

Wenjie Ma

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🏠 [euclidgame.github.io](https://github.com/maeuclidgame)

🔗 [euclidgame](#)

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EDUCATION

Nanjing University, Nanjing, China

B.S. in Computer Science and Technology

Sep. 2019 – Jun. 2023

National Elite Program of Computer Science

GPA: 4.68/5.00 (93.6/100) **Rank:** 1st /213 **TOEFL:** 113 (Speaking 25)

Highlight Courses: Operating Systems (99), Linear Algebra (99), Mathematical Logic (94), Formal Languages and Automata (94), Concurrency: Algorithms and Theories (96), Introduction to Machine Learning (95), Problem Solving (94, 4-semester course covering Discrete Mathematics, Data Structures, Algorithm Design and Analysis, Abstract Algebra, Computer Theory etc.), Software Engineering (98), Principles and Techniques of Compilers (100).

PUBLICATIONS

1. Context Sensitivity without Contexts: A Cut-Shortcut Approach to Fast and Precise Pointer Analysis

Wenjie Ma, Shengyuan Yang, Tian Tan, Xiaoxing Ma, Chang Xu, Yue Li

In *Proceedings of the 44th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2023)*, Orlando, FL, June 2023

[📄 full text][📦 artifact][🗣️ talk]

PUBLICATIONS (SUBMITTED)

1. Anvil: Verifying Liveness of Cluster Management Controllers

Xudong Sun, Wenjie Ma, Jiawei Tyler Gu, Zicheng Ma, Tej Chajed, Jon Howell, Andrea Lattuada, Oded Padon, Lalith Suresh, Adriana Szekeres, Tianyin Xu

In submission to the 18th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2024)

RESEARCH EXPERIENCE

Xlab, University of Illinois Urbana-Champaign, Urbana-Champaign, IL

Research Assistant, Distributed System Reliability

Mar. 2023 – Present.

Advisor: Prof. Tianyin Xu

Collaborators: VMWare Research Group

- **Anvil: a formal verification framework for cluster management controllers**

🔗 <https://github.com/vmware-research/verifiable-controllers>

1. Anvil is a formal verification framework for developing practical cluster management controllers and mechanically proving the controller satisfies a set of **liveness** and safety properties. We demonstrated three verified representative and full-fledged Kubernetes controllers that manage critical systems: ZooKeeper, Rabbitmq and FluentBit.
2. **Key contributions:** led the proof of liveness and safety properties using TLA and Verus, implemented rich features for controllers and crafted models for several components: Kubernetes API server, third-party libraries, controllers.
3. I am one of the two **key contributors** and second-author on a paper submitted to OSDI 2024.

PASCAL group, Nanjing University, Nanjing, China

Research Assistant, Static Program Analysis

Mar. 2021 – Nov. 2022

Advisors: Prof. Yue Li and Prof. Tian Tan

- **Traditional Whole Program Pointer Analysis**

🔗 <https://github.com/pascal-lab/Tai-e>

1. Proposed a new approach for pointer analysis, which is faster than context-insensitive analysis, 400x faster than traditional context-sensitive analysis in some cases and achieves precision comparable to context sensitive analysis.
2. Independently designed detailed algorithms for program patterns like containers and field accesses, implemented the approach on a static analysis framework (TAI-E), evaluated it exhaustively on 10 large and complex real-world Java applications (e.g. Eclipse and Soot) which in total exceeded 2M lines of code.
3. First-author paper published at PLDI 2023 as an undergraduate.

- **Co-review:** Science of Computer Programming.

- **Precise Interprocedural Dataflow Analysis:** Implemented IFDS/IDE frameworks on TAI-E.

TALKS

- "Context Sensitivity without Contexts: A Cut-Shortcut Approach to Fast and Precise Pointer Analysis", PLDI 2023

TEACHING EXPERIENCE

Teaching Assistant — *Static Program Analysis*

Nanjing University

Sep. 2022 – Feb. 2023

- A course of static analysis for both graduates and undergraduates (180 students enrolled in).
- **My role:** Wrote documents and tests (<https://tai-e.pascal-lab.net/en/intro/overview.html>) for the course programming assignments that are registered by students from 140+ universities all over the world; helped students understand the courses and accomplish programming assignments; designed final exam papers.

COURSE PROJECTS

Principles and Techniques of Compilers

Nanjing University

Mar. 2022 – Jun. 2022

- Developed all the components of a compiler that compiles source code of a C-like language into MIPS assembly code and conducted code optimization on it.

Operating Systems

Nanjing University

Mar. 2021 – Jun. 2021

- Implemented a multiprocessor xv6-like operating system kernel based on a hardware abstraction layer and reproduced some Linux command line tools (e.g., `pstree`, `libco`, `strace`).

Experiments in Digital Logical Circuits

Nanjing University

Sep. 2020 – Dec. 2020

- Implemented a MIPS processor written in Verilog (over 2000 lines) with support of I/O operations and softwares and demonstrated it on FPGA.

Introduction to Computer Systems

Nanjing University

Sep. 2020 – Dec. 2020

- Implemented a simple but complete full-system emulator supporting the most common used instructions of x86, interrupt/exception, common devices, segmentation/paging.

HONORS & AWARDS

Grand Prize for Outstanding Undergraduate Thesis, Nanjing University

2023

Excellence Award for Undergraduates in Basic Science, Nanjing University

2021 & 2022

First prize of People's Scholarship, Nanjing University

2021

Elite Program First-class Scholarship, Nanjing University

2020

SKILLS

Programming Languages: Java, C++, C, Rust, Python, JavaScript, Coq, Assembly, Verilog