower Bounds.* Invited to the special issue of SIAM Journal on Computing on STOC 2018.

  - Huacheng Yu. *An Improved Combinatorial Algorithm for Boolean Matrix Multiplication.* Invited to the special issue of Information and Computation on ICALP 2015.

  - Amir Abboud, Virginia Vassilevska Williams, and Huacheng Yu. *Matching Triangles and Basing Hardness on an Extremely Popular Conjecture.* Invited to the special issue of SIAM Journal on Computing on STOC 2015.

TEACHING EXPERIENCE

Guest Lectures

- ICPC University Alumni Lecture Series, "Succint Data Structures"   2020.7

– Northeastern Univeristy, *Special Topics in Complexity Theory*, "Dynamic Data Structure Lower Bounds"   2017.12

– Stanford CS254, "Randomized Algorithms"   2015.4

Stanford CS254: Computational Complexity, Fall 2016   2016.9-2016.12

Teaching assistant

Stanford CS254: Computational Complexity, Spring 2015   2015.4-2015.6

Teaching assistant

Algorithm Design and Implementation for Olympiad in Informatics   2008.8-2010.8

Lecture at National Winter Camp in Informatics, 2009.

Problems development for National Olympiad in Informatics, National Winter Camp and Chinese Team Selection Contest.

Fundamentals of Programming Tutor   2008.9-2008.12

Tutor in `C++` programming for the course.

SERVICES

Conference program committees:

ESA 2021, STOC 2021, FOCS 2019, ISAAC 2018, COCOON 2017, COCOA 2017

Conference paper reviewing:

STOC, FOCS, SODA, CCC, SOCG, ICALP, ITCS, ESA, STACS, RANDOM, ISAAC, SWAT, WADS

Journal paper reviewing:

Journal of the ACM, SIAM Journal on Computing, Transactions on Algorithms, Computational Complexity, Transactions on Computation Theory, Theoretical Computer Science, Information Processing Letters, Algorithmica, Discrete & Computational Geometry

Stanford theory seminar student organizer   *2014.1-2015.12*

ACADEMIC TALKS

Multi-Pass Graph Streaming Lower Bounds.

- FOCS 2020, November 2020

Succinct Data Structures.

- ICPCU Alumni Lecture series, July 2020

Nearly Optimal Static Las Vegas Succinct Dictionary.

- STOC 2020, June 2020
- Chinese Academy of Sciences, Algorithm and Complexity seminar, May 2020
- TCS+ talk, April 2020

How to Store a Random Walk.

- SODA 2020, January 2020
- Princeton theory lunch September 2019
- Rutgers theory lunch, September 2019

Optimal Succinct Rank Data Structure via Approximate Nonnegative Tensor Decomposition.
- STOC 2019, June 2019

Optimal Lower Bounds for Distributed and Streaming Spanning Forest Computation.
- SODA 2019, January 2019
- Simons workshop, October 2018

Cell-Probe Lower Bounds from Online Communication Complexity.
- Nanjing theory day, May 2018
- Columbia theory seminar, September 2017
- Stanford theory lunch, April 2017

Crossing the Logarithmic Barrier for Dynamic Boolean Data Structure Lower Bounds.
- STOC 2018, June 2018
- Harvard postdoc day, September 2017
- Berkeley theory lunch, April 2017

Amortized Dynamic Cell-Probe Lower Bounds from Four-Party Communication.
- Dagstuhl seminar, November 2016
- Harvard ToC seminar, October 2016
- FOCS 2016, October 2016

Cell-probe Lower Bounds for Dynamic Problems via a New Communication Model.
- STOC 2016, June 2016
- MADALGO theory seminar, March 2016
- Stanford theory lunch, January 2016

Combinatorial Algorithms for Boolean Matrix Multiplication.
- Stanford theory qualifying exam, August 2015

An Improved Combinatorial Algorithm for Boolean Matrix Multiplication.
- MADALGO theory seminar, June 2016
- HALG 2016, June 2016
- China Theory Week, August 2015
- Chinese Academy of Sciences, Algorithm and Complexity seminar, July 2015
- ICALP 2015, July 2015

More Applications of the Polynomial Method to Algorithm Design.
- Stanford theory lunch, February 2015
- SODA 2015, January 2015

Finding Four-Node Subgraphs in Triangle Time.
- Chinese Academy of Science, Algorithm and Complexity seminar, July 2014

Finding Orthogonal Vectors in Discrete Structures.
- SODA 2014, January 2014
- Stanford theory lunch, October 2013

Hat Guessing Games.
- Stanford theory lunch, February 2013