Hanlin Ren

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🌐 https://hanlin-ren.github.io/   ⬆ Last updated: Sep 2024

Education

Oct 2021 – present   🔖 **University of Oxford, UK**
DPhil in computer science
Advisor: Prof. Rahul Santhanam

Aug 2016 – Jun 2021   🔖 **Tsinghua University, China**
Bachelor of engineering
Major: computer science (Special Pilot CS Class, a.k.a Yao Class)
GPA: 3.83/4; rank: 8/38

Publications

(Note: in theoretical computer science, the list of authors are usually sorted in alphabetical order.)

🔖 **On the Complexity of Avoiding Heavy Elements.**
Zhenjian Lu, Igor C. Oliveira, <u>Hanlin Ren</u>, and Rahul Santhanam
FOCS 2024.

🔖 **Symmetric Exponential Time Requires Near-Maximum Circuit Size.**
Lijie Chen, Shuichi Hirahara, and <u>Hanlin Ren</u>
STOC 2024.

🔖 **Polynomial-Time Pseudodeterministic Construction of Primes.**
Lijie Chen, Zhenjian Lu, Igor C. Oliveira, <u>Hanlin Ren</u>, and Rahul Santhanam
FOCS 2023.

🔖 **Bounded Relativization.**
Shuichi Hirahara, Zhenjian Lu, and <u>Hanlin Ren</u>
CCC 2023.

🔖 **Range Avoidance, Remote Point, and Hard Partial Truth Table via Satisfying-Pairs Algorithms.**
Yeyuan Chen, Yizhi Huang, Jiatu Li, and <u>Hanlin Ren</u>.
STOC 2023.

🔖 **NP-Hardness of Approximating Meta-Complexity: A Cryptographic Approach.**
Yizhi Huang, Rahul Ilango, and <u>Hanlin Ren</u>
STOC 2023.

🔖 **On the Range Avoidance Problem for Circuits.**
<u>Hanlin Ren</u>, Rahul Santhanam, and Zhikun Wang.
FOCS 2022.

🔖 **Maintaining Exact Distances under Multiple Edge Failures.**
Ran Duan and <u>Hanlin Ren</u>.
STOC 2022.

🔖 **Robustness of Average-Case Meta-Complexity via Pseudorandomness.**
Rahul Ilango, <u>Hanlin Ren</u>, and Rahul Santhanam.
STOC 2022.

Publications (Continued)

- **A Relativization Perspective on Meta-Complexity.**
  Hanlin Ren and Rahul Santhanam.
  STACS 2022.

- **Hardness of KT Characterizes Parallel Cryptography.**
  Hanlin Ren and Rahul Santhanam.
  CCC 2021. *Invited to the ToC special issue for CCC 2021.*

- **Constructing a Distance Sensitivity Oracle in $O(n^{2.5794}M)$ Time.**
  Yong Gu and Hanlin Ren.
  ICALP 2021.

- **Approximate Distance Oracles Subject to Multiple Vertex Failures.**
  Ran Duan, Yong Gu, and Hanlin Ren.
  SODA 2021.

- **Improved Distance Sensitivity Oracles with Subcubic Preprocessing Time.**
  Hanlin Ren.
  ESA 2020. *Invited to the JCSS special issue for ESA 2020.*

- **Strong Average-Case Circuit Lower Bounds from Non-trivial Derandomization.**
  Lijie Chen and Hanlin Ren.
  STOC 2020. *Invited to the SICOMP special issue for STOC 2020.*

- **Approximating All-Pair Bounded-Leg Shortest Path and APSP-AF in Truly-Subcubic Time.**
  Ran Duan and Hanlin Ren.
  ICALP 2018.

Manuscripts / In Submission

- **Metamathematics of Resolution Lower Bounds: A TFNP Perspective.**
  Jiawei Li, Yuhao Li, and Hanlin Ren

Academic Talks

- **Metamathematics of Resolution Lower Bounds: A TFNP Perspective.**

NII Algorithm Lunch Seminar.	Jul 2024
Oxford-Warwick-Imperial Complexity Network.	Jul 2024
Shanghai Jiao Tong University.	Aug 2024
Oxford proof complexity workshop.	Sep 2024

- **Symmetric Exponential Time Requires Near-Maximum Circuit Size.**

Tsinghua University.	Dec 2023
Peking University. https://b23.tv/BV1Cj411J7CB	Dec 2023
ICT, Chinese Academy of Sciences.	Jan 2024
STOC 2024 (with Zeyong Li). https://youtu.be/yVBSU1_0i2o	Jun 2024
Fudan University.	Aug 2024

- **The Iterative Win-Win Method, and Explicit Constructions (without) Using It.**
  A series of two talks at the CSDM Seminar, Institute for Advanced Study. https://youtu.be/uxyN2eVYKic   Nov 2023

Academic Talks (Continued)

Polynomial-Time Pseudodeterministic Construction of Primes.
DIMAP Seminar, University of Warwick.   Jun 2023
TCS+. https://youtu.be/yalaX02fVow   Sep 2023
Algorithms and Complexity Theory Seminars, University of Oxford.   Oct 2023
FOCS 2023.   Nov 2023
Recent Developments in Explicit Constructions, FOCS 2023 Workshop.   Nov 2023
UIUC Theory Seminar.   Jan 2024
Meta-Complexity 2023 Reunion, Simons Institute.   Apr 2024

NP-Hardness of Approximating Meta-Complexity: A Cryptographic Approach.
Minimal Complexity Assumptions for Cryptography, Meta-Complexity 2023, Simons Institute. https://youtu.be/v9JiEf2WH58   May 2023
ICT, Chinese Academy of Sciences (online).   May 2023
STOC 2023. https://youtu.be/DtJQ5-3zptE   Jun 2023

Robustness of Average-Case Meta-Complexity.
Seminar at Meta-Complexity 2023, Simons Institute.   Mar 2023

Bounded Relativization.
Student Seminar, Meta-Complexity 2023, Simons Institute.   Feb 2023
CCC 2023. https://youtu.be/gPqcSXNU0ms   Jul 2023
Warwick complexity meetings (online).   Nov 2023

Range Avoidance, Remote Point, and Hard Partial Truth Table via Satisfying-Pairs Algorithms.
Lower Bounds, Learning, and Average-Case Complexity, Meta-Complexity 2023, Simons Institute. https://youtu.be/pd45Av1iTlw   Feb 2023
STOC 2023.   Jun 2023

Recent Advances in the Range Avoidance Problem.
Yaoclass Seminar (online).   Dec 2022

Range Avoidance Part II: Beyond Circuit Lower Bounds.
New Directions in Derandomization, FOCS 2022 Workshop. https://vimeo.com/user39621409/review/772183410/1201f3a1d4   Nov 2022

On the Range Avoidance Problem for Circuits.
ICMS workshop on Mathematical Approaches to Lower Bounds: Complexity of Proofs and Computation.   Jul 2022
Warwick complexity meetings (online).   Aug 2022
FOCS 2022. https://vimeo.com/user39621409/review/771296149/46488425a3   Nov 2022

Maintaining Exact Distances under Multiple Edge Failures.
STOC 2022. http://youtu.be/B1wMXgTCy8o   Jun 2022

A Relativization Perspective on Meta-Complexity.
STACS 2022 (online).   Mar 2022

Faster Algorithms for Distance Sensitivity Oracles.
IJTCS 2021 (hybrid).   Aug 2021
Yaoclass Seminar.   Nov 2021

Constructing a Distance Sensitivity Oracle in $O(n^{2.5794}M)$ Time.
ICALP 2021 (online). http://youtu.be/uIFoucab6d4   Jul 2021

Hardness of KT Characterizes Parallel Cryptography.
DIMACS workshop on meta-complexity, barriers, and derandomization. http://youtu.be/hZZaEuumtTY   Apr 2022
CCC 2021 (online). http://youtu.be/esFxj1cNLCE   Jul 2021
Yaoclass Seminar.   Apr 2021
Oxford-Warwick complexity meetings (online).   Apr 2021

Academic Talks (Continued)

🔖 **Approximate Distance Oracles Subject to Multiple Vertex Failures.**
SODA 2021 (online). `https://player.vimeo.com/video/496602190`. Jan 2021
Yaoclass Seminar. Dec 2020

🔖 **Improved Distance Sensitivity Oracles with Subcubic Preprocessing Time.**
ESA 2020 (online). `https://youtu.be/2Z46AybFkJ8`. Sep 2020

🔖 **Strong Average-Case Circuit Lower Bounds from Non-trivial Derandomization.**
STOC 2020 (online). `https://youtu.be/xWDQ4LefOVs`. Jun 2020
SIGMA, ICT, Chinese Academy of Sciences (online). Mar 2020

🔖 **Approximating All-Pair Bounded-Leg Shortest Path and APSP-AF in Truly-Subcubic Time.**
ICALP 2018. Jul 2018

Special Issue Invitation

🔖 STOC 2020, ESA 2020, CCC 2021

Teaching Experience

2020 Fall	🔖 **Design and Analysis of Algorithms** (graduate level) *Instructor: Prof. Ran Duan* Teaching assistant
2021 Spring	🔖 **Theory of Computation** (undergraduate level) *Instructor: Prof. Ran Duan* Teaching assistant
2022 Michaelmas Term	🔖 **Advanced Complexity Theory** (Part C) *Instructor: Prof. Rahul Santhanam* Marker and tutor

Selected Awards

2021	🔖 Clarendon Scholarship
2019	🔖 Yao Award, bronze prize
2018	🔖 Evergrande Scholarship
2017	🔖 Baidu "Future Star" Scholarship
2015	🔖 Gold medal (15th place) in Chinese National Olympiad in Informatics (NOI)