

# YOUWEI ZHONG

Shanghai Jiao Tong University ◇ Shanghai, China

Currently at Yale University ◇ New Haven, US

(+86) 13611764416 ◇ (+1) 2036758366 ◇ zhongyouwei@sjtu.edu.cn ◇ <https://ywzh.org/>

## EDUCATION

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### Shanghai Jiao Tong University

September 2021 – Present

Undergraduate in Computer Science

Member of **John Hopcroft Class**, an elite CS program at Zhiyuan College, Shanghai Jiao Tong University, for top 5% of students, with a focus on **Theoretical Computer Science**.

Core GPA: 3.91

TOEFL Score: 101

### Shanghai High School

September 2018 – June 2021

Member of the Engineering Class, an elite class at SHS, one of the best high schools in China.

## PUBLICATION

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### A Parameterized Framework for the Formal Verification of Zero-Knowledge Virtual Machines

2024

*Youwei Zhong*

*OOPSLA 2024*

- The Second Place Winner in the Student Research Competition
- This paper introduces a parameterized framework for the formal verification of zkVMs in Coq. We prove the soundness and completeness of the constraint generation algorithm from machine instructions to semantics-level constraints. Existing works target specific zkVMs, and require repeated proof work in this phase, whereas our proofs are parameterized and can be reused in development and by all zkVMs. We also demonstrate the generality of our framework by instantiation on two examples: Cairo VM and a simplified zkEVM.

## RESEARCH EXPERIENCE

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### Rigorous Software Engineering (ROSE) group, Yale University

November 2024 - Present

*Research internship*

*New Haven, Connecticut, US*

- Tutored by Ruzica Piskac, Timos Antonopoulos and Ning Luo
- Worked in optimization of zero-knowledge circuits, using the cvc5 SMT solver.

### PLSE, UC Santa Barbara / Riema Labs

March 2024 - October 2024

*Research internship / Security R&D*

*Remote*

- Tutored by Yu Feng and Yanju Chen, collaborated with Ranjit Jhala
- Worked in developing bug finders for zero-knowledge virtual machines.
- Developed an analyzer for circom, a domain specific language for zero-knowledge circuits.

### John Hopcroft Center, Shanghai Jiao Tong University

April 2023 - October 2024

*Research internship*

*Shanghai, China*

- Tutored by Qinxiong Cao and Yuncong Hu
- Worked in the formal verification of zero-knowledge virtual machines, using the Coq proof assistant, with a paper accepted by OOPSLA 2024 SRC.
- Developed a DSL in Coq that provides a built-in field element type. Enabled symbolic execution and entailment generation in our DSL. Wrote an example of proving the correctness of a bit-decomposition program in our DSL.

## MANUSCRIPTS

### **A Parameterized Framework for the Formal Verification of Zero-Knowledge Virtual Machines**

2024

*Youwei Zhong, Zihan Xu, Yuncong Hu, Xiang Xie, Yu Yu, Qinxiang Cao*

- This paper (revision in progress) is an extension work based on my OOPSLA 2024 SRC paper with the same name.

## ACADEMIC ACTIVITIES

### **OOPSLA/SPLASH 2024**

October 2024

*Student Volunteer*

*Pasadena, California, United States*

- Attended the Programming Languages Mentoring Workshop (PLMW).
- Participated in the Student Research Competition and got the 2nd place in undergraduate category.

## WORK EXPERIENCE

### **Minghong Investment**

January 2024 - February 2024

*Quantitative Developer*

*Shanghai, China*

- Worked in developing a high frequency trading system.

## TEACHING EXPERIENCE

### **Program Design and Data Structure - Part III, Shanghai Jiao Tong University**

June 2023 – July 2023

*Teaching assistant*

*Shanghai, China*

- Prepared the code repository for the project of Ray Tracing in Rust. Wrote a detailed setup manual for the students.
- Designed the tasks of the project. Answered the questions of the students.

## HONORS AND AWARDS

**The 2nd Place Winner in OOPSLA 2024 SRC**

October 2024

**Longfor Scholarship (10'000 yuan, 10 winners each year)**

December 2022

**Zhiyuan Honors Scholarship (5'000 yuan per year, Top 5%)**

December 2023, 2022 and 2021

**Three Good Student of Shanghai Jiao Tong University**

October 2024, 2023 and 2022

## MISCELLANEOUS

### **John Class Online**

December 2021 – Present

*Maintainer*

- Designed an internal class forum based on Discourse, a well-known open source discussion platform.
- Maintained the operation of the Aliyun server and the website.

### **Zhiyuan College Debate Team**

July 2021 – July 2022

*Captain*

*Shanghai, China*

- Organized the recruitment of the debate team. Produced recruiting WeChat pushes.
- Lead the preparation for Freshman Cup and Union Cup. Organized team building activities.

## TECHNICAL SKILLS

### **Research Interests**

Formal Verification, Zero-Knowledge Proof

### **Computer Languages**

Coq, C, C++, Python, Rust

### **Machine Learning library**

Pytorch, Scikit-learn

### **Tools**

Git, VSCode