Yicheng Ouyang

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Education

University of Illinois Urbana-Champaign Aug. 2021 – Present, Champaign, IL, USA
Ph.D. in Computer Science (GPA 3.57/4) *Advisor: Prof. Lingming Zhang and Prof. Darko Marinov*

Southern University of Science and Technology Sept. 2016 – July 2020, Shenzhen, China
B.S. in Computer Science and Technology (GPA: 3.46/4) *Advisor: Prof. Yuqun Zhang*

Skills

Programming Language: Java, Python, Bash.
Software and Framework: ASM, Java Agent, JavaParser, Maven, Unity3D, Git.
Spoken Language: Mandarin, English.

Industry Experience

Kuaishou Technology May 2021 – Aug. 2021
Research/Engineering intern in the Quality Assurance Team *Beijing, China*

Refactoring-aware Developer Contribution Evaluation System | Java, Eclipse JDT

- Designed an algorithm to evaluate developers' efforts in code commits, distinguishing trivial refactoring alterations.
- Implemented the prototype of the refactoring-aware developer contribution evaluation system independently in Java.
- Initiated its experimental adoption within the company, saving substantial costs of purchasing external services.

Ant Group June 2020 – May 2021
Research/Engineering intern in the Quality Assurance and Infrastructure Team *Hangzhou, China*

Non-intrusive Dynamic Taint Analysis | Java, ASM, Java Agent

- Designed the first practical non-intrusive dynamic taint analysis technique for JVM-based microservice systems.
- Implemented and deployed a prototype in pre-launch environments, significantly aiding data correctness validation.
- Led as the first author in publishing and presenting the work at ICSE 2023

Regression Test Selection System | Java, ASM, Java Agent

- Implemented the first regression test selection (RTS) system at Alipay in Java, automating the bypass of test cases unaffected by code change during regression testing.
- Integrated the RTS system in the Continuous Integration pipeline, saving 67.3% test execution time on average.

Empirical Study of Industrial Record&Replay Testing Noises

- Conducted the first comprehensive empirical study on industrial record&replay testing noises within microservice applications, establishing a foundational understanding in this domain.
- Provided various practical guidelines and potential solutions for detecting and fixing record&replay testing noises.

Suzhou Dayu Network Technology Co. Ltd. June 2018 – Sep. 2018
Engineering intern in the Game Development Department *Suzhou, China*

The Hook Man | JavaScript, Cocos Creator

- Led a small multidisciplinary team to develop a 2D vertical scrolling game, The Hook Man.
- Conceptualized game design and independently completed programming tasks using JavaScript.

Research Experience

University of Illinois Urbana-Champaign 2021 - 2023
Research Assistant *IL, USA*

UniAPR: a Unified Patch Validation Framework | Java, ASM, Java Agent, Maven

- Developed an on-the-fly patch validation algorithm for Automated Program Repair (APR) techniques, eliminating the need for JVM re-initialization and significantly accelerating patch validation processes by an order of magnitude.
- Co-authored a paper presented at ICSE 2021.

Southern University of Science and Technology 2019 - 2020
Research Assistant/Intern *Shenzhen, China*

Discrepancy-driven JVM Fuzzing Framework | Java, Soot

- Implemented an automated fuzzing algorithm to identify bugs in open-source and commercial JVMs, resulting in the discovery of 35 JVM bugs, with 15 confirmed.
- Co-authored a paper presented at ICSE 2023.

Simulee: CUDA Synchronization Bugs Detector | Python3, Bash

- Contributed to the development and assessment of a lightweight CUDA synchronization bug detector, which identified 24 CUDA synchronization bugs in real-world projects, with 10 confirmed by developers.
- Co-authored a paper presented at ICSE 2020.

Teaching Experience

CS427: Software Engineering I Fall 2023

Teaching Assistant at UIUC *Instructor: Prof. Lingming Zhang and Prof. Reyhaneh Jabbarvand*

- Led a team of 5 TAs in a course with 350 students by effectively delegating tasks and coordinating regular meetings, enhancing students' learning experience.
- Collaborated with fellow TAs to develop multiple auto-graders for assignments, significantly reducing grading time.
- Addressed student inquiries via Campuswire and office hours, boosting course engagement and comprehension.

CS309: Object-oriented Analysis and Design Fall 2019

Teaching Assistant at SUSTech *Instructor: Prof. Yuqun Zhang*

- Guided students through lab sessions, enhancing their understanding and practical skills.
- Implemented automated grading scripts in Python3 and Bash, improving assignments grading efficiency.

Selected Projects

Automatic Repair Tool for CUDA Synchronization Bugs | Python3 2020

- Designed and implemented the first code-level automatic repair tool for CUDA synchronization bugs in Python3.
- Fixed 21 bugs among the 24 previously-unknown bugs found by Simulee with the implemented repair tool.
- Won Distinguished Thesis Award in SUSTech.

SUSTech Monopoly | C#, Unity 2019

- Led a team of three in developing a 3D multiplayer Monopoly game themed around SUSTech campus life, achieving 1000+ daily active users at peak and garnering coverage from multiple nationwide media outlets.
- Designed game framework and implemented client-side functionality, enhancing users' gameplay experience.

Gomoku AI | Python3 2019

- Implemented a Gomoku AI utilizing the alpha-beta pruning algorithm, achieving a top 10 rank in a grade-wide round-robin AI competition.

Publications

- **Yicheng Ouyang**, Kailai Shao, Kunqiu Chen, Ruobing Shen, Chao Chen, Mingze Xu, Yuqun Zhang, Lingming Zhang. **MirrorTaint: Practical Non-intrusive Dynamic Taint Tracking for JVM-based Microservice Systems.** In Proceedings of the 45th IEEE/ACM International Conference on Software Engineering (ICSE 2023), 2023.

- Mingyuan Wu, **Yicheng Ouyang**, Minghai Lu, Junjie Chen, Yingquan Zhao, Heming Cui, Guowei Yang, Yuqun Zhang. **SJFuzz: Seed & Mutator Scheduling for JVM Fuzzing.** In Proceedings of the 31st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (FSE 2023), 2023.

- Lingchao Chen, **Yicheng Ouyang**, Lingming Zhang. **Fast and Precise On-the-fly Patch Validation for All.** In Proceedings of the 43rd IEEE/ACM International Conference on Software Engineering (ICSE 2021), 2021.

- Mingyuan Wu, **Yicheng Ouyang**, Husheng Zhou, Lingming Zhang, Cong Liu, Yuqun Zhang. **Simulee: Detecting CUDA Synchronization Bugs via Memory-Access Modeling.** In Proceedings of the 42nd IEEE/ACM International Conference on Software Engineering (ICSE 2020), 2020.