Sungmin Kang

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EDUCATION

Korea Advanced Institute of Science and Technology Mar. 2014 – Aug. 2024

- Integrated Ph.D. in Computer Science (2019 – 2024)
- B.S. in Computer Science (2014 – 2019)

RESEARCH EXPERIENCE

KAIST Computational Intelligence for Software Engineering Lab. Sept. 2018 – Current
Undergraduate Intern (Sept – Dec. 2018), Full-time Graduate Student (Mar. 2019 – Aug. 2024)

- Thesis: Reliable Large Language Model-based Software Artifacts via Execution
- Supervisor: Dr. Shin Yoo
- Research Areas: Software Testing, Automatic Debugging

Microsoft Research Asia Oct. 2022 – Apr. 2023
Research Intern

- Project: Developing an Explainable Automated Debugging Technique via Large Language Models
- Supervisor: Dr. Jian-guang Lou
- Research Areas: Language Models, Automated Program Repair

NAVER WEBTOON Corp. July 2017 – Dec. 2017
Undergraduate Research Intern

- Project: Developing improved algorithms for cartoon colorization
- Supervisor: Team Leader Jaehyuk Chang, Dr. Jaegul Choo
- Research Areas: Computer Vision, Deep Learning

PUBLICATIONS

CONFERENCES

[1] **Sungmin Kang** (co-1st author), Gabin An, Shin Yoo, "A Quantitative and Qualitative Evaluation of LLM-based Fault Localization", *FSE'24*, accepted as full paper.

[2] **Sungmin Kang** (co-1st author), Wonkeun Choi, Shin Yoo, "A Bayesian Framework for Automated Debugging", *ISSTA'23*, accepted as full paper.

[3] **Sungmin Kang** (co-1st author), Juyeon Yoon, Shin Yoo, "Large Language Models are Few-shot Testers: Exploring LLM-based General Bug Reproduction", *ICSE'23*, accepted as full paper.

[4] **Sungmin Kang** (1st author), Louis Milliken, Shin Yoo, "Detecting Inaccurate Descriptions in LLM-generated Code Comments", under submission.

JOURNALS

[1] **Sungmin Kang** (1st author), Bei Chen, Shin Yoo, Jian-guang Lou, "Explainable Automated Debugging via Large Language Model-driven Scientific Debugging", *Empirical Software Engineering*, major revision recommended.

[2] **Sungmin Kang** (co-1st author), Juyeon Yoon, Nargiz Askarbekkyzy, Shin Yoo, "Evaluating Diverse Large Language Models for Automatic and General Bug Reproduction", *ACM Transactions on Software Engineering*, accepted.

[3] **Sungmin Kang** (1st author), Robert Feldt, Shin Yoo, "Deceiving Humans and Machines Alike: Search-based Test Input Generation for DNNs using Variational Autoencoders", *ACM Transactions on Software Engineering and Methodology*, accepted.

[4] Jeongju Sohn, **Sungmin Kang** (co-1st author), Shin Yoo, "Arachne: Search Based Repair of Deep Neural Networks", *ACM Transactions on Software Engineering and Methodology*, accepted.

[5] Kyeong Min Song, Shinho Kim, **Sungmin Kang** (3rd author), Tae Won Nam, Geon Yeong Kim, Hunhee Lim, Eugene N. Cho, Kwang Ho Kim, Se Hun Kwon, Min Seok Jang et al., "Microcellular sensing media with ternary transparency states for fast and intuitive identification of unknown liquids", *Science Advances*, accepted.

[6] Koeun Han, Hee-Jin Jeong, Hee-Bum Yang, **Sung-Min Kang**(4th author), Jin-Kyung Kwon, Seungill Kim, Doil Choi, and Byoung-Cheorl Kang, "An ultra-high-density bin map facilitates high-throughput QTL mapping of horticultural traits in pepper", *DNA Research,* accepted.

WORKSHOPS AND SHORT PAPERS

[1] Jae Yong Lee, **Sungmin Kang** (2nd author), Juyeon Yoon, Shin Yoo, "The GitHub Recent Bugs Dataset for Evaluating LLM-based Debugging Applications", *ICST'24*, accepted to Demonstration track.

[2] Robert Feldt, **Sungmin Kang**(2nd author), Juyeon Yoon, Shin Yoo, "SOCRATEST - Towards Autonomous Testing Agents via Conversational Large Language Models", *ASE'23*, accepted to NIER track.

[3] **Sungmin Kang**(1st author), Shin Yoo, "GLAD: Neural Predicate Synthesis to Repair Omission Faults", *ICSE'23*, accepted as poster.

[4] **Sungmin Kang**(1st author), Shin Yoo, "Towards Objective-Tailored Genetic Improvement Through Large Language Models", *GI'23*, accepted as position paper.

[5] **Sungmin Kang**(1st author), Shin Yoo, "Language Models Can Prioritize Patches for Practical Program Patching", *ICSE'22 Workshop on Automated Program Repair,* 2022, accepted as full paper.

[6] **Sungmin Kang**(1st author), Shin Yoo, "Improving Fault Localization and Automated Program Repair with Suspicious Predicates", *KCSE'22*, accepted as short paper.

[7] **Sungmin Kang**(1st author), Robert Feldt, Shin Yoo, "SINVAD: Search-based Image Space Navigation for DNN Image Classifier Test Input Generation", *ICSE'20 Workshop on Search-based Software Testing, 2020,* accepted as full paper.

[8] **Sungmin Kang**(1st author), Jaegul Choo, and Jaehyuk Chang, "Consistent Comic Colorization with Pixel-wise Background Classification", *NIPS'17 Workshop on Machine Learning for Creativity and Design, 2017*, accepted as poster.

SERVICE

JOURNAL REVIEWER
Reviewer for TSE (2023), TOSEM (2023, 2024), JSS (2024), ASE (2024), IEEE Software (2023), PLOS ONE (2024), IEEE Communications (2024)

CONFERENCE/WORKSHOP REVIEWER
PC member for ISSRE (2024), GI (2024, 2025), SBFT (2025), LLMfwEC (2024)

PROJECTS & LEADERSHIP

Analyzing Korean Quiz Show with Data Science Jan. 2020 – Nov. 2020
Discovered statistical patterns in quiz questions to achieve **highest quiz show score ever** (link)

Playing Othello+ with AlphaZero Sept. 2018
Implemented AlphaZero and played **team leader** role in "KAIST-POSTECH Science War" AI competition

International Conference for the Integration of Science Technology and Society 2014 – 2016
As **president** of the organization, overall coordinated conference with 300+ participants and 38 organizers

AWARDS

Best Position Paper Award (International Workshop on Genetic Improvement 2023) 2023
For the paper "Towards Objective-Tailored Genetic Improvement Through Large Language Models"

Best Presentation Award (International Workshop on Genetic Improvement 2023) 2023
For the paper "Towards Objective-Tailored Genetic Improvement Through Large Language Models"

Best Short Paper Award (Korea Conference on Software Engineering 2022) 2022
For the paper "Improving Fault Localization and Automated Program Repair with Suspicious Predicates"

Excellent Teaching Assistant Reward (KAIST School of Computing) 2019
As an assistant of the "AI Based Software Engineering" course

SKILLS

Natural Languages
Korean (native), English (native)

Programming Languages
Fluent in Python, familiar with C, bash.