Zerui Cheng

Fourth-year Undergraduate,

Majoring in Computer Science,

Member of the Honored Yao Class Program,

IIIS, Tsinghua University

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Education

B.Eng. , Aug 2019 - Jul 2023 (expected)

Tsinghua University   Current Cumulative GPA: 3.9/4.0

Majoring in Computer Science, member of the honored undergraduate CS program Yao Class founded by Turing Award winner Andrew.C.Yao

Research Interests

I'm broadly interested in various areas,
 including but not limited to:

- **Blockchains and Cryptocurrencies**
- **Mechanism Design and Incentive Design**
- **Applied Cryptography**

Research Experience

Research Intern   **Mar 2022 - Aug 2022**

Affiliation: UC Berkeley   Advisor: Prof. Dawn Song

Worked on the design and implementation of "zkBridge", the first ever trustless cross-chain bridge secured by cryptographic guarantee.
Co-authored the paper "zkBridge: Trustless Cross-chain Bridge Made Practical".

Research Intern   **Feb 2022 - Aug 2022**

Affiliation: Duke University   Advisor: Prof. Fan Zhang

Worked on designing, analyzing and simulating side contracts against EIP-1559 of Ethereum. Still in progress now, and results will hopefully come out soon.

Summer Research Intern   **Jul 2021 - Aug 2021**

Affiliation: Shanghai Qizhi Institute   Advisor: Prof. Zhixuan Fang

Worked on theoretical modeling and mathematical analysis (using queueing theory) of transaction waiting time on popular blockchains (e.g., Bitcoin).

Student Research Training Program   **Oct 2020 - Feb 2022**

Affiliation: Tsinghua University   Advisor: Prof. Zhixuan Fang

Worked on two projects during the period of time:
1. Analysis of multi-agent selfish mining on Bitcoin by theory and simulation.
2. Mechanism design and implementation of CrowdMine, a new protocol aimed on re-utilizing computation power for useful work in Proof-of-Work blockchains.

Co-first author of the paper "Crowdsourcing Work as Mining: A Decentralized Computation and Storage Paradigm".

Papers

zkBridge: Trustless Cross-chain Bridge Made Practical
                                        [Accepted to ACM CCS 2022]

Tiancheng Xie, Jiaheng Zhang, **Zerui Cheng**, Fan Zhang, Yupeng Zhang, Yongzheng Jia, Dan Boneh, Dawn Song

Crowdsourcing Work as Mining: A Decentralized Computation and Storage Paradigm   *[In submission now]*

Canhui Chen*, **Zerui Cheng***, Shutong Qu, Zhixuan Fang [*: equal contribution]

Other Projects

Design and Analysis of Side Contracts against EIP-1559 From Theory, Simulation, and Empirical View
                                        Feb 2022 till now

In-progress research project during internship, advised by Prof. Fan Zhang

An Algorithm for Graph Matching with Restrictions on Edge Weights, Based on Number Theory, Linear Algebra and Randomization (link)   May 2021 - June 2021

<Numerical Analysis> course project, instructed by Prof. Wenjian Yu

A Survey on Blockchain System and Related Cryptographic Methods (link)   Apr 2021 - June 2021

<Fundamentals of Crypto> course project, instructed by Prof. Yilei Chen

Game-Theoretic Analysis of Multi-Agent Selfish Mining in Bitcoin (link)   Oct 2020 -May 2021

Students' Research Training Project, advised by Prof. Zhixuan Fang
Presented at Rump Session on IC3 Blockchain Summer Camp 2022

Scholarships

Yao Award (Intro to the Prize)   **Sep 2022**

Scholarship for Excellence in Academic Achievements
                                        Oct 2021

Scholarship for Excellence in Scientific and Technological Innovation   **Oct 2021**

Scholarship for Excellence in Voluntary Work and Social Activities   **Oct 2020**

Xuetang Scholarship (Tuition Fee Exemption)
Annual, from 2019

Honors / Awards	ICPC is short for International Collegiate Programming Contest CCPC is short for Chinese Collegiate Programming Contest

Winner of IC3 Blockchain Camp Hackathon   **Aug 2022**
Project: Optimal Wallet Design for Client Security, led by Ittay Eyal and Roi Bar-Zur

155th worldwide (top 0.5%) in Google CodeJam
Jun 2022

Gold Award in CCPC (Harbin Site)   **Nov 2021**
Leader of Team "Safety Car", 7th place nationwide

Gold Award in ICPC (Yinchuan Site)   **May 2021**
Member of Team "Tsar Bomba", 5th place nationwide

Silver Award in ICPC (East Continental Final)   **Apr 2021**
Member of Team "Tsar Bomba", 40th place worldwide

Gold Award in CCPC (Changchun Site)   **Nov 2020**
Member of Team "Tsar Bomba", 8th place nationwide

Second Place in "Leetcode Cup" National Programming Contest   **Oct 2019**

Silver Medal in National Olympiad in Informatics
Jul 2018

Gold Medal in CTSC (Chinese Team Selection Contest) for Informatics   **May 2018**

Bronze Medal in APIO (Asia-Pacific Informatics Olympiad)
May 2018

Gold Medal in National Olympiad in Informatics Winter Camp   **Feb 2018**

Social Work / Activities	**Vice President, IIIS Students Union** **From Oct 2021**

Deputy Secretary, IIIS Youth League Committee
Oct 2021 - Feb 2022

League Branch Secretary of Yao Class 92 **From Sep 2021**

Problem Setter of National Olympiad in Informatics 2021
Jul 2021

Volunteer of the 110th Anniversary of Tsinghua University
                                                                    Apr 2021

Member, Organization Department of IIIS Students Union
                                                        Aug 2020 - Sep 2021

Member, Contest Stuff Department of THU Algorithm
Association   **Jul 2020 - Feb 2022**

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Skills   **Programming Skills**
                    Most Proficient: C/C++   **Frequently Used:** Python, Solidity
                    Also familiar with: Golang, Matlab, SQL, Verilog, gnark, ZoKrates

                    Language Skills
                    Chinese (native), English (111pts in TOEFL iBT, R30 L27 S24 W30)

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Last Revised on: *Sep 12, 2022*