

Xiaoyu Sun

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RESEARCH INTEREST

My work contributes to the fields of software engineering, programming languages, and cyber security. My research combines aspects of static/dynamic analysis techniques and software testing techniques to detect software defects, e.g., compatibility issues, privacy leaks, typestate misuse, etc. I have published several high-quality papers in software engineering journals (TOSEM) and conferences (ICSE, ASE, ISSRE). Also, I have taught a wide range of software engineering and programming language courses. I like to deliver project-based courses where students work in small-ish teams on practical term-long projects.

EDUCATION

- **Monash University** Melbourne, Australia
Doctor of Philosophy in Software Systems & Cybersecurity Sept. 2019 – Oct. 2022
Advisors: ARC Laureate Professor John Grundy and Professor Li Li
- **Beijing Normal University** Beijing, China
Bachelor of Science in Computer Science and Technology Sept. 2011 – Jul. 2015

WORK EXPERIENCE

- **Monash University** Melbourne, Australia
Admin Teaching Assistant Feb.2022 - July.2022
 - **Monash FIT2099 (Object oriented design and implementation):**
 - Ensure all students felt attended to with personalized feedback, class discussion and encouragement.
 - Assisted with lesson plans and aligning plans with structured goals to improve students' performance.
 - **Monash FIT3077 (Software Architecture and Design):**
 - I have specialised in separating the whole software design into small independent tasks where students can work in small groups on a project for the whole course.
 - I am always committed to encouraging students to do self-directed learning in practise to develop independent learning skills.
- **Alibaba Group** Hangzhou, China
Senior Software Engineer Jun.2017 - Sep.2019
 - **Systems Design:** Focus on designing and building scaled, distributed services with low latency messaging and high availability/fault tolerance.
 - **Alipay Platform:** Software development for supporting commercial marketing activities during global shopping festivals for over 80 million merchants.
- **China Internet Plus Group** Shanghai, China
Software Engineer Jul.2015 - Jun.2017
 - **Web Developer:** Created scalable, fast back-end systems and enhanced software products, mobile applications and prototypes.
 - **Service Developer:** Developed domain and web service applications with Java and other programs. Strategically performed SQL tuning activities for Oracle database, increasing the performance rate by 50% and overall efficiency rate by 30%.

RESEARCH PROJECTS

Taming sophisticated language features to support whole-program analysis.

Mar.2020 - Oct.2022

– *Papers published in TOSEM 2022, ICSE 2022.*

- **Reflection Analysis:** Improve the state-of-the-art reflection analyzer, DroidRA, by enhancing its completeness and precision. Our tool is used by commercial companies like Alibaba Group, which has over 900 million users.
- **Native Code Analysis:** Propose a prototype tool, Jucify, which enables static analyzers to unify native code and bytecode in apps' call-graphs.
- **Javascript Code Analysis:** Transfer JS code to intermediate representation to unify Javascript code and bytecode in apps' call-graphs.

Detecting Compatibility Issues in Android

Dec.2021 - Aug.2022

– *Paper published in ASE 2022.*

- Design and implement a prototype tool, **JUnitTestGen**, that performs field-aware, inter-procedural backward data-flow analysis to infer the call trace of APIs in real-world Android apps.
- Propose a lightweight, crowdsourced testing platform, **LAZYCOW**, which enables the possibility of automatically dispatching and executing test cases on real-world devices around the world.

Characterizing Sensor Leaks in Android Apps.

Jun.2021 - Sep.2021

– *Paper published in ISSRE 2021.*

- Design and implement a prototype tool, **SEEKER**, that leverages static analysis to automatically detect privacy leaks originating from Android sensors.
- Enhance the state-of-the-art static analysis tool (**FlowDroid**) by making it support field-aware data leak detection.

Demystifying Sensitive Operations in Android apps.

Sep.2019 - Jun.2021

– *Paper published in TOSEM 2022.*

- Propose a new prototype tool, **HiSenDroid**, that deploys an automated static app analyzer tailored for detecting hidden sensitive operations through static analyses, including call graph analysis, forward data-flow analysis, inter-procedural backward data-flow analysis, etc.

PUBLICATIONS

Understanding and detecting Tpestate Misuse for Android Applications.

Xiaoyu Sun, Jordan Samhi, Xiaobin Hu, Li Li and John Grundy.

The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (FSE 2023) – Under Submission. (CORE A)*

Taming Android Fragmentation through Lightweight Crowdsourced Testing.

Xiaoyu Sun, Xiao Chen, Yonghui Liu, John Grundy, Li Li.

IEEE Transactions on Software Engineering (TSE 2022) – Under Major Revision. (CORE A)*

Demystifying Hidden Sensitive Operations in Android apps.

Xiaoyu Sun, Xiao Chen, Li Li, Haipeng Cai, John Grundy, Jordan Samhi, Tegawendé F. Bissyandé and Jacques Klein.

ACM Transactions on Software Engineering and Methodology (TOSEM) 2022. (CORE A)*

Mining Android API Usage to Generate Unit Test Cases for Pinpointing Compatibility Issues

Xiaoyu Sun, Xiao Chen, Yanjie Zhao, Pei Liu, John Grundy and Li Li.

The 37th IEEE/ACM International Conference on Automated Software Engineering (ASE) 2022. (CORE A)*

JuCify: a step towards Android code unification for enhanced static analysis

Jordan Samhi, Jun Gao, Nadia Daoudi, Pierre Graux, Henri Hoyez, Xiaoyu Sun, Kevin Allix, Tegawendé F. Bissyandé and Jacques Klein.

In Proceedings of the 44th International Conference on Software Engineering (ICSE) (2022), pp. 1232–1244. (CORE A)*

A First Look at CI/CD Adoptions in Open-Source Android Apps

Pei Liu, **Xiaoyu Sun**, Yanjie Zhao, Yonghui Liu, John Grundy, and Li Li.

In Proceedings of the 5th International Workshop on Advances in Mobile App Analysis (A-Mobile) 2022.

Code Implementation Recommendation for Android GUI Components

Yanjie Zhao, Li Li, **Xiaoyu Sun**, Pei Liu and John Grundy

The 44th International Conference on Software Engineering, Demonstrations Track (ICSE-Demo) 2022.

Characterizing Sensor Leaks in Android Apps.

Xiaoyu Sun, Xiao Chen, Kui Liu, Sheng Wen, Li Li, and John Grundy.

In 2021 IEEE 32nd International Symposium on Software Reliability Engineering (ISSRE) (2021), IEEE, pp. 498–509.

(CORE A)

Taming reflection: An essential step toward whole-program analysis of android apps.

Xiaoyu Sun, Li Li, Tegawendé F. Bissyandé, Jacques Klein, Damien Octeau, and John Grundy.

ACM Transactions on Software Engineering and Methodology (TOSEM) 30, 3 (2021), 1–36. (CORE A)*

Icon2Code: Recommending code implementations for android GUI components.

Yanjie Zhao, Li Li, **Xiaoyu Sun**, Pei Liu, and John Grundy.

Information and Software Technology 138 (IST) 2021, 106619. (CORE A)

A First Look at Security Risks of Android TV Apps

Yonghui Liu, Li Li, Pingfan Kong, **Xiaoyu Sun** and Tegawendé F. Bissyandé.

In 2021 36th IEEE/ACM International Conference on Automated Software Engineering Workshops (ASEW) (2021), IEEE, pp. 59–64.

Androzoopen: Collecting large-scale open source android apps for the research community.

Pei Liu, Li Li, Yanjie Zhao, **Xiaoyu Sun**, and John Grundy.

In Proceedings of the 17th International Conference on Mining Software Repositories (MSR) (2020), pp. 548–552. (CORE A)

GRANT

ByteDance Research Collaboration

Nov.2022 - Dec.2023

Project Title: Preventing IP leakage in Third-party Code Auditing

Grant: 300,000 U.S.D

My Roles:

- Propose a theoretical framework to define the IP leakage of code in a fine-grained manner.
- Design an efficient and scalable tool for IP leakage detection.
- Supervise PhD students for tool implementation.
- Communicate with industrial software engineers to integrate our prototype tool into real-world apps as an auditing service.

PROFESSIONAL SERVICE ACTIVITIES

Program Committee Member:

- The 31st International Conference on Program Comprehension 2023 (ICPC 2023)
- The 20th International Conference on Mining Software Repositories (MSR 2023)
- The workshops for International Conference on Software Engineering (ICSE 2023)
- The 4th ACM/IEEE International Conference on Automation of Software Test (AST 2023)
- The workshops for International Conference on Automated Software Engineering (ASE 2021, 2022)
- The Second International Symposium on Advanced Security on Software and Systems (ASSS 2022)

Journal Reviewer:

- ACM Computing Surveys (CSUR)
- Empirical Software Engineering (EMSE)
- Automated Software Engineering
- IEEE Transactions on Reliability
- Software Testing, Verification and Reliability

External Reviewer:

– European Conference on Computer Vision (ECCV 2022)

Sub-Reviewer: – International Conference on Software Engineering (ICSE)

– The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (FSE)

– IEEE/ACM International Conference on Automated Software Engineering (ASE)

– IEEE International Symposium on Software Reliability Engineering (ISSRE)

– IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER)

ADVISING

Yonghui Liu (PhD student) – Taming JavaScript Language : An essential step toward whole-program analysis of android apps.

Hongdan Wang (Master Student) – Using Java Programming for Detecting Android Permission Misuse.

Anna Zhang (Bachelor Honours) – Using Java Programming for Developing Crowdsourced Testing Platform

Jimmy Low (Bachelor Honours) – Using Java Programming for Developing Crowdsourced Testing Platform

Junxuan Liang (Bachelor Honours) – Using Java Programming for Developing Crowdsourced Testing Platform

HONORS & AWARDS

Monash PhD Scholarship – Full Time.

China Undergraduate Mathematical Contest in Modeling award (top 5%).

National College Mathematical Contest in Modeling Honorable Mention.

Fellowship of national students' platform for innovation and entrepreneurship training program(top 1%).

Professional Scholarships(2013 and 2014)

SKILLS

- **Referees:** John Grundy, Li Li, Jacques Klein
- **Language:** Mandarin(native), English(fluent)
- **Computer Languages:** JAVA, Python, Android, SQL, JavaScript, HTML, C++/C
- **Keywords:** Programming Language, Program Analysis, Software Testing, Cyber Security