Curriculum Vitae

Sunbeom So (소순범)

- Assistant Professor at GIST (Gwangju Institute of Science and Technology)
- Email: sunbeomso@gist.ac.kr
- Webpage: https://gist-pal.github.io
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Research Interests

I am interested in various research topics for improving the safety and reliability of software. To tackle my research problems, I mainly focus on developing and using techniques based on ***SMT-based formal methods*** such as formal verification and symbolic execution, but I am also interested in using other practical techniques such as fuzzing to effectively achieve the goal of my research.

- **Formal verification** for proving the absence of vulnerabilities and errors in software.
- **Symbolic execution** for finding vulnerabilities and errors in software.
- **Efficient decision procedures for first-order theories** for making formal verification and symbolic execution more practical.
- **Testing SMT solvers** for enhancing the reliability of verification and symbolic execution tools.

Education

- **Ph.D. in Computer Science and Engineering** 2016.09 – 2022.08
  Korea University Seoul, Korea
  Thesis: Automatic Verification, Testing, and Repair of Smart Contracts
  Advisor: Hakjoo Oh
- **B.S. in Computer and Communication Engineering** 2011.03 – 2016.08
  Korea University Seoul, Korea
  Graduation with Top Honors (Valedictorian)

Work Experience

- Assistant Professor 2023.09 – current
  School of Electrical Engineering and Computer Science Gwangju, Korea
  GIST
- Research Professor 2022.09 – 2023.08
  BK21 FOUR R&E Center for Computer Science and Engineering Seoul, Korea
  Korea University

Publications

I have published papers at top-tier conferences in the field of software security (**Security 2021**, **S&P 2020**), software engineering (**ICSE 2023**, **FSE 2023**), programming languages (**OOPSLA 2018**), and artificial intelligence (**IJCAI 2018**).

1. SmartFix: Fixing Vulnerable Smart Contracts by Accelerating Generate-and-Verify Repair using Statistical Models
   Sunbeom So, and Hakjoo Oh
   ESEC/FSE 2023: *ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering*
   ⋆ **BK21 인정 IF 4**

2. Diver: Oracle-Guided SMT Solver Testing with Unrestricted Random Mutations
   Jongwook Kim*, Sunbeom So*, and Hakjoo Oh (∗: co-first authors)
   ICSE 2023: *45th International Conference on Software Engineering*
   ⋆ **BK21 인정 IF 4**

3. SmarTest: Effectively Hunting Vulnerable Transaction Sequences in Smart Contracts through Language Model-Guided Symbolic Execution
   Sunbeom So, Seongjoon Hong, and Hakjoo Oh
   Security 2021: *30th USENIX Security Symposium*
   ⋆ **BK21 인정 IF 3**

4. VeriSmart: A Highly Precise Safety Verifier for Ethereum Smart Contracts
   Sunbeom So, Myungho Lee, Jisu Park, Heejo Lee, and Hakjoo Oh
   S&P 2020: *41st IEEE Symposium on Security and Privacy*
   ⋆ **BK21 인정 IF 4**

5. Automatic Diagnosis and Correction of Logical Errors for Functional Programming Assignments
   Junho Lee, Dowon Song, Sunbeom So, and Hakjoo Oh
   OOPSLA 2018: *ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications*
   ⋆ **BK21 인정 IF 4**

6. Synthesizing Pattern Programs from Examples
   Sunbeom So, and Hakjoo Oh
   IJCAI 2018: *International Joint Conference on Artificial Intelligence*
   ⋆ **BK21 인정 IF 4**

7. Synthesizing Imperative Programs from Examples Guided by Static Analysis
   Sunbeom So, and Hakjoo Oh
   SAS 2017: *Static Analysis Symposium*
   ⋆ **BK21 인정 IF 1**

8. Synthesizing Regular Expressions from Examples for Introductory Automata Assignments
   Mina Lee*, Sunbeom So*, and Hakjoo Oh (∗: co-first authors)
   GPCE 2016: *ACM SIGPLAN International Conference on Generative Programming: Concepts and Experiences*
   ⋆ **Best Paper Award**

Academic Activities

Program Committee (PC) member

- **ISSTA 2025**: The ACM SIGSOFT International Symposium on Software Testing and Analysis

Artifact Evaluation Committee (AEC) member

- **CAV 2023**: 35th International Conference on Computer Aided Verification
- **OOPSLA 2020**: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications

Journal Reviewer

- **TSE**: IEEE Transactions on Software Engineering (2022, 2023)
- **TOSEM**: ACM Transactions on Software Engineering and Methodology (2023)

Open-sourced Research Software

I have developed the following open-sourced software.

- **Main developer** of VeriSmart, SmarTest, and SmartFix
  VeriSmart: a formal safety verification tool for smart contracts
  SmarTest: a symbolic execution tool for smart contracts
  SmartFix: a vulnerability-repair tool for smart contracts
  `https://github.com/kupl/VeriSmart-public`
- **Main developer** of Pat
  A pattern program synthesizer
  `https://github.com/kupl/pat`
- **Main developer** of Simpl
  An imperative program synthesizer
  `https://github.com/kupl/SimplPublic`
- Developer of AlphaRegex
  A regular expression synthesizer
  `https://github.com/kupl/AlphaRegexPublic`

Research Grant (Principal Investigator)

- **Research Subsidies for Ph.D. Candidates** 2020.06 – 2021.05
  National Research Foundation of Korea (NRF)
  20,000,000 KRW

Technology Transfer

- **스마트 컨트랙트 검증 장치 및 방법** (오학주, 소순범, 이명호) 2020.09 – 2023.08
  SOOHO.IO Inc.
  5,000,000 KRW

Awards

- **The 27th Humantech Paper Award*** **(Participation Prize)** 2021.02
  Samsung Electronics
  *: # of awarded submissions: 116 out of 1991 (5.8%)

- **Naver Ph.D Fellowship Award** 2020.12
  Naver
- **Valedictorian at the College of Information & Communication** 2017.02
  Korea University
- **Best Paper Award** 2016.10
  ACM SIGPLAN GPCE 2016

Scholarships

- **Junior Fellow-Research Grant** 2020 Fall – 2021 Spring
  Korea University
- **Honor Graduates Scholarship** 2017 Spring – 2020 Spring
  Korea University
- **Undergraduate Student Scholarship** 2015 Spring – 2016 Spring
  Kwanjeong Educational Foundation
- **Academic Excellence Scholarship** 2012 Spring, 2014 Fall
  Korea University

Invited Talks

- Automatic Safety Analysis of Smart Contracts
  CSE Graduate Seminar at UNIST 2024.05.22
- Introduction to Program Analysis Techniques with Applications to Smart Contract Security
  Graduate Seminar at KENTECH 2024.05.01
- 스마트 컨트랙트 안전성 향상을 위한 프로그램 분석 기술 소개
  CS Colloquium at Korea University 2023.12.20
- SmarTest: Effectively Hunting Vulnerable Transaction Sequences in Smart Contracts through Language Model-Guided Symbolic Execution
  Top Conference Session at Korea Software Congress (KSC) 2021 2021.12.22
- VeriSmart: A Highly Precise Safety Verifier for Ethereum Smart Contracts
  Top Conference Session at Korea Computer Congress (KCC) 2020, Online 2020.07.03

Conference Presentations

- SmartFix: Fixing Vulnerable Smart Contracts by Accelerating Generate-and-Verify Repair using Statistical Models
  ESEC/FSE 2023, San Francisco (USA) 2023.12.05
- SmarTest: Effectively Hunting Vulnerable Transaction Sequences in Smart Contracts through Language Model-Guided Symbolic Execution
  USENIX Security 2021, Online 2021.08.11
- VeriSmart: A Highly Precise Safety Verifier for Ethereum Smart Contracts
  IEEE S&P 2020, Online 2020.05.20
- Synthesizing Pattern Programs from Examples
  IJCAI 2018, Stockholm (Sweden) 2018.07.16

- Synthesizing Imperative Programs from Examples Guided by Static Analysis
  SAS 2017, New York (USA) 2017.08.30
- Synthesizing Regular Expressions from Examples for Introductory Automata Assignments
  GPCE 2016, Amsterdam (Netherlands) 2016.10.31

Teaching

- *Programming Languages and Compilers* (taught in English) 2023 Fall, 2024 Fall
  Undergraudate course at GIST EECS
- *Software Engineering* (taught in English) 2024 Spring
  Undergraudate course at GIST EECS