Hakjoo Oh

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Research Area

Programming languages with applications to software engineering, security, and AI:

- **Program analysis** for automatically detecting software bugs and vulnerabilities
- **Program repair** for automatically fixing buggy or vulnerable software
- **Program synthesis** for automatically writing programs on behalf of humans

Educational Background

Ph.D. in Computer Science. Seoul National University	Mar 2007 – Feb 2012
M.S. in Computer Science. Seoul National University	Mar 2005 – Feb 2007
B.S. in Computer Science. KAIST	Mar 2001 – Feb 2005
Seoul Science High School	Mar 1999 – Feb 2001

Employment History

Professor, Korea University	Sep 2023 – Present
Associate Professor, Korea University	Sep 2018 – Aug 2023
Assistant Professor, Korea University	Mar 2015 – Aug 2018
Research Assistant Professor, Seoul National University	Mar 2014 – Feb 2015
Postdoctoral Researcher, Seoul National University	Mar 2012 – Feb 2014

Awards

1. **ACM SIGSOFT Distinguished Paper Award** at the ACM/IEEE International Conference on Software Engineering (**ICSE**) for "SymTuner: Maximizing the Power of Symbolic Execution by Adaptively Tuning External Parameters", May 2022.
2. **ACM SIGSOFT Distinguished Paper Award** at the ACM SIGSOFT International Symposium on Software Testing and Analysis (**ISSTA**) for "Effective White-box Testing of Deep Neural Networks with Adaptive Neuron-Selection Strategy", July 2020.
3. **ACM SIGSOFT Distinguished Paper Award** at the ACM/IEEE International Conference on Software Engineering (**ICSE**) for "Resource-aware Program Analysis via Online Abstraction Coarsening", May 2019.

4. **Best Paper Award** at the ACM SIGPLAN International Conference on Generative Programming: Concepts and Experiences (GPCE) for "Synthesizing Regular Expressions from Examples for Introductory Automata Assignments", November 2016.

5. **Outstanding Lecture Award**, Korea University
   - 2021.04 (COSE 212 Programming Languages)
   - 2020.11 (COSE 312 Compilers)
   - 2019.10 (COSE 215 Theory of Computation)

Publications

Published papers on programming languages, software engineering, and security in premier conferences and journals such as **POPL** (2022)**, PLDI** (2012, 2014, 2020)**, OOPSLA** (2015, 2017a, 2017b, 2018a, 2018b, 2019, 2020, 2023)**, TOPLAS** (2014, 2016, 2017, 2018, 2019, 2023)**, ICSE** (2017, 2018, 2019, 2020, 2021, 2022a, 2022b, 2023a, 2023b, 2023c)**, FSE** (2018, 2019, 2020, 2021, 2022, 2023)**, ASE** (2018)**, ISSTA** (2020)**, TSE** (2020)**, IEEE S&P** (2017, 2020)**, USENIX Security** (2021, 2023)**,** and **IJCAI** (2017, 2018)**.**

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

2. Seunghoon Woo, Eunjin Choi, Heejo Lee, and Hakjoo Oh.
   V1SCAN: Discovering 1-day Vulnerabilities in Reused C/C++ Open-source Software Components Using Code Classification Techniques
   Security 2023: 32nd USENIX Security Symposium

3. Dongkwon Lee, Woosuk Lee, Hakjoo Oh, and Kwangkeun Yi.
   Optimizing Homomorphic Evaluation Circuits by Program Synthesis and Time-Bounded Exhaustive Search
   TOPLAS: ACM Transactions on Programming Languages and Systems. 2023

4. Chan Gu Kang and Hakjoo Oh.
   Modular Component-based Quantum Circuit Synthesis.
   OOPSLA 2023: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications. (conditional accept)

5. Jinkook Kim, Minseok Jeon, Sejeong Jang, and Hakjoo Oh.
   Automating Endurance Test for Flash-based Storage Devices in Samsung Electronics.
   ICST 2023: ICST 2023: IEEE International Conference on Software Testing, Verification and Validation (Industry Track)

6. Myungho Lee, Sooyoung Cha, and Hakjoo Oh.
   Learning Seed-Adaptive Mutation Strategies for Greybox Fuzzing.
   ICSE 2023: International Conference on Software Engineering

7. Jongwook Kim, Sunbeom So, and Hakjoo Oh.
   Diver: Oracle-Guided SMT Solver Testing with Unrestricted Random Mutations.
   ICSE 2023: International Conference on Software Engineering

8. Yoonseok Ko and Hakjoo Oh.
Learning to Boost Disjunctive Static Bug-Finders.
ICSE 2023: International Conference on Software Engineering

9. Wonseok Oh and Hakjoo Oh.
PyTER: Effective Program Repair for Python Type Errors.
ESEC/FSE 2022: ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering

10. Sooyoung Cha, Myungho Lee, Seokhyun Lee, and Hakjoo Oh.
SymTuner: Maximizing the Power of Symbolic Execution by Adaptively Tuning External Parameters.
ICSE 2022: International Conference on Software Engineering. (**ACM SIGSOFT Distinguished Paper Award**)

11. Junhee Lee*, Seongjoon Hong*, and Hakjoo Oh (* contributed equally)
NPEX: Repairing Java Null Pointer Exceptions without Tests.
ICSE 2022: International Conference on Software Engineering

12. Minseok Jeon and Hakjoo Oh.
Return of CFA: Call-Site Sensitivity Can Be Superior to Object Sensitivity Even for Object-Oriented Programs.
POPL 2022: The 49th ACM SIGPLAN Symposium on Principles of Programming Languages

13. Sooyoung Cha, Seongjoon Hong, Jiseong Bak, Jingyoung Kim, Junhee Lee, Hakjoo Oh.
Enhancing Dynamic Symbolic Execution by Automatically Learning Search Heuristics.
TSE: IEEE Transactions on Software Engineering. 2021 (accepted)

14. Dowon Song, Woosuk Lee, and Hakjoo Oh.
Context-Aware and Data-Driven Feedback Generation for Programming Assignments.
ESEC/FSE 2021: ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering

15. Donghoon Jeon, Minseok Jeon, and Hakjoo Oh.
A Practical Algorithm for Learning Disjunctive Abstraction Heuristics in Static Program Analysis.
IST: Information and Software Technology.

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

17. Seunghoon Woo, Sunghan Park, Seulbae Kim, Heejo Lee, and Hakjoo Oh.
CENTRIS: A Precise and Scalable Approach for Identifying Modified Open-Source Software Reuse.
ICSE 2021: The 43rd ACM/IEEE International Conference on Software Engineering.

18. Minseok Jeon, Myungho Lee, and Hakjoo Oh.
Learning Graph-based Heuristics for Pointer Analysis without Handcrafting Application-Specific Features.
OOPSLA 2020: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications.

19. Sooyoung Cha and Hakjoo Oh.
Making Symbolic Execution Promising by Learning Aggressive State-Pruning Strategy.
ESEC/FSE 2020: ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering

20. Seokhyun Lee, Sooyoung Cha, Dain Lee, and Hakjoo Oh.
Effective White-box Testing of Deep Neural Networks with Adaptive Neuron-Selection Strategy.
ISSTA 2020: The ACM SIGSOFT International Symposium on Software Testing and Analysis. (**ACM SIGSOFT Distinguished Paper Award**)

21. Dongkwon Lee, Woosuk Lee, Hakjoo Oh, and Kwangkeun Yi.
Optimizing Homomorphic Evaluation Circuits by Program Synthesis and Term Rewriting.
PLDI 2020: The 41st ACM SIGPLAN Conference on Programming Language Design and Implementation

22. Seongjoon Hong*, Junhee Lee*, Jeongsoo Lee, and Hakjoo Oh (* contributed equally)
SAVER: Scalable, Precise, and Safe Memory-Error Repair.
ICSE 2020: The 42nd ACM/IEEE International Conference on Software Engineering.

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

24. Dowon Song, Myungho Lee, and Hakjoo Oh.
Automatic and Scalable Detection of Logical Errors in Functional Programming Assignments.
OOPSLA 2019: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications.

25. Sooyoung Cha and Hakjoo Oh.
Concolic Testing with Adaptively Changing Search Heuristics.
ESEC/FSE 2019: ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering

26. Kihong Heo, Hakjoo Oh, and Hongseok Yang.
Resource-aware Program Analysis via Online Abstraction Coarsening.
ICSE 2019: The 40th ACM/IEEE International Conference on Software Engineering. May, 2019. (**ACM SIGSOFT Distinguished Paper Award**)

27. Minseok Jeon, Sehun Jeong, Sungdeok Cha, and Hakjoo Oh.
A Machine-Learning Algorithm with Disjunctive Model for Data-Driven Program Analysis.
TOPLAS: ACM Transactions on Programming Languages and Systems. 2019

28. Sooyoung Cha, Seonho Lee, and Hakjoo Oh.
Template-Guided Concolic Testing via Online Learning.
ASE 2018: IEEE/ACM International Conference on Automated Software Engineering. September 2018

29. Sooyoung Cha, Sehun Jeong, and Hakjoo Oh.
A Scalable Learning Algorithm for Data-Driven Program Analysis.
IST: Information and Software Technology. 2018

30. Minseok Jeon, Sehun Jeong, and Hakjoo Oh.
Precise and Scalable Points-to Analysis via Data-Driven Context Tunneling.
OOPSLA 2018: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications. November 2018

31. Junho Lee, Dowon Song, Sunbeom So, and Hakjoo Oh.
Automatic Diagnosis and Correction of Logical Errors for Functional Programming Assignments .
OOPSLA 2018: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications. November 2018

32. Junhee Lee*, Seongjoon Hong*, and Hakjoo Oh. (* contributed equally)
MemFix: Static Analysis-Based Repair of Memory Deallocation Errors for C.
ESEC/FSE 2018: ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering

33. Sunbeom So and Hakjoo Oh.
Synthesizing Pattern Programs from Examples.
IJCAI 2018: International Joint Conference on Artificial Intelligence. June 2018

34. Sooyoung Cha, Seongjoon Hong, Junhee Lee, and Hakjoo Oh.
Automatically Generating Search Heuristics for Concolic Testing.
ICSE 2018: The 39th ACM/IEEE International Conference on Software Engineering. May 2018

35. Kihong Heo, Hakjoo Oh, Hongseok Yang, Kwangkeun Yi.
Adapting Static Analysis via Learning with Bayesian Optimization.
TOPLAS: ACM Transactions on Programming Languages and Systems. 2018

36. Kihong Heo, Hakjoo Oh, and Hongseok Yang.
Learning Analysis Strategies for Octagon and Context Sensitivity from Labeled Data Generated by Static Analyses.
FMSD: Formal Methods in System Design. 2018

37. Woosuk Lee, Wonchan Lee, Dongok Kang, Kihong Heo, Hakjoo Oh, Kwangkeun Yi.
Sound Non-Statistical Clustering of Static Analysis Alarms.
TOPLAS: ACM Transactions on Programming Languages and Systems. 2017

38. Sehun Jeong, Minseok Jeon, Sungdeok Cha, and Hakjoo Oh.
Data-Driven Context-Sensitivity for Points-to Analysis.
OOPSLA 2017: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications, October 2017.

39. Kwonsoo Chae, Hakjoo Oh, Kihong Heo, Hongseok Yang.
Automatically Generating Features for Learning Program Analysis Heuristics for C-like Languages.
OOPSLA 2017: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications, October 2017.

40. Sunbeom So and Hakjoo Oh.
Synthesizing Imperative Programs from Examples Guided by Static Analysis.
SAS 2017: Static Analysis Symposium. 2017

41. Min-je Choi, Sehun Jeong, Hakjoo Oh, and Jaegul Choo.
End-to-End Prediction of Buffer Overruns from Raw Source Code via Neural Memory

Networks.
IJCAI 2017: International Joint Conference on Artificial Intelligence. August 2017.

42. Seulbae Kim, Seunghoon Woo, Heejo Lee, and Hakjoo Oh.
VUDDY: A Scalable Approach for Vulnerable Code Clone Discovery.
S&P 2017: IEEE Symposium on Security and Privacy. May 2017.

43. Kihong Heo, Hakjoo Oh, and Kwangkeun Yi.
Machine-Learning-Guided Selectively Unsound Static Analysis.
ICSE 2017: 38th ACM/IEEE International Conference on Software Engineering, May 2017

44. Kihong Heo, Hakjoo Oh, and Kwangkeun Yi.
Selective Conjunction of Context-Sensitivity and Octagon Domain toward Scalable and Precise Global Static Analysis.
SP&E: Software: Practice and Experience. 2017

45. Hakjoo Oh, Wonchan Lee, Kihong Heo, Hongseok Yang, and Kwangkeun Yi.
Selective X-Sensitive Analysis Guided by Impact Pre-Analysis.
TOPLAS: ACM Transactions on Programming Languages and Systems, vol. 38, Issue 2, 2016

46. Kihong Heo, Hakjoo Oh, and Hongseok Yang.
Learning a Variable-Clustering Strategy for Octagon from Labeled Data Generated by a Static Analysis.
SAS 2016: Static Analysis Symposium. 2016

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

48. Sooyoung Cha, Sehun Jeong, and Hakjoo Oh.
Learning a Strategy for Choosing Widening Thresholds from a Large Codebase.
APLAS 2016: Asian Symposium on Programming Languages and Systems. 2016

49. Sol Kim, Kihong Heo, Hakjoo Oh, and Kwangkeun Yi.
Widening with Thresholds via Binary Search.
SP&E: Software: Practice and Experience 2016

50. Hongzhe Li, Jaesang Oh, Hakjoo Oh, Heejo Lee.
Automated Source Code Instrumentation for Verifying Potential Vulnerabilities.
IFIP SEC: 31st International Information Security and Privacy Conference. 2016

51. Hakjoo Oh, Hongseok Yang, and Kwangkeun Yi.
Learning a Strategy for Adapting a Program Analysis via Bayesian Optimisation.
OOPSLA 2015: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications, October 2015.

52. Hakjoo Oh, Wonchan Lee, Kihong Heo, Hongseok Yang, and Kwangkeun Yi.
Selective Context-Sensitivity Guided by Impact Pre-Analysis.
PLDI 2014: The 35th ACM SIGPLAN Conference on Programming Language Design and Implementation, June 2014.

53. Hakjoo Oh, Kihong Heo, Wonchan Lee, Woosuk Lee, Daejun Park, Jeehoon Kang, and Kwangkeun Yi.
Global Sparse Analysis Framework.
TOPLAS: ACM Transactions on Programming Languages and Systems, vol. 36, Issue 3, 2014

54. Woosuk Lee, Hakjoo Oh, and Kwangkeun Yi.
A Progress Bar for Static Analyzers.
SAS 2014: Static Analysis Symposium, 2014

55. Yoonseok Ko, Kihong Heo, and Hakjoo Oh.
A Sparse Evaluation Technique for Detailed Semantic Analyses.
COMLAN: Computer Languages, Systems, and Structures, Vol. 40, Issues 3-4. 2014

56. Hakjoo Oh, and Kwangkeun Yi.
Access-based Abstract Memory Localization in Static Analysis.
SCP: Science of Computer Programming 78(9):1701-1727, 2013

57. Hakjoo Oh, Kihong Heo, Wonchan Lee, Woosuk Lee, and Kwangkeun Yi.
Design and Implementation of Sparse Global Analyses for C-like Languages.
PLDI 2012: The 33rd ACM SIGPLAN Conference on Programming Language Design and Implementation, June 2012 (**First PLDI paper from Korea**)

58. Hakjoo Oh, and Kwangkeun Yi.
Access-based Localization with Bypassing.
APLAS 2011: Asian Symposium on Programming Languages and Systems, December 2011

59. Hakjoo Oh, Lucas Brutschy, and Kwangkeun Yi.
Access-analysis-based Tight Localization of Abstract Memories.
VMCAI 2011: International Conference on Verification, Model Checking, and Abstract Interpretation, Jan 2011

60. Hakjoo Oh, and Kwangkeun Yi.
An Algorithmic Mitigation of Large Spurious Interprocedural Cycles in Static Analysis.
SP&E: Software: Practice and Experience 40(8):585-603, 2010

61. Hakjoo Oh.
Large Spurious Cycles in Global Static Analysis and Its Algorithmic Mitigation.
APLAS 2009: Asian Symposium on Programming Languages and Systems, December 2009

62. Yungbum Jung, Hakjoo Oh, and Kwangkeun Yi.
Identifying Static Analysis Techniques for Finding Non-fix Hunks in Fix Revisions.
DSMM 2009: ACM Workshop on Data-intensive Software Management and Mining, November 2009

Service

Program Committee (PC) members

1. ICSE 2025: The 47th International Conference on Software Engineering

2. PLDI 2024: ACM SIGPLAN Conference on Programming Language Design and Implementation
3. ISSTA 2024: ACM SIGSOFT International Symposium on Software Testing and Analysis
4. ICSE 2024: The 46th International Conference on Software Engineering
5. ISSTA 2023: ACM SIGSOFT International Symposium on Software Testing and Analysis
6. CC 2023: ACM SIGPLAN International Conference on Compiler Construction
7. OOPSLA 2022: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications
8. ISSTA 2022: ACM SIGSOFT International Symposium on Software Testing and Analysis
9. PLDI 2022: ACM SIGPLAN Conference on Programming Language Design and Implementation
10. APLAS 2021: The Asian Symposium on Programming Languages and Systems (**PC chair**)
11. OOPSLA 2021: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications
12. OCaml 2021: The OCaml Users and Developers Workshop
13. WoSCA 2021: International Workshop on Smart Contract Analysis
14. ECOOP 2021: The 35th European Conference on Object-Oriented Programming
15. ICSE 2021: The 43rd International Conference on Software Engineering
16. TAPAS 2020: The 11th Workshop on Tools for Automatic Program Analysis (**PC Co-Chair**)
17. APLAS 2020: The Asian Symposium on Programming Languages and Systems
18. WoSCA 2020: International Workshop on Smart Contract Analysis
19. OOPSLA 2020: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (External Review Committee)
20. LCTES 2020: The 21st ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems
21. ICSE-SEIP 2020: The 42nd International Conference on Software Engineering (Software Engineering in Practice Track)
22. ATVA 2020: The 18th International Symposium on Automated Technology for Verification and Analysis
23. SAS 2019: The 25th Static Analysis Symposium (Artifact Evaluation Chair)
24. CAV 2019: The 31st International Conference on Computer-Aided Verification

25. ATVA 2019: The 17th International Symposium on Automated Technology for Verification and Analysis
26. APLAS 2018: The 16th Asian Symposium on Programming Languages and Systems
27. SAS 2018: The 25th Static Analysis Symposium
28. OOPSLA 2018: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications
29. APLAS 2017: The 15th Asian Symposium on Programming Languages and Systems
30. APLAS 2015: The 13th Asian Symposium on Programming Languages and Systems
31. SAC 2015: The 30th ACM Symposium on Applied Computing (Programming Languages Track)
32. SAC 2014: The 29th ACM Symposium on Applied Computing (Programming Languages Track)
33. APLAS 2013: The 11th Asian Symposium on Programming Languages and Systems