

Lingjun Liu

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ABOUT ME

I am currently a PhD student at North Carolina State University (NC State). My research experiences include testing and reliability analysis of complex systems, such as nuclear safety software and air traffic control systems. My research interests lie in automated testing, software reliability, and fault diagnosis for safety-critical systems and cyber-physical systems.

EDUCATION

North Carolina State University , Raleigh, NC, US PhD student, Computer Science Adviser: Prof. Marcelo d'Amorim	2024 — Present
Korea Advanced Institute of Science and Technology (KAIST) , Daejeon, South Korea Master of Science, Computer Science Adviser: Prof. Doo-Hwan Bae	2019 — 2021
KAIST , Daejeon, South Korea Exchange Program, Computer Science	2018 — 2019
National Tsing Hua University , Hsinchu, Taiwan Bachelor of Science, Computer Science	2014 — 2019

WORK EXPERIENCE

KAIST <i>Full-time Researcher</i>	Daejeon, South Korea 2023 — 2024, 2021 — 2022
<ul style="list-style-type: none">• Adviser: Prof. Eunkyong Jee• Developing a reliability measurement prototype for nuclear power plant PLC software using Bayesian Belief Network modeling and statistical testing• Research on reliability estimation methods for safety-critical software and nuclear safety software	
Suresoft Technologies Inc. <i>Associate Research Engineer</i>	Seongnam, South Korea 2022 — 2023
<ul style="list-style-type: none">• Developed coding guideline checkers for the C++ language and web services using Java Spring framework within a static analysis tool• Software packaging, Regression testing	

PUBLICATIONS

- **Search-based Test Case Selection for PLC Systems using Functional Block Diagram Programs**
Miriam Ugarte Querejeta, Eunkyong Jee, **Lingjun Liu**, Pablo Valle, Aitor Arrieta, and Miren Illarramendi Rezabal
International Symposium on Software Reliability Engineering (ISSRE), 2023
- **MuFBDTester: A mutation-based test sequence generator for FBD programs implementing nuclear power plant software**
Lingjun Liu, Eunkyong Jee, and Doo-Hwan Bae
Software Testing, Verification and Reliability (STVR), 2022
- **An Empirical Study of Reliability Analysis for Platooning System-of-Systems**
Sangwon Hyun, **Lingjun Liu**, Hansu Kim, Esther Cho, and Doo-Hwan Bae
International Conference on Software Quality, Reliability and Security Companion (QRS-C), 2021
- **Attack-driven Test Case Generation Approach using Model-checking Technique for Collaborating Systems**
Zelalem Mihret, **Lingjun Liu**
International Workshop on Engineering and Cybersecurity of Critical Systems (EnCyCriS), 2021
- **Platooning LEGOs: An Open Physical Exemplar for Engineering Self-Adaptive Cyber-Physical Systems-of-Systems**
Yong-Jun Shin, **Lingjun Liu**, Sangwon Hyun, and Doo-Hwan Bae
International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), 2021

- **MuGenFBD: Automated Mutant Generator for Function Block Diagram Program**
Lingjun Liu, Eunkyong Jee, and Doo-Hwan Bae
KIPS Transactions on Software and Data Engineering (KTSDE), 2021
- **A Systematic Translation from PAT-based Counterexamples to Viable Test Cases**
Zelalem Mihret, Lingjun Liu, Eunkyong Jee, and Doo-Hwan Bae
Korea Conference on Software Engineering (KCSE), 2021
- **Analysis of coupling effect hypothesis for function block diagram programs**
Lingjun Liu, Eunkyong Jee, and Doo-Hwan Bae
Korea Software Congress (KSC), 2020
- **Automated mutant generation for function block diagram programs**
Lingjun Liu, Eunkyong Jee, and Doo-Hwan Bae
Korea Conference on Software Engineering (KCSE), 2020

AWARDS

Best Artifact Award

International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS) 2021

Outstanding Short Paper Award

Korea Conference on Software Engineering (KCSE) 2020

KAIST scholarship

KAIST 2019

PROJECTS

Clustering and pattern mining for analyzing interaction failures 2021

- Research on time-series clustering, sequence pattern mining, similarity to distance measures, and environment context models for time-series data in transportation systems
- Developed a sequence pattern mining algorithm using python

[CybWin] Security testing of air traffic control systems

The Research Council of Norway, Norway 2020 — 2021

- Research on security attacks in air traffic control systems, model-based security testing, and model checking techniques
- Developed a security test generation approach using model checking
- Developed formal models for air traffic control system and security attack
- Developed a simulator of air traffic control system using Java Agent DEvelopment Framework (JADE)

[SW Starlab] Simulation-based runtime verification of System-of-Systems

Institute for Information & communications Technology Promotion (IITP), Korea 2020 — 2021

- Research on specification patterns and scopes used in runtime verification
- Developed verification property checking for Mass Casualty Incident-Response (MCI-R) system

Developing Automated Mutation-based Test Generation Technique to Maximize the Fault-detection Effectiveness for FBD Programs

National Research Foundation of Korea (NRF), Korea 2019 — 2021

- Research on FBD testing and mutation testing techniques for general software and FBD programs
- Developed an automated test generation tool for FBD programs using mutation testing techniques and Yices SMT solver
- Developed Yices scripts by defining original FBD program and mutant in SMT constraints to generate mutation-adequate test cases

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)

Student Volunteer 2020