

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
Advisor: David Simchi-Levi
- **2020/08 - 2021/01** Research Assistant, Haihua Institute for Frontier Information Technology
Research Area: Network Optimization
Advisor: Longbo Huang
- **2016/05 - 2020/07** Undergraduate Student, Institute for Interdisciplinary Information Sciences (Yao Class), Tsinghua University
Research Area: 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 the blockchain platform.
- **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.

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) [#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)