

# Zuoyan Zhang

📍 Changsha, Hunan

✉ [zyanz@hnu.edu.cn](mailto:zyanz@hnu.edu.cn)

☎ +86 132-5337-3940

🔗 [zuoyanzhang.github.io](https://zuoyanzhang.github.io)

🐙 [github.com/zuoyanzhang](https://github.com/zuoyanzhang)



## Education

### Hunan University

PhD in Computer Science and Technology

Sep 2024 – present

Changsha, Hunan

- **Supervisor:** Jie Zhao
- **Laboratory:** CYCLE Lab
- **Research Interests:** AI Compilers, LLM Distributed Training Acceleration

### Information Engineering University

Master in Computer Technology (GPA: 88.7/100)

Sep 2021 – Jun 2024

Zhengzhou, Henan

- **Laboratory:** State Key Laboratory of Mathematical Engineering and Advanced Computing
- **Research Interests:** Numerical Program Analysis, Polyhedral Compiler

### Henan University of Technology

Bachelor in Computer Science and Technology

Sep 2017 – Jun 2021

Zhengzhou, Henan

## Experience

### AI for Science Institute

Intern Research

Jun 2023 – Sep 2023

Beijing, China

- Implemented and optimized accuracy testing framework for ABACUS core numerical functions.
- Developed customized precision testing schemes targeting diverse function categories.
- Designed and implemented comprehensive test suites for Simpson's integral and spherical harmonic functions.

## Publications

### [1] Arfa: An agile Regime-based Floating-point Optimization Approach for Rounding Errors

Jinchen Xu, Mengqi Cui, Fei Li, **Zuoyan Zhang**, Hongru Yang, Bei Zhou, Jie Zhao.

In Proceedings of the 33rd ACM International Symposium on Software Testing and Analysis (ISSTA 2024).

DOI: 10.1145/3650212.3680378

### [2] Eiffel: Inferring Input Ranges of Significant Floating-point Errors via Polynomial Extrapolation

**Zuoyan Zhang**, Bei Zhou, Jiangwei Hao, Hongru Yang, Mengqi Cui, Yuchang Zhou, Guanghui Song, Fei Li, Jinchen Xu, Jie Zhao.

In Proceedings of the 38th IEEE/ACM International Conference on Automated Software Engineering (ASE 2023).

DOI: 10.1109/ASE56229.2023.00139

### [3] Hierarchical search algorithm for error detection in floating-point arithmetic expressions

**Zuoyan Zhang**, Jinchen Xu, Jiangwei Hao, Yang Qu, Haotian He, Bei Zhou.

The Journal of Supercomputing.

DOI: 10.1007/s11227-023-05523-6

## Projects

### Intelligent Compilation and Optimization Techniques for Supernode Parallelism Strategies

Jan 2025 – Dec 2026

- Huawei Technologies (Agreement No. TC20241115006).
- My research will focus on two key aspects of LLM distributed training optimization:
  - \* Design automated search algorithms for distributed parallelization strategies in large-scale model training.
  - \* Investigate compute-communication co-optimization approaches to enhance training efficiency.
- Core Researcher
- ¥ 2,286,000

- Research on Floating-point Error Detection and Precision OptimizationOct 2022 – Sep 2024
- Open Project of the State Key Laboratory of Mathematical Engineering and Advanced Computing (Grant No. 2023B02).
  - Developed Maxfpeed, an innovative floating-point error detection tool, with optimized detection algorithms achieving significant efficiency improvement over existing methods for complex arithmetic expressions analysis.
  - Core Researcher
  - ¥ 600,000

- Deep Learning and Tensor Compilers based on the Polyhedral ModelJan 2021 – Dec 2024
- National Natural Science Foundation of China (Grant No. U20A20226).
  - Contributed to developing an automatic mixed-precision code generator that utilizes the polyhedral model with fitting functions to determine optimal iteration space for nested loop programs.
  - Research Team Member
  - ¥ 2,600,000 in total; ¥ 800,000 for the Information Engineering University

- Elementary Mathematics Library SystemJun 2018 – Jun 2022
- National major special project.
  - Architected and implemented a comprehensive test framework for high-performance mathematical libraries, including correctness, anomaly detection, precision and performance testing modules, with automated test suites and scripts for continuous validation.
  - Core Team Member

Honors and Awards

- |                                     |  |
|-------------------------------------|--|
| • Excellent MEng Dissertation Award | Information Engineering University, Oct 2024 |
| • National Scholarship              | Ministry of Education of China, Dec 2023     |
| • First Class Academic Scholarship  | Information Engineering University, Nov 2023 |
| • Second Class Academic Scholarship | Information Engineering University, Nov 2022 |
| • First Class Academic Scholarship  | Information Engineering University, Nov 2021 |

Technical Skills

**Languages:** C, C++, Python, Shell, and etc.  
**Technologies:** PyTorch, MindSpore, Linux, Latex, Matlab, Git, Docker, Make, CMake, and etc.  
**Concepts:** Machine Learning Systems, AI Compilers, Polyhedral Compiler, Large Language Model, Distributed System, Computation-Communication Co-design, Floating-point Error, Dynamic Analysis.

Activities and Leadership

**Undergraduate Teaching Assistant:** Compiler Principles Course, Hunan University  
**Executive Committee Member:** CCF Student Chapter, Hunan University