

Miao Miao

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RESEARCH INTERESTS

My research interest lies in program analysis and fuzz testing, and their applications in software reliability and security. I focus on enhancing the reliability and usability of static analysis tools by automatically detecting bugs and diagnosing their root causes. I also work on improving the fuzz testing evaluation process by developing benchmarks that integrate program characteristics, aiming for a more comprehensive and accurate assessment of fuzzing tools.

EDUCATION

Doctor of Philosophy, Software Engineering

Jan 2023 - present

The University of Texas at Dallas, Richardson, Texas, USA

Advisor: Dr. Shiyi Wei

Master of Science, Software Engineering

Aug 2021 - Dec 2022

The University of Texas at Dallas, Richardson, Texas, USA

GPA: 3.97

Bachelor of Engineering, Computer Science and Technology

Sep 2014 - June 2018

The Xi'an University of Finance and Economics, Xi'an, China

GPA: 3.59

AWARDS

- Winner of ICSE 2025 ACM student research competition (1st place).
- Mary and Richard Templeton Graduate Fellowship in 2025.
- The ACM SIGSOFT CAPS Travel Award for ICSE 2025.
- The Jonsson School Best Teaching Assistant Award in 2024.

PUBLICATIONS

* ICSE and ISSTA are top-tier conferences in Software Engineering, while TOSEM and EMSE are among the field's leading journals.

• Program Feature-based Benchmarking for Fuzz Testing

Miao Miao, Sriteja Kummita, Eric Bodden, and Shiyi Wei.

In the 34th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2025.

• An Extensive Empirical Study of Nondeterministic Behavior in Static Analysis Tools

Miao Miao, Austin Mordahl, Dakota Soles, Alice Beideck, and Shiyi Wei.

In the 47th IEEE/ACM International Conference on Software Engineering (ICSE), 2025.

• Visualization Task Taxonomy to Understand the Fuzzing Internals

Kummita Sriteja, Miao Miao, Bodden Eric, and Shiyi Wei.

ACM Transactions on Software Engineering and Methodology Journal (TOSEM), 2025.

• Program Feature-based Fuzzing Benchmarking

Miao Miao.

In the 47th IEEE/ACM International Conference on Software Engineering, ACM Student Research Competition (ICSE-SRC), 2025.

• Visualization Task Taxonomy to Understand the Fuzzing Internals (Registered Report)

Kummita Sriteja, Miao Miao, Bodden Eric, and Shiyi Wei.

In the Proceedings of the 3rd ACM International Fuzzing Workshop (FUZZING), 2024.

• ECSTATIC: Automatic Configuration-Aware Testing and Debugging of Static Analysis Tools

Austin Mordahl, Dakota Soles, Miao Miao, Zenong Zhang, and Shiyi Wei.

In the 32nd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), Tool Demonstration Track, 2023.

Papers Under Review

- **Towards Automated Identification of Data Constraints in Software Documentation**

Ying Zhou, Miao Miao, Vlad Birsan, Oscar Chaparro, Shiyi Wei, and Andrian Marcus.

Under review at Empirical Software Engineering Journal (EMSE), 2025.

RESEARCH EXPERIENCE

Fuzzing Bottleneck Localization

Jan 2025 – Present

- Conduct experiments to identify fuzzing blockers across different fuzzers (e.g., AFL++, LibFuzzer, Honggfuzz) using Fuzz-Introspector.
- Analyze the impact of various factors on fuzzing blocker detection, including branch side hit frequency, number of trials, and runtime.
- Investigate and localize the root causes of fuzzing blockers specific to each fuzzer.
- Perform differential testing to evaluate how fuzzer design influences fuzzing blockers.

Program Feature-based Benchmarking for Fuzz Testing

May 2024 – Nov 2024

- Performed a literature review of 25 recent grey-box fuzzing papers to extract fine-grained program features from their claimed improvements.
- Created the first feature-based benchmark that defines 10 configurable parameters for the extracted program features with 153 generated programs.
- Evaluated 11 popular fuzzers to understand fuzzer behaviors and the impact of each program parameter on their performance.

Visualization Task Taxonomy to Understand the Fuzzing Internals

May 2024 – Nov 2024

- Conducted semi-structured interviews with fuzzing experts.
- Systematically extracted the task taxonomy from the interview data through qualitative data analysis.
- Evaluated the support of existing visualization tools for fuzzing through the lens of our taxonomy.

An Extensive Empirical Study of Nondeterministic Behavior in Static Analysis Tools

June 2023 – Aug 2024

- Performed qualitative analysis of the repositories of 11 popular static analysis tools that shows common nondeterministic issues and categorizes their root causes.
- Constructed an experiment framework and conducted empirical study that detects previously unknown nondeterministic behaviors in tools such as SOOT, WALA, DOOP, FlowDroid, PyCG and Infer.
- Debugged root causes of discovered nondeterministic bugs and reported them to tool developers.

Towards Automated Identification of Data Constraints in Software Documentation

Sep 2022 – Dec 2023

- Identified and validated the data constraints in requirements documentation which specify allowed data values in software systems.
- Identified 15 discourse patterns, commonly used to describe data constraints in natural language.
- Debugged and evaluated an NLP-based automated splitter which breaks down a sentence to fragments based on the developed discourse patterns. These patterns are used as features for machine learning.
- Trained and evaluated 5 machine learning classifiers for automatically extracting data constraints.

INDUSTRY EXPERIENCE

iOS Engineering Intern, Tinder Inc.

May 2022 – Aug 2022

iOS Developer, LotusFlare Inc.

Aug 2019 – June 2021

Junior Software Engineer, KA Software

Apr 2018 – Apr 2019

TEACHING EXPERIENCE

Teaching Assistant

** Contributed to curriculum development and design of projects and assignments; Provided video and in-class tutorials to guide students through project implementation.*

- CS/SE 6356: Software Maintenance Evolution and Re-Engineering (Spring 2023)
- CS 4386: Compiler Design (Fall 2023)
- CS 6353: Compiler Construction (Spring 2024)

SERVICES

- Artifact Evaluation Committee member: the 34th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2025).
- Artifact Evaluation Committee member: the 46th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2025).
- Junior Program Committee member: the 22nd International Conference on Mining Software Repositories (MSR 2025).
- Mentored four high school students and three undergraduate students in the UTD K-12 Summer Research Program and Clarks Summer Research Program (Summer 2023, Summer 2024).
- Student Volunteer: the 47th IEEE/ACM International Conference on Software Engineering (ICSE 2025).
- Student Volunteer: the 32nd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2023).
- Sub-review: CCS2025, USENIX2025, ISSTA2025, ICSE2025, FSE2025, USENIX2024, MSR2025, ISSTA2024, ICSE2024, FSE2024, ASE2024, FSE 2023, ISSTA 2023, SecDev 2023, ICSE 2023.