Yuxuan Jiang

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Education

University of Michigan   *Sep 2023 to present*
Ph.D. in Computer Science and Engineering
- **Research Areas:** Reliable Machine Learning (enabled) Systems, AIOps, Cloud Reliability
- **Advisor**: Prof. Ryan Huang

University of Illinois Urbana-Champaign   *Sep 2019 to May 2023*
B.E. in Electrical and Computer Engineering

Zhejiang University   *Sep 2019 to May 2023*
B.E. in Electrical and Computer Engineering

Research Interest

Computer Systems: Enhancing systems reliability and optimizing performance and flexibility through innovative abstraction-level strategies.

Research Experience

Research Assistant   *Ann Arbor, MI, USA*
University of Michigan – OrderLab, Advised by Prof. Ryan Huang   *Aug 2023 to present*
- Keywords: **ML-enabled Systems Reliability**, **Distributed Systems Fail-Slowness Tolerance**
- Leading a project on **detecting silent errors in ML training workflows**—this work addresses a critical gap in the reliability of ML systems by automating checks to prevent errors that degrade model quality. Currently in submission to OSDI'25.
- Conducted a comprehensive analysis of over **50** silent issues across ML pipelines, revealing insights into issues that often go unnoticed and impact model outcomes in real-world settings.
- Developed a monkey-patching-based Python-level instrumentor with **mild overhead (¡0.5x) under full instrumentation**. It captures both API invocations and variable updates to provide **a high-fidelity trace** for ML invariant inference.
- Designed a robust analysis pipeline that extracts and refines invariants from program traces. **Precondition inference as its core ensures invariants are accurate, transferable, and diagnostic in nature**.
- Validated the tool's effectiveness in real-world scenarios by successfully detecting over **15 diverse training issues** using invariants generated from **5 small-scale PyTorch official tutorial pipelines**.

Cloud Reliability Research Intern   *Beijing, China*
Microsoft Research Asia – DKI Group, advised by Dr. Shilin He   *Oct 2022 to Jul 2023*
- Keywords: **AIOps**, **ML4Sys**, **Failure Diagnosis**
- Leveraging LLMs and finetuned models to **automate cloud incident diagnosis** on Azure. This research, recognized at **ICSE'24**, tackled key pain points in cloud operations by generating precise, actionable diagnosis queries from incident tickets.
- Innovated with **curriculum learning and Retrieval-Augmented Generation (RAG)** to enable accurate generation of diagnosis queries derived from incident tickets.
- Created a novel **code-semantics-based** metric for evaluating query generation systems. By statically canonicalizing queries and using **symbolic and dataflow analysis**, this metric allows for accurate comparison **without actual execution**—outperforming traditional NLP metrics.
- Collaborated with product teams to push for real-world deployment of the query generation tool.
- Collaborated with the systems team on data-driven fault detection for large GPU clusters, a project later accepted at ATC'24, advancing reliability for large-scale hardware deployments.

Research Assistant   *Urbana, IL*

- ○ Keywords: **Controller Reliability**, **Distributed Systems Fail-Slowness Tolerance**
- ○ Contributed to an **automated testing tool for Kubernetes controllers correctness**, a project later accepted to **SOSP'23**.
- ○ Designed an advanced input exploration strategy to **rigorously test the error-handling pathways of operators**, creating oracles that identify unhealthy system states. This enriched alarm descriptions and reduced false negatives, greatly improving system reliability.
- ○ Interfaced with Kubernetes' ApiMachinery to capture system snapshots, streamlining debugging by allowing for rich state-based diagnostics.
- ○ Re-architected the testing framework (Acto) to enable **parallel testing** and support **multiple runtime environments** like Kind, K3D, and MiniKube.
- ○ Validated Acto's effectiveness on real-world Kubernetes controllers, discovering **18** previously unknown bugs (32% of all identified by Acto) across three popular operators. To date, 14 of these bugs have been patched.
- ○ Worked on a fault injection tool to test distributed systems' tolerance of hardware slowness faults.

Publications

One-Size-Fits-None: Understanding and Enhancing Slow Fault Tolerance in Modern Distributed Systems	Apr 2025

Ruiming Lu, Yunchi Lu, **Yuxuan Jiang**, Guangtao Xue, Peng Huang

NSDI'25: *Proceedings of the 22nd USENIX Symposium on Networked Systems Design and Implementation*

Xpert: Empowering Incident Management with Query Recommendations via Large Language Models	Apr 2024

Yuxuan Jiang, Chaoyun Zhang, Shilin He, Zhihao Yang, Minghua Ma, Si Qin, Yu Kang, Yingnong Dang, Saravan Rajmohan, Qingwei Lin, Dongmei Zhang

ICSE'24: *Proceedings of the IEEE/ACM 46th International Conference on Software Engineering*

Acto: Automatic End-to-End Testing for Operation Correctness of Cloud System Management	Oct 2023

Jiawei Tyler Gu, Xudong Sun, Wentao Zhang, **Yuxuan Jiang**, Chen Wang, Mandana Vaziri, Owolabi Legunsen, Tianyin Xu

SOSP'23: *Proceedings of the 29th Symposium on Operating Systems Principles*

Awards

Award of Excellence: Top 5% interns. Microsoft Research Asia (MSRA) 2023

Scholarship for Outstanding Students: Zhejiang University, 2020, 2021, 2022

Leadership & Teaching Experience

Microsoft Student Learn Ambassador	*Nov 2021 to May 2023*
Zhejiang University	
Teaching Assistant for CS428: Distributed Systems	*Jan 2023 to May 2023*
Zhejiang University	
Academic and Life Tutor for Internation Students in China	*Oct 2021 to Jan 2022*
Zhejiang University	