

# Jiyuan Wang

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## Education

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### University of California, Los Angeles

*Ph.D. Candidate, Department of Computer Science*

GPA: 3.74/4.00

California, US

*Sep. 2019 – Mar. 2025*

### Tsinghua University

*B.S., Department of Physics*

GPA: 3.63/4.00

Beijing, China

*Aug. 2015 – Jul. 2019*

### University of Zurich

*Exchange student, Department of Physics*

GPA: 5.62/6.00

Zurich, Switzerland

*Aug. 2017 – Jan. 2018*

## Research Interest

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Testing, Heterogenous Computing, Big Data, Quantum Computing

## Research Experience

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### SOLAR Group

Research Assistant

Advisors: **Prof. Miryung Kim** and **Prof. Harry Xu**

Dept. CS, UCLA

*Sep. 2019 - Present*

- **QDiff: Differential Testing for Quantum Software Stacks [SIGSOFT research highlight]**
  - A differential testing framework for quantum programming framework.
  - To apply differential testing for quantum, we generate equivalent quantum programs, explore the backends and compiler setting options, and compare the final with K-S test.
  - For Cirq, Pyquil, and Qiskit, we found four new bugs in their simulators and two possible root causes for hardware execution divergence.
  - Selected for the SIGSOFT research highlight!
- **DuoReduce: Bug Isolation for Multi-Layer Extensible Compilation**
  - A novel dual-dimensional bug isolation approach for multi-layer compilers.
  - Our tool speeds up the bug isolation time by 901X, and avoids the need to inspect 7389 lines of compiler code respectively.
- **Leveraging Hardware Probes and Optimizations for Accelerating Fuzz Testing of Heterogeneous Applications**
  - A novel fuzz testing technique that enables fuzzing on real heterogeneous architectures.
  - We generate test guidance by inserting device-side in-kernel hardware probes and parallelize fuzzing with FPGAs.
  - Our tool is the first to design hardware optimizations to accelerate fuzz testing.

### Software System Security Assurance Group

Undergraduate Research Assistant

Research Advisor: **Prof. Yu Jiang**

Dept. CS, Tsinghua University

*Jan. 2017 - Sept. 2017*

- **QuanFuzz: Fuzz Testing of Quantum Program**

- A fuzz testing tool for quantum programs focusing on quantum sensitive branches.
- We regard initial states of the qubits as an input for the quantum program, and achieve mutations by applying specific quantum gates on the initial qubits.

## Working Experience

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### AWS Privacy Engineering

Applied Scientist

Advisors: **Dr. Rami Kici**

Amazon Web Service

Mar. 2025 - Present

- o Implement a fuzzer to generate valid policies to test Zelkova.

### AWS Privacy Engineering

Applied Scientist intern

Advisors: **Dr. Antonio Filleri and Dr. Nico Rosner**

Amazon Web Service

Jun. 2023 - Sep. 2023 & Jun. 2024 - Sep. 2024

- **Matilda: a debugging tool that facilitates the friction-free generation of test data**

- Implement a fuzzer to generate test data, with oracles that consider the output statistics of SMT solvers like Z3 and CVC5.
- Given the statistics, conduct data analysis to pick the most important data that our tool needs to consider.

- **Integrity Analyzer: a static analysis tool for data corruption risk**

- Implement a static analyzer to detect the potential data corruption risk in the program.
- Evaluate our tool with AWS S3 group and successfully detect the checksum gap for all the micro benchmarks.

## Publications

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- [1] **Jiyuan Wang**, Yuxin Qiu, Ben Limpanukorn, Hong Jin Kang, Qian Zhang, Miryung Kim. DuoReduce: Bug Isolation for Multi-Layer Extensible Compilation. *FSE 2025*.
- [2] Ben Limpanukorn, **Jiyuan Wang**, Hong Jin Kang, Zitong Zhou, Miryung Kim. Fuzzing MLIR Compilers with Custom Mutation Synthesis. *ICSE 2025*.
- [3] **Jiyuan Wang**, Qian Zhang, Hongbo Rong, Guoqing Harry Xu, Miryung Kim. Leveraging Hardware Probes and Optimizations for Accelerating Fuzz Testing of Heterogeneous Applications. *ESEC/FSE 2023*.
- [4] Qian Zhang, **Jiyuan Wang**, Guoqing Harry Xu, Miryung Kim. HeteroGen: Transpiling C to Heterogeneous HLS Code with Automated Test Generation and Program Repair. *ASPLOS 2022*.
- [5] **Jiyuan Wang**, Qian Zhang, Miryung Kim, Guoqing Harry Xu. QDiff: Differential Testing of Quantum Software Stacks. *ASE 2021*, **SIGSOFT research highlight**.
- [6] Qian Zhang, **Jiyuan Wang**, Miryung Kim. HeteroFuzz: Fuzz Testing to Detect Platform Dependent Divergence for Heterogeneous Applications. *ESEC/FSE 2021*.
- [7] **Jiyuan Wang**, Fuchen Ma, Yu Jiang. Poster: Fuzz Testing of Quantum Program. *ICST 2021*, *Best Poster*.
- [8] Qian Zhang, **Jiyuan Wang**, Muhammad Ali Gulzar, Rohan Padhye, Miryung Kim. BigFuzz: Efficient Fuzz Testing for Data Analytics Using Framework Abstraction. *ASE 2020*.

## Services

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- o Reviewer of IEEE Software
- o Sub-reviewer of FSE 2025
- o FSE 2025 Artifact Evaluation Committee member
- o Student Volunteer for ICSE 2022