

# Hanlin Ren

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📅 Last updated: Jul 2023

## 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.)

- 📖 **Polynomial-Time Pseudodeterministic Construction of Primes.**  
Lijie Chen, Zhenjian Lu, Igor Oliveira, [Hanlin Ren](#), and Rahul Santhanam  
FOCS 2023.
- 📖 **Bounded Relativization.**  
Shuichi Hirahara, Zhenjian Lu, and [Hanlin Ren](#)  
CCC 2023.
- 📖 **Range Avoidance, Remote Point, and Hard Partial Truth Table via Satisfying-Pairs Algorithms.**  
Yeyuan Chen, Yizhi Huang, Jiayu Li, and [Hanlin Ren](#).  
STOC 2023.
- 📖 **NP-Hardness of Approximating Meta-Complexity: A Cryptographic Approach.**  
Yizhi Huang, Rahul Ilango, and [Hanlin Ren](#)  
STOC 2023.
- 📖 **On the Range Avoidance Problem for Circuits.**  
[Hanlin Ren](#), Rahul Santhanam, and Zhikun Wang.  
FOCS 2022.
- 📖 **Maintaining Exact Distances under Multiple Edge Failures.**  
Ran Duan and [Hanlin Ren](#).  
STOC 2022.
- 📖 **Robustness of Average-Case Meta-Complexity via Pseudorandomness.**  
Rahul Ilango, [Hanlin Ren](#), and Rahul Santhanam.  
STOC 2022.
- 📖 **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.*

## Publications (Continued)

- **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.

## Academic Talks

- **Polynomial-Time Pseudodeterministic Construction of Primes.**  
DIMAP Seminar, University of Warwick. Jun 2023
- **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. Jul 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

## Academic Talks (Continued)

- **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/uIFouc6d4> 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
- **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/xWDQ4Lef0Vs>. 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, Prague, Czech Republic. Jul 2018

## Special Issue Invitation

- STOC 2020, ESA 2020, CCC 2021

## Teaching Experience

- |                      |  |
|----------------------|--|
| 2020 Fall            | ■ <b>Design and Analysis of Algorithms</b> (graduate level)<br><i>Instructor: Prof. Ran Duan</i><br>Teaching assistant |
| 2021 Spring          | ■ <b>Theory of Computation</b> (undergraduate level)<br><i>Instructor: Prof. Ran Duan</i><br>Teaching assistant        |
| 2022 Michaelmas Term | ■ <b>Advanced Complexity Theory</b> (Part C)<br><i>Instructor: Prof. Rahul Santhanam</i><br>Marker and tutor           |

## Selected Awards

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|------|---|
| 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) |