

Zishuo Zhao 赵梓硕

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PhD Candidate, ISE, University of Illinois Urbana-Champaign

Background

- **2021/01 - now** PhD Candidate, Department of Industrial & Enterprise Systems Engineering, University of Illinois Urbana-Champaign
Research Area: Operations Research
Advisor: Yuan Zhou
Expected Graduation: 2026 - 2028 (depending on my research progress)
Tentative Thesis Title: *Economics for Reliable Decentralization and Trustworthy AI*
- **2023/09 - 2024/08** Visiting Student, Institute for Data Systems and Society (IDSS), Massachusetts Institute of Technology
Research Topic: Data-Driven Dynamic Mechanism Design
Advisor: David Simchi-Levi
- **2020/08 - 2021/01** Research Assistant, Haihua Institute for Frontier Information Technology
Research Topic: Network Optimization
Advisor: Longbo Huang
- **2016/05 - 2020/07** Undergraduate Student, Institute for Interdisciplinary Information Sciences (Yao Class), Tsinghua University
Research Topic: Geometry-Based Visual SLAM
Advisor: Shi-Min Hu
- **2015/08 - 2016/05** Undergraduate Student, Department of Computer Science and Technology, Tsinghua University

Research Statement

I am a fourth-year PhD candidate in UIUC, majoring in operations research. I have a special interest in the mechanism design for blockchain and decentralized AI, with a (starry-eyed) dream [i*] on the exploration of the design and theoretical boundaries of **decentralized trustworthy AI** platforms, for a general scope of reliability and social sustainability in AI and digital economy, including (particularly) the current concern and initiative of **AI safety** for the upcoming AGI era.

Particularly, I am recently interested in the exploration into a novel paradigm of *incentive security* on blockchain and AI platforms, which aims to combine game-theoretic and systematic/cryptographic methodologies to prevent dishonest behavior of *untrusted but rational* parties.

My current research topics span the following:

- **AI for mechanism design** [#A4M]: e.g., using data-driven methods to improve the performance of economic platforms.
- **Mechanism design for AI** [#M4A]: e.g., using economic incentives to reinforce the efficiency and reliability of AI systems, especially on decentralized platforms.
- **Sustainability in AI & Economy** [#SUS]: e.g., using interdisciplinary methodologies to foster long-term social welfare and environmental friendliness for new-era AI and economic platforms.

Additionally, I was interested in geometry-based computer vision (Visual SLAM in particular) at my undergraduate times. Although I no longer focus on that research field, I am still happy to discuss about related topics, especially the recently fruitful field of Embodied AI [#EAI].

Selected Papers

Proof-of-Learning with Incentive Security [i*] [#M4A] [#SUS] [Link]

Zishuo Zhao, Zhixuan Fang, Xuechao Wang, Xi Chen, Yuan Zhou.

In Submission (2024).

Invited to *INFORMS Conference on Security (IConS'24)*.

ACM EC Workshop on Foundation Models and Game Theory (ACM EC FMGT'24).

A preliminary version presented on *INFORMS Annual Meeting 2023*.

Bayesian Mechanism Design for Blockchain Transaction Fee Allocation [#M4A] [Link]

Xi Chen*, David Simchi-Levi*, Zishuo Zhao*, Yuan Zhou*. (alphabetical order)

Major Revision in *Operations Research*, 2024.

Best Paper Award, *NeurIPS Workshop on Decentralization and Trustworthy Machine Learning in Web3 (NeurIPS DMLW'22)*.

Crypto Economics Security Conference (CESC 2022).

Invited to OR Talk by 运筹OR帷幄 (OR China) in 2024.

Invited to *INFORMS Annual Meeting 2022*.

It Takes Two: A Peer-Prediction Solution for Blockchain Verifier's Dilemma [i*] [#M4A] [Link]

Zishuo Zhao, Xi Chen, Yuan Zhou.

Working Paper (2024). Substantially improved results are available compared to the Arxiv version.
[Draft]

Invited to OR Talk by 运筹OR帷幄 (OR China) in 2024.

Other Papers

Personalized Pricing with Group Fairness Constraint [#A4M] [#SUS] [Link]

Xin Chen*, Zexing Xu*, Zishuo Zhao*, Yuan Zhou*. (alphabetical order)

ACM Conference on Fairness, Accountability, and Transparency (ACM FAccT 2023)

Dynamic Car Dispatching and Pricing: Revenue and Fairness for Ridesharing Platforms [#A4M] [#SUS] [Link]

Zishuo Zhao, Xi Chen, Xuefeng Zhang, Yuan Zhou

International Joint Conference on Artificial Intelligence (IJCAI 2022), **Long Oral (3.75%)**.

Invited to *INFORMS Annual Meeting 2021*.

ClusterSLAM: A SLAM Backend for Simultaneous Rigid Body Clustering and Motion Estimation [#EAI] [Link]

Jiahui Huang, Sheng Yang, Zishuo Zhao, Yukun Lai, Shi-Min Hu.

Computational Visual Media (CVM), Volume 7, pages 87–101 (2021).

International Conference on Computer Vision (ICCV 2019).

Tentative Projects

Online Peer Prediction (for LLM Alignment) [#A4M] [#M4A]

with David Simchi-Levi, Qiushi Han and Renfei Tan.

Awards

Academic

- **Best Paper Award**, NeurIPS Workshop on Decentralization and Trustworthy Machine Learning in Web3, 2022
- Crypto Economics Security Conference (CESC) Travel Award, 2022
- UIUC Graduate College Conference Presentation Award, 2021
- Xuetang Scholarship in Tsinghua University, 2016-2020
- 12th place in 2nd THUCTF Cybersecurity Contest in Tsinghua University, 2020
- 12th place in 24th Artificial Intelligence Programming Contest in Tsinghua University, 2020
- 15th place in 20th Artificial Intelligence Programming Contest in Tsinghua University, 2016.
- Second Prize in Chinese Mathematical Olympiad (CMO), 2014
- First Prize in National Olympiad in Informatics in Provinces (NOIP), 2013

Arts

- Finalist Award in the “一盏茶时 (*IHS Tea Time*)” photography exhibition for the 12th Anniversary of IHS, Tsinghua University, 2023.
- Scholarship for Arts Excellence in Tsinghua University, 2018.
- Third Prize in the Art Festival of No.1 Middle School affiliated to CCNU, for piano performance *Hatsukoi*, 2013.

Academic Activities

Academic Services

- Invited to OR Talk by 运筹OR帷幄 (OR China) for two talks in 2024.
- Facilitator in section Revenue & Pricing, INFORMS Annual Meeting, 2021.
- Invited to the Alumni Forum for the 10th Anniversary of IHS, Tsinghua University in 2021.

Conference Reviewing

- ESA 2024

Advising

- Haibo Xiao (Undergraduate at Tsinghua University)
- Hongxu Su (PhD student at HKUST(GZ))
- Qiushi Han (Undergraduate at UIUC, visiting MIT)
- Renfei Tan (PhD student at MIT)

Miscellaneous

Languages

- Mandarin Chinese (native)
- English (fluent)
- Classical Chinese (writing as a hobby)

Coding Skills

- Mainly using C++, MATLAB and Mathematica, also with command of Python, Java, PHP.
- With some knowledge in ROS, Verilog HDL and assembly language.
- Open to learn new programming languages when in need.

Extracurricular Activities

- I have an amateur interest in Capture-The-Flag (CTF) cybersecurity competitions, and developed two Reverse challenges in the TQLCTF 2022.
- I have a wide scope of hobbies in arts and aerobic sports, especially in vocal music, photography, piano, table tennis and orienteering.

(Updated on Sep 27, 2024)