ZITONG (ERIC) ZHOU

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EDUCATION

University of California, Los Angeles (UCLA) *Sep 2023 – 2028 (Expected)*
(Attending) Ph.D in Computer Science, *advised by Prof. Miryung Kim*

University of Illinois at Urbana-Champaign (UIUC) *Aug 2021 – May 2023*
M.Eng. in Electrical and Computer Engineering

New York University *Sep 2017 – May 2021*
B.A. in Computer Science & Mathematics

RESEARCH INTERESTS

I work in the research area of software engineering. My research broadly spans software engineering, programming languages, and compilers. My goal is to build practical testing and analysis tools that help developers understand and verify critical software behaviors. In particular, I have worked on: (1) contextualized, LLM-based regression test augmentation targeting code changes; (2) synthesizing tests for optimizing compilers from LLM program snippets.

PUBLICATIONS

Change And Cover: Last-Mile, Pull Request-Based Regression Test Augmentation. Zitong Zhou*, Matteo Paltenghi*, Michael Pradel, Miryung Kim. * Equal Contribution. *International Conference on Software Engineering (ICSE)*. 2026.

Testing Optimizing Compilers with Grammar Composition Styles. Zitong Zhou, Ben Limpanukorn, Jiyuan Wang, Hong Jin Kang, Miryung Kim. [Preprint]

Fuzzing MLIR Compilers with Custom Mutation Synthesis. Ben Limpanukorn, Jiyuan Wang, Hong Jin Kang, **Zitong Zhou**, Miryung Kim. *International Conference on Software Engineering (ICSE)*. 2025.

AquaSense: Automated Sensitivity Analysis of Probabilistic Programs via Quantized Inference. Zitong Zhou, Zixin Huang, Sasa Misailovic. *Automated Technology for Verification and Analysis (ATVA)*. 2023.

RESEARCH EXPERIENCE

Taint Flow Risk Quantification *advised by Prof. Miryung Kim (UCLA)*

- Formulate the risk of taint flows flagged by static analyzers (e.g., Clang's Static Analyzer, CodeQL) quantitatively using reachability analysis and flow sensitivity.
- Design and implement a LLVM-based instrumentation tool that computes the sensitivity of taint flows at runtime (e.g., during fuzzing).

Constrained Grammar Fuzzing of Compiler Optimizations *advised by Prof. Miryung Kim (UCLA)*

- Design grammar fuzzer (TargetFuzz) that constrains mutations to reconstruct composition styles—structural relations like adjacency, repetition, nesting between program constructs—that trigger compiler optimizations.
- Provide an API to define program constructs using grammar as input, and a default registry of composition styles to fuzz a new optimizing compiler out of the box.
- Evaluated on 63 LLVM & MLIR optimizations; outperform naïve grammar fuzzer by 2.2×; achieve highest coverage in 3/4 LLVM optimization categories and highest overall on MLIR; discover 14 new bugs (9 optimization bugs).

Automated Test Generation for Pull Requests (PRs) using LLM *advised by Prof. Miryung Kim (UCLA), collaboration with Prof. Michael Pradel*

- Design a LLM-based pipeline (ChaCo) that analyzes pull request (PR) context, retrieves test context, and generate tests to increase patch coverage.
- Retrieve test context—relevant tests, fixtures, parametrizations, data generators, helper utilities...—using a mixture of dynamic regression test selection and LLM-prompting; allow LLMs to generate well-integrated tests.
- Evaluated on 145 real-world PRs, ChaCo achieved 100% patch coverage on 30% PRs; Dynamic test context contributes to 100% coverage improvement. 12 tests were submitted, 9 merged, exposing 2 previously unknown bugs.

Approximate Sensitivity Analysis of Probabilistic Programs *advised by Prof. Sasa Misailovic (UIUC)*

- Implement a transpiler that takes a PP in Stan, PSI, or StormIR and outputs an sensitivity analyzer in *PyTorch*
- Achieve exact analysis on discrete models, and 18× speedup on continuous models with $\leq$ 5% accuracay loss

WORK EXPERIENCE

Dept. of Computer Science, UCLA *Sep 2023 – Present*
Teaching Assistant of CS32, CS130 *Los Angeles, CA*

Dept. of Computer Science, UCLA *Sep 2023 – Present*
Graduate Student Researcher *Los Angeles, CA*

Dept. of Computer Science, UIUC *May 2021 – Aug 2021*
Researcher *Urbana, IL*

NYU CS 201 & 202 *Spring '20 – Spring '21*
Grader *New York, NY*

DJI *Summer '18*
Intern – Robotics Algorithm *Shenzhen, China*
Implements a robotics control algorithm using behavior tree in *ROS*