Zishuo Zhao 赵梓硕

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1 Background

- **2023/09 - 2024/08** Visiting Student, Institute for Data Systems and Society (IDSS), Massachusetts Institute of Technology
  Advisor: David Simchi-Levi
- **2021/01 - now** PhD student, Department of Industrial & Enterprise Systems Engineering, University of Illinois Urbana-Champaign
  Research Area: Operations Research
  Advisor: Yuan Zhou
  Expected Graduation: Summer 2026
- **2020/08 - 2021/01** Research Assistant, Haihua Institute for Frontier Information Technology
- **2016/05 - 2020/07** Undergraduate student, Institute for Interdisciplinary Information Sciences (Yao Class), Tsinghua University
- **2015/08 - 2016/05** Undergraduate student, Department of Computer Science and Technology, Tsinghua University

2 Research Interests

I am a fourth-year PhD candidate in UIUC, majoring in operations research, and currently doing research in mechanism design. In general, my research interests span a wide scope related to incentive-aware design and optimization for emerging applications in digital economy, including blockchain systems, e-commerce, ridesharing platforms and so on. I am also interested in data-driven mechanism design based on statistical/online learning, and topics in cryptography and distributed systems with applications in blockchain.

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.

On a very high level, my (starry-eyed) dream `[i*]` for research lies in the following fields, which are also the topics I am actively working on:

- **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 security 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 graphics and vision 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].

3 Research

3.1 Publications and Preprints

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

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

In Submission.

ACM EC Workshop on Foundation Models and Game Theory, 2024. [Link]

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

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)

Bayesian Mechanism Design for Blockchain Transaction Fee Allocation[1] [#M4A] [Link]

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

Best Paper Award*, NeurIPS Workshop on Decentralization and Trustworthy Machine Learning in Web3 (DMLW), 2022.*

Crypto Economics Security Conference (CESC 2022).

Invited to *INFORMS Annual Meeting 2022.*

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.*

[1] A preliminary version of this research has the title "Bayesian-Nash-Incentive-Compatible Mechanism for Blockchain Transaction Fee Allocation"

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).

3.2 Working Projects

Incentive-Aware Dynamic Auction for Budgeted Bidders [#A4M]

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

(Peer Prediction for) Decentralized Verification Game [i*] [#M4A]

(an interest-driven project; a preliminary version: [Link])

4 Awards

4.1 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
- 12th place in 2nd THUCTF Cybersecurity Contest in Tsinghua University, 2020
- 12th place in 24th Artificial Intelligence Programming Contest in Tsinghua University, 2020
- Xuetang Scholarship in Tsinghua University, 2016-2020
- 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

4.2 Arts

- Finalist Award in the "一盏茶时 (*IIIS Tea Time*)" photography exhibition for the 12th Anniversary of IIIS, 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, 2013.

5 Academic Activities

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

6 Miscellaneous

6.1 Languages

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

6.2 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.

6.3 Coding Skills

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

(Updated on Jun 4, 2024)