Lingjun Liu

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EDUCATION

North Carolina State University (NCSU), Raleigh, NC, USA — 2024 – 2029 (Expected)
Ph.D. in Computer Science
Adviser: Prof. Marcelo d'Amorim

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea — 2019 – 2021
M.S. in Computer Science
Advisor: Prof. Doo-Hwan Bae
Exchange Program in Computer Science (during B.S.) — 2018 – 2019

National Tsing Hua University, Hsinchu, Taiwan — 2014 – 2019
B.S. in Computer Science
Note: Five-year degree including one-year exchange at KAIST

ACADEMIC EXPERIENCE

North Carolina State University — Raleigh, NC, USA
Graduate Research Assistant – Advisor: Prof. Marcelo d'Amorim — 2024 – Present

- (Research Project) Mutational Fuzzing for C Compilers
  - Built program mutation-based fuzzing framework using agentic AI (Gemini) to automatically generate bug history-driven mutators for C compilers
  - Discovered 60 bugs across GCC and Clang

KAIST — Daejeon, South Korea
Full-time Researcher – Supervisor: Prof. Eunkyoung Jee — 2023 – 2024 | 2021 – 2022

- (Research Project) Reliability Estimation of Nuclear PLC Software
  - Developed reliability measurement prototype using Bayesian Belief Networks and statistical testing to enable regulatory organizations to evaluate nuclear PLC software reliability

KAIST — Daejeon, South Korea
Graduate Research Assistant – Advisor: Prof. Doo-Hwan Bae — 2018 – 2021

- (Research Project) Mutation-Based Test Generation for FBD Programs
  - Developed automated test generator for nuclear safety software using mutation operators and Yices SMT solver
  - Modeled FBD programs and mutations as SMT constraints to enable systematic test case generation
  - Maximized fault detection effectiveness through mutation-based testing techniques
- (Research Project) Runtime Verification of System-of-Systems
  - Designed runtime verification property patterns and scopes
  - Developed verification checker for Mass Casualty Incident-Response (MCI-R) systems to ensure safety properties during operation
- (Research Project) Security Testing of Air Traffic Control Systems
  - Modeled attack scenarios on air traffic control systems using JADE multi-agent framework
  - Implemented test case generation via model checking to systematically verify system behaviors under attacks
- (Research Project) Failure Pattern Analysis for Transportation Systems
  - Applied sequence pattern mining and time-series clustering to detect interaction failures

INDUSTRY EXPERIENCE

Suresoft Technologies Inc. — Seongnam, South Korea
Associate Research Engineer — 2022 – 2023

- Static Analysis Tool Development
  - Developed C++ rule checkers based on AUTOSAR C++14 coding guidelines to improve automotive software quality
  - Implemented backend services for license validation using Java Spring framework
  - Managed software packaging and conducted regression testing to ensure reliability

PUBLICATIONS

- **Bug Histories as Sources of Compiler Fuzzing Mutators** [preprint]
  Lingjun Liu, Feiran Qin, Owolabi Legunsen, Marcelo d'Amorim
  Under Submission, 2025
- **Development of Reliability Measurement Method and Tool for Nuclear Power Plant Safety Software**
  Lingjun Liu, Wooyoung Choi, Eunkyoung Jee, Duksan Ryu [TKIPS]
  The Transactions of the Korea Information Processing Society, 2024
  – Extended version of the KCSE 2024 paper
- **A Reliability Evaluation Tool for Nuclear Power Plant Safety Software**
  Lingjun Liu, Wooyoung Choi, Eunkyoung Jee, Duksan Ryu
  Korea Conference on Software Engineering (KCSE), 2024
  – **Best Short Paper Award**
- **Search-based Test Case Selection for PLC Systems using Functional Block Diagram Programs** [ISSRE]
  Miriam Ugarte Querejeta, Eunkyoung Jee, **Lingjun Liu**, Pablo Valle, Aitor Arrieta, Miren Illarramendi Rezabal
  International Symposium on Software Reliability Engineering, 2023
- **MuFBDTester: A mutation-based test sequence generator for FBD programs implementing nuclear power plant software** [STVR]
  Lingjun Liu, Eunkyoung Jee, Doo-Hwan Bae
  Software Testing, Verification and Reliability, 2022
- **An Empirical Study of Reliability Analysis for Platooning System-of-Systems** [QRS-C]
  Sangwon Hyun, **Lingjun Liu**, Hansu Kim, Esther Cho, Doo-Hwan Bae
  International Conference on Software Quality, Reliability and Security Companion, 2021
- **Attack-driven Test Case Generation Approach using Model-checking Technique for Collaborating Systems**
  Zelalem Mihret, **Lingjun Liu** [EnCyCriS]
  International Workshop on Engineering and Cybersecurity of Critical Systems, 2021.
- **Platooning LEGOs: An Open Physical Exemplar for Engineering Self-Adaptive Cyber-Physical Systems-of-Systems**
  Yong-Jun Shin, **Lingjun Liu**, Sangwon Hyun, Doo-Hwan Bae [SEAMS]
  International Symposium on Software Engineering for Adaptive and Self-Managing Systems, 2021
  – **Best Artifact Award**
- **MuGenFBD: Automated Mutant Generator for Function Block Diagram Program** [KTSDE]
  Lingjun Liu, Eunkyoung Jee, Doo-Hwan Bae
  KIPS Transactions on Software and Data Engineering, 2021
  – Extended version of the KCSE 2020 paper
- **A Systematic Translation from PAT-based Counterexamples to Viable Test Cases**
  Zelalem Mihret, **Lingjun Liu**, Eunkyoung Jee, Doo-Hwan Bae
  Korea Conference on Software Engineering (KCSE), 2021
- **Analysis of coupling effect hypothesis for function block diagram programs**
  Lingjun Liu, Eunkyoung Jee, Doo-Hwan Bae
  Korea Software Congress (KSC), 2020
- **Automated mutant generation for function block diagram programs**
  Lingjun Liu, Eunkyoung Jee, Doo-Hwan Bae
  Korea Conference on Software Engineering (KCSE), 2020
  – **Outstanding Short Paper Award**

FELLOWSHIPS

- 2024 University Graduate Fellowship at NCSU – Top graduate student fellowship
- 2019 KAIST Scholarship – Merit-based full support

PRESENTATIONS

MuFBDTester: A mutation-based test sequence generator for FBD programs implementing nuclear power plant software – Link

- ISSRE – Journal First, Conference Second (J1C2) Track 2023
- KCSE – Invited talk of excellent international conference/journal papers 2023

SERVICE

International Conference on Software Engineering (ICSE) 2020
Student Volunteer