# ZHIYUAN ZHAO

2001 Longxiang Boulevard, Longgang District, Shenzhen, Guangdong, China

zhiyuanzhao@link.cuhk.edu.cn ⋄ +86 17826513608

## EDUCATION

**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

**The Bound of Download Rate 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 of bownload rate 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 download rate 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

**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

**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

**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

- 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

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