

# ZHIYUAN ZHAO

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## EDUCATION

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### The Chinese University of Hong Kong, Shenzhen

B.Eng. of Electronic Information Engineering - Electrical Engineering

Sep 2020 - now

**Current CGPA:** 3.763/4.0, ranking in the top 5%; **Current MGPA:** 3.797/4.0, ranking in the top 5%.

**Core Curriculum:** *Discrete Mathematics, Introduction to Information Theory, Data Structures, Stochastic Processes, Blockchain and Decentralized Applications, Principles of Communication Systems, Signals and Systems, Digital Logic and Systems, Introduction to Computer Science: Programming Paradigms, Machine Learning, Optimization.*

## RESEARCH EXPERIENCE

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### The bound of Multi-Message Private Information Retrieval

Jun 2023 - now

School of Science and Engineering, CUHK-Shenzhen

*Supervisor: Zitan Chen*

- Significantly contributed to the field by proving the inaccessibility of the bound in the paper titled “[Multi-Message Private Information Retrieval: Capacity Results and Near-Optimal Schemes](#)” with respect to the linear Multi-Message Private Information Retrieval scheme, specifically under conditions where  $P$  (the number of desired messages) does not divide evenly into  $M$  (total number of messages)
- Introduced a novel analytical approach to assess the bound of Multi-Message Private Information Retrieval. This approach leverages rank conditions to constrain the query matrix and evaluates the “similarity” of the query matrix to simplify the problem

### The Optimal File Size of Private Information Retrieval and Secret Sharing

Apr 2023 - Jun 2023

School of Science and Engineering, CUHK-Shenzhen

*Supervisor: Zitan Chen*

- Identified the smallest possible file size for the rate-optimal byzantine-resistant communication-efficient secret sharing scheme
- Disproved the findings of “[Communication Efficient Secret Sharing With Small Share Size](#)” by demonstrating the incorrectness of their claim regarding achieving a smaller share size and decoding delay
- Confirmed the optimality of the file size had been achieved in the scheme proposed by “[Communication Efficient Secret Sharing](#)”
- Investigated the lower file size bound for balanced capacity-achieving private information retrieval file size, thus establishing a minimum file size requirement for balanced capacity-achieving private information retrieval

### Communication Efficient Secret Sharing and Multi-Party Computation

Jul 2022 - Mar 2023

School of Science and Engineering, CUHK-Shenzhen

*Supervisor: Zitan Chen*

- Designed and proposed a matrix-based approach inspired by the research presented in “[Communication Efficient Secret Sharing](#)”, aiming to make the scheme applicable for computer program implementation
- Referenced the book “[Secure Multiparty Computation and Secret Sharing](#)” and “[Lecture Notes in Secret Sharing](#)” to gain further insights and deepen understanding in the field

## PROJECT

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### Bouncing Ball Game in Microprocessor

Sep 2022 - Dec 2022

- Developed a bouncing ball game on a microprocessor from scratch using C language
- Implemented an always-moving baffle in the middle of the game, enabling the ball to bounce back upon collision with the baffle
- Introduced ball speed boost functionality for both Player A and B, allowing them to accelerate the ball’s movement using designated keys

- Created a flashing ball effect where, after every five collisions with the board and the baffle, the ball briefly disappears and flashes to provide visual feedback

## CarRenting Smart Contract

Nov 2022 - Dec 2022

- Developed a decentralized car rental system using Solidity programming language on the Ethereum blockchain
- Implemented a smart contract called CarRenting that enables users to participate in car rental auctions and make bids
- Designed functions for placing bids, canceling auctions, withdrawing funds, and adding reviews for rented cars

## TEACHING EXPERIENCE

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### Undergraduate Student Teaching Fellow

Sep 2022 - Dec 2022

School of Data Science, CUHK-Shenzhen

Course: *Introduction to Computer Science (CSC3002)*

- Led tutorials for 200+ students, delivering comprehensive instruction.
- Designed and developed assignment case studies.
- Conducted weekly office hours for Q&A and support.

### Undergraduate Student Teaching Fellow

Sep 2021 - Dec 2021

School of Science and Engineering, CUHK-Shenzhen

Course: *Advanced Mathematics (MAT1008)*

- Led calculus tutorials for 27 students.
- Provided homework feedback and corrections.
- Conducted weekly office hours for student support.

## EXTRA-CURRICULAR ACTIVITIES AND HONORS

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### Soccer Achievements

- Member of CUHK-Shenzhen Men's Soccer Team
- Two gold medals in College Soccer Competition
- Silver medal in Freshmen Soccer Competition

### Go Game Achievements

- 5th dan rank in Go game
- 4th place in Shenzhen Go Game League One

### IEEE Student Branch Involvement

- Vice-Chair, CUHK(SZ) IEEE Student Branch
- Conducted and published interviews on CUHK(SZ) IEEE WeChat account to promote the organization's mission

## ACADAMIC HONORS

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- AY 2020-2021 Academic Performance Scholarship: Class A (0.5% in CUHK-Shenzhen)
- 20th Round Undergraduate Research Award (5% in CUHK-Shenzhen)
- SSE Dean's List Award of AY 2020-21, AY 2021-22 and AY 2022-23 (20% in CUHK-Shenzhen)

## SKILLS

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- Computer Language: C++, C, Python, Java, Solidity, HTML, CSS
- Software: MATLAB, LaTeX