Han Hu

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Education

Monash University, Melbourne, Australia 07/2021 - 11/2024

Ph.D. in Computer Science (CS)

- Monash Graduate Scholarship (MGS)
- Monash International Tuition Scholarship (MITS)

Tsinghua University, Beijing, China 09/2017 – 06/2020

M.S. in Engineering

- Highest Prize in NASAC 2018 (Top Academic Competition of Static Analysis in China)
- Tsinghua-VMware Scholarship (First-Class Scholarship)

University of Electronic Science and Technology of China, Chengdu, China 09/2013 – 06/2017

B.S. in Software Engineering (SE)

- Computer Science Core GPA: 88.91/100 (ranks 2/29 in my major).
- Outstanding Graduate of UESTC

Research Overview & Career Focus

My research primarily focuses on **mobile application (app) analysis**, including **static program analysis**, **cross-platform (Android, iOS) app analysis**, **dynamic GUI analysis**, and developing **AI** & **Large Language Model (LLM)**–assisted approaches to enhance existing program analysis approaches for mobile apps.
Key projects include the **cross-platform GUI adaptation and exploration** [TOSEM'2024, NeurIPS'2023, TOSEM'2023] and the **analysis of vulnerabilities in on-device models** [TOSEM'2023, WWW'2022, ICSE'2021]. I am also actively engaged in **code generation** [Starcoder2, TOSEM'2021, ICONIP'2019].
Summary of Achievements: As the **first author**, I have secured **4 CCF A & CORE A*** publications during my Ph.D. In total, my scholarly contributions encompass 7 authored publications within the esteemed CCF A & CORE A* categories. Furthermore, I am the main inventor of four officially granted Chinese national invention patents, one of which is the first inventor.
Recent Work Expanding my research scope, I now focus on the analysis of vulnerabilities inherent in on-device DL models and the assessment of the reliability of the outputs generated by these models. This endeavor encompasses a comprehensive examination of deployed models and their corresponding codes in apps, as well as the development of rigorous benchmarks for evaluating the outputs of such models.

Publications

- **Han Hu**, et al. Enhancing GUI Exploration Coverage of Android Apps with Deep Link-Integrated Monkey. (TOSEM 2024, **CCF A**, **CORE A***)
- **Han Hu**, et al. A First Look at On-device Models on iOS. (TOSEM 2023, ICSE 2024-JF, **CCF A**, **CORE A***)
- **Han Hu**, et al. Pairwise GUI Dataset Construction Between Android Phones and Tablets. (Dataset, NeurIPS 2023, **CCF A**, **CORE A***)
- **Han Hu**, et al. Automated Mapping of Adaptive App GUIs from Phone to TV. (TOSEM 2023, ICSE 2024-JF, **CCF A**, **CORE A***)

- Yujin Huang, **Han Hu**, et al. Robustness of on-device Models: Adversarial Attack to Deep Learning Models on Android Apps (ICSE-SEIP 2021)
- Qiuyuan Chen, Xin Xia, **Han Hu**, et al. Why My Code Summarization Model Does Not Work: Code Comment Improvement with Category Prediction.(TOSEM 2021, **CCF A**, **CORE A***)
- Huang, Yujin, Terry Yue Zhuo, Qiongkai Xu, **Han Hu**, et al. Training-free Lexical Backdoor Attacks on Language Models. (WWW 2023, **CCF A**, **Core A***)
- **Han Hu**, et al. Code Generation from Supervised Code Embeddings. (ICONIP 2019, **CCF C**, **CORE A**)
- Qiuyuan Chen, **Han Hu**, et al. Code Summarization with Abstract Syntax Tree. (ICONIP 2019, **CCF C**, **CORE A**)
- Zhaoyi Liu, Qiuyuan Chen, **Han Hu**. Teacher-Student Learning and Post-Processing for Robust BiLSTM Mask-Based Acoustic Beamforming. (ICONIP 2019, **CCF C**, **CORE A**)

Under Review

- **Han Hu**, et al. Pioneering Large Language Model for Unified Device-Agnostic Adaptive GUI Design. (expected to submit)

Research Experience

GUI Analysis for Mobile Apps 2021 - Present

This research focuses on the cross-platform adaptability of mobile application Graphical User Interfaces (GUIs), aiming to propose a unified **Cross-Platform Adaptive Framework for Mobile Interfaces**. Due to varying screen sizes and interaction modes across platforms, app developers currently face the challenge of redeveloping GUIs for each platform, hindering the efficient use of existing designs. We propose an **Automated Cross-Platform GUI Conversion Framework** to enhance the efficiency of porting GUIs from mobiles to other devices like TVs and tablets.

Furthermore, current GUI exploration and testing tools exhibit low code coverage in app testing, often below 20%. To address this, we have designed a plugin to **improve the Test Code Coverage** of existing GUI testing tools, achieving a 26% higher coverage rate than the best current tools. This enhancement enables more effective cross-platform testing and data collection among mobiles, tablets, and TVs.

- **Han Hu**, et al. Automated Mapping of Adaptive App GUIs from Phone to TV. (TOSEM 2023, ICSE 2024-JF, **CCF A**, **CORE A***)
- **Han Hu**, et al. Pairwise GUI Dataset Construction Between Android Phones and Tablets. (NeurIPS 2023, **CCF A**, **CORE A***)
- **Han Hu**, et al. Enhancing GUI Exploration Coverage of Android Apps with Deep Link-Integrated Monkey. (TOSEM 2024, **CCF A**, **CORE A***)
- **Han Hu**, et al. Pioneering Large Language Model for Unified Device-Agnostic Adaptive GUI Design. (expected to submit)

Vulnerability Analysis for On-device Deep Learning Models 2021 - 2023

This research focuses on how to protect the security of machine learning models on Android and iOS platforms. We employ **Reverse Engineering** and **Static Code Analysis** on Apps to identify potential vulnerabilities in on-device models. Successfully, we have exploited these vulnerabilities using customized image inputs, causing malfunction in relevant features of real-world iOS and Android applications. We have also explored security protection mechanisms against such vulnerabilities.

- **Han Hu**, et al. A First Look at On-device Models on iOS. (TOSEM 2023, ICSE 2024-JF, **CCF A**, **CORE A***)

- Huang, Yujin, Terry Yue Zhuo, Qiongkai Xu, **Han Hu**, et al. Training-free Lexical Backdoor Attacks on Language Models. (WWW 2023, **CCF A**, **Core A***)
- Yujin Huang, **Han Hu**, et al. Robustness of on-device Models: Adversarial Attack to Deep Learning Models on Android Apps (ICSE-SEIP 2021)

Work Experience

Monash University, Melbourne, Australia Mar. 2022 – Now

Teaching Associate & Assistant lecturer

Unit: FIT2081 - Mobile application development; FIT2095- e-Business software technologies; FIT3077- Software engineering: Architecture and design

Ji Hua Laboratory, Foshan, China Jun. 2020 - Jun. 2021

Researcher & Developer

Developing cutting-edge interdisciplinary systems that combine deep learning and optics.

Patents

Method, System, Electronic Device, and Storage Medium for Predicting Properties of Luminescent Materials. (Publication **NO. CN112396134B** and **NO. CN113470761B**)

Two granted Chinese invention patents, the **1st Author**

A Multi-Level Analysis-Based Method and Apparatus for C Language Defect Detection. (Publication **NO. CN111104335B**)

A granted Chinese invention patent, the third author

A Generalized Intelligent Review Platform and its Review Method (Publication **NO. CN106875156A**)

A granted Chinese invention patent, the fourth author

Academic Service

Program Committee

ACL-2020, 2023 (CCF A, CORE A*)
EMNLP-2023 (CCF A, CORE A*)
AACL-IJCNLP-2020, 2022, 2023 (CCF C, CORE B)
ICONIP-2019 (CCF C, CORE A)

Paper Reviewer

Neurips-2024 (CCF A, CORE A*) SIGIR-2023 (CCF A, CORE A*)
SANER-2023 (CCF B, CORE A)
EACL-2023 (CORE A)
EMNLP-2022, 2023 (CCF A, CORE A*)