Maoyi Xie

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Research Interests

My research focuses on software and systems security, including the Linux kernel and smart contracts, using program analysis techniques such as static analysis, fuzzing, and large language models.

Employment

Nanyang Technological University ..... **Singapore**

2025 – present	Research Assistant, AUMOVIO-NTU Corporate Lab
2024 – 2025	Research Assistant, Continental-NTU Corporate Lab

Education

Nanyang Technological University ..... **Singapore**

2023 – present	Doctor of Philosophy, Computer Science and Engineering, College of Computing and Data Science Advisor: Prof. Yang Liu

Tianjin University ..... **Tianjin, China**

2019 – 2023	Bachelor of Engineering, Cyberspace Security, College of Intelligence and Computing

Honors and Awards

2022	Outstanding Student, Tianjin University
2022	Outstanding Student Leader, Tianjin University

Publications

^ co-first author; * corresponding author.

Refereed Journal Articles

[J1] Xinpeng Huang, Wangjie Qiu, Wanqing Jie, Qing Xia, Qinnan Zhang, Yuqiang Sun, **Maoyi Xie**, Yang Liu, and Zhiming Zheng. "FlashShield: Detecting Flash Loan Attacks in DeFi Using Hypergraph Neural Network." In: *IEEE Transactions on Dependable and Secure Computing (TDSC)*. 2026.

[J2] **Maoyi Xie**, Kaixuan Li*, Jingquan Ge, Wei Ma, Yuqiang Sun, Ziqiao Kong, Cen Zhang, Dongge Liu, Oliver Chang, and Yang Liu. "ARASH: Token-Efficient LLM-Assisted Crash Root Cause Analysis in Fuzz Driver Generation." In: *ACM Transactions on Software Engineering and Methodology (TOSEM)*. 2026.

Refereed Conference Publications

[C1] Juantao Zhong^, Daoyuan Wu^, Ye Liu*, **Maoyi Xie**, Yang Liu, Yi Li, and Ning Liu. "Detecting Various DeFi Price Manipulations with LLM Reasoning." In: *Proceedings of the 40th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2025.

[C2] Ziqiao Kong, Cen Zhang*, **Maoyi Xie**, Ming Hu, Yue Xue, Ye Liu, Haijun Wang, and Yang Liu. "Smart Contract Fuzzing Towards Profitable Vulnerabilities." In: *Proceedings of the 33rd ACM International Conference on the Foundations of Software Engineering (FSE)*. 2025.

[C3] **Maoyi Xie**, Ming Hu*, Ziqiao Kong, Cen Zhang, Yebo Feng, Haijun Wang, Yue Xue, Hao Zhang, Ye Liu, and Yang Liu. "DeFort: Automatic Detection and Analysis of Price Manipulation Attacks in DeFi Applications." In: *Proceedings of the 33rd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*. 2024.

Industry Projects

As Project Lead

2025 – 2026 **Logickaller: Kernel Fuzzing for Logic Bugs.** AUMOVIO-NTU Corporate Lab. Built a Linux kernel fuzzer for logic bugs and integrated it into AUMOVIO's platform (cf. TD4).

2025 – 2026 **ARASH: LLM-Assisted Crash Root Cause Analysis and Fuzz Driver Repair.** AUMOVIO-NTU Corporate Lab, in collaboration with Google. Built an LLM-assisted pipeline that analyzes fuzzing crashes and repairs faulty fuzz drivers (cf. [J2], [P2], TD10).

2024 **LLM4RCA: LLM-Based Multi-Agent Root Cause Analysis.** Continental-NTU Corporate Lab. Designed a multi-agent LLM framework that localizes and explains the root causes of crashes (cf. [P1], TD11).

2024 **Emulation-Based Fuzzing for Automotive Software.** Continental-NTU Corporate Lab. Built an emulation-based fuzzer for ARM automotive software.

Patents and Technology Disclosures

Patents

[P1] **Maoyi Xie**, Wei Ma, Jingquan Ge, Cen Zhang, Sheikh Mahbub Habib, Gabriel Wayne Byman, Elisabeth Margerita Waitz, Praveen Kakkolangara, and Yang Liu. "A Computer-Implemented Method and Computer System for Root-Cause Analysis." European Patent Application No. 25208581.6, filed 14 October 2025. *Pending.* [Corresponds to TD11.]

[P2] **Maoyi Xie**, Jingquan Ge, Kaixuan Li, Wenbing Tang, Yang Liu, Praveen Kakkolangara, and Sheikh Mahbub Habib. "Apparatus, Data Carrier, Computer Program, and Method for Testing a Fuzz Driver for Fuzz Testing Software." UK Patent Application No. 2512857.0, filed 7 August 2025. *Pending.* [Corresponds to TD10.]

[P3] Kaixuan Li, Jingquan Ge, **Maoyi Xie**, Yang Liu, Praveen Kakkolangara, Sheikh Mahbub Habib, and Yi Wang. "Apparatus, Data Carrier, Computer Program, and Methods for Detecting and Fixing Software Vulnerabilities." UK Patent Application No. 2522585.5, filed 23 December 2025. *Pending.* [Corresponds to TD7.]

[P4] Kaixuan Li, Jingquan Ge, Wei Ma, **Maoyi Xie**, Yang Liu, Suraj Jayakumar Menon, and Markus Brendl. "Apparatus, Data Carrier, Computer Program, and Method for Repairing a Computer Program." UK Patent Application No. 2512389.4, filed 30 July 2025. *Pending.* [Corresponds to TD12.]

[P5] Jingquan Ge, Wei Ma, Kaixuan Li, **Maoyi Xie**, Yang Liu, Suraj Jayakumar Menon, Lihua Zhang, and Markus Brendl. "Apparatus, Data Carrier, Computer Program, and Method for Deploying Hot Patches in a Computer System." Chinese Patent Application No. 202511208500.9, filed 27 August 2025. *Pending.* [Corresponds to TD13.]

Technology Disclosures

[TD1] Kaixuan Li, **Maoyi Xie** et al. "TSFuzz: Typestate-Directed Fuzz Harness Generation for Embedded C" (2026E03314 SG).

[TD2] **Maoyi Xie** et al. "Deterministic Root Cause Analysis for Fuzzing Crashes" (2026E03014 SG).

[TD3] Chuan Qin, Kaixuan Li, **Maoyi Xie** et al. "GuardRec: Detecting Recurring Vulnerabilities in IoT Firmware by Matching Root-Cause Guards" (2026E02720 SG).

[TD4] **Maoyi Xie** et al. "Logickaller: Kernel Fuzzing for Logic Bug Detection" (2026E00814 SG).

[TD5] Kaixuan Li, Zong Cao, Jingquan Ge, **Maoyi Xie** et al. "Neuro-Symbolic Detection for C/C++ Path-Sensitive Vulnerabilities" (2026E00104 SG).

[TD6] Jingquan Ge, Kaixuan Li, **Maoyi Xie** et al. "PGFilter: A Parameter-Guided, Token-Saving Source Code Filter for LLM-Based Root Cause Analysis" (2025E05430 SG).

[TD7] Kaixuan Li, Jingquan Ge, **Maoyi Xie** et al. "ΔSynth: Synthesizing Static Analysis Rules for Vulnerability Detection via Semantic Mining" (2025E05037 SG).

[TD8] Kaixuan Li, Jingquan Ge, **Maoyi Xie** et al. "LogicFuzz: Coordinated LLM Agents for Next-Gen Fuzz Driver Generation" (2025E04486 SG).

[TD9] Kaixuan Li, Jingquan Ge, **Maoyi Xie** et al. "Automatic Java Deserialization Vulnerability Mining and Exploitation via LLM Agents" (2025E01925 SG).

[TD10] **Maoyi Xie** et al. "ARASH: Analysis and Repair of Crash" (2025E01753 SG).

[TD11] **Maoyi Xie** et al. "LLM4RCA: LLM-Based Multi-Agent Root Cause Analysis" (2024E04182 SG).

[TD12] Kaixuan Li, Jingquan Ge, Wei Ma, **Maoyi Xie** et al. "AutoPatcher: Automatic Root-Cause-Analysis Guided Program Repair via Large Language Models" (2024E04091 SG).

[TD13] Jingquan Ge, Wei Ma, Kaixuan Li, **Maoyi Xie** et al. "BootHotPatch: Transparent Hot Patch Automatic Deployment Framework during Linux-Based Vehicle System Boot" (2024E03625 SG).

Industrial Impact

Deployed Tools

2026	**Logickaller** (cf. TD4). Integrated into AUMOVIO's platform.
2025	**ARASH** (cf. [J2], [P2], TD10). Integrated into AUMOVIO's platform; partially integrated into Google's OSS-Fuzz-Gen.
2024	**DeFort** (cf. [C3]). Integrated into MetaTrust's platform.
2024	**Emulation-based fuzzer**. Integrated into Continental's platform.

Vulnerability Disclosures

2026	Discovered, reported, and fixed Linux kernel vulnerabilities, with **more than 50 patches** merged into mainline and **34 CVEs** assigned, including CVE-2026-63829 (8.8), CVE-2026-63917 (8.8), CVE-2026-63921 (8.8), CVE-2026-68409 (8.8), CVE-2026-72003 (8.8), CVE-2026-72029 (8.8), CVE-2026-72051 (8.8), CVE-2026-72052 (8.8), CVE-2026-72053 (8.8), CVE-2026-72054 (8.8), CVE-2026-72055 (8.8), CVE-2026-72061 (8.8), CVE-2026-72136 (8.8), CVE-2026-72157 (8.8), and CVE-2026-93190 (8.4).

Professional Service

- **Program Committee:** ICSE 2027 Shadow PC, Research Track
- **Journal Referee:** ACM Transactions on Software Engineering and Methodology (TOSEM), 2026
- **Co-Reviewing:** ICSE 2024–2026; FSE 2026; ISSTA 2024, 2026; ASE 2026; CCS 2025; WWW 2023