

# Xiaoyu Sun

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🏠 <https://sunxiaobi.github.io>

🐙 <https://github.com/sunxiaobi>

## RESEARCH INTEREST

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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

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- **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

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- **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

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### 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

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### 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**

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### **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**

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### **Program Committee Member:**

- 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:**

- Automated Software Engineering
- ACM Computing Surveys (CSUR)
- 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

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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

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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

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- **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