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
  PhD candidate in Department of 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 Typestate 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 Submission.* (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.*

Androzooopen: 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 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

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