

# Hakjoo Oh

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## Research Areas

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I work on programming languages, software engineering, and software security.

- ▶ static and dynamic program analysis
- ▶ program synthesis and repair

## Education

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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

## Experience

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Associate Professor, Korea University	Sep 2018 – Current
Assistant Professor, Korea University	Mar 2015 – Aug 2018
Research Assistant Professor, Seoul National University	Mar 2012 – Feb 2015

## Publications

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Published papers on programming languages, software engineering, security, and artificial intelligence in premier conferences and journals such as PLDI (2012, 2014), OOPSLA (2015, 2017, 2017, 2018, 2018), ICSE (2017, 2018, 2019), FSE (2018), ASE (2018), S&P (2017), IJCAI (2017, 2018), and TOPLAS (2014, 2016, 2017, 2018, 2019).

1. Kihong Heo, Hakjoo Oh, and Hongseok Yang. *Resource-aware Program Analysis via Online Abstraction Coarsening*. ICSE 2019: International Conference on Software Engineering (accepted)
2. Minseok Jeon\*, Seungho Jeong\*, Sungdeok Cha, and Hakjoo Oh (\*contributed equally). *A Machine-Learning Algorithm with Disjunctive Model for Data-Driven Program Analysis*. TOPLAS: ACM Transactions on Programming Languages and Systems. 2019 (accepted)
3. 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

4. Sooyoung Cha, Sehun Jeong, and Hakjoo Oh. *A Scalable Learning Algorithm for Data-Driven Program Analysis*. **IST**: Information and Software Technology
5. 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
6. 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
7. Junhee Lee, Seongjoon Hong, and Hakjoo Oh. *MemFix: Static Analysis-Based Repair of Memory Deallocation Errors for C*. **FSE 2018**: ACM SIGSOFT Symposium on the Foundations of Software Engineering. November 2018
8. Sunbeom So and Hakjoo Oh. *Synthesizing Pattern Programs from Examples*. **IJCAI 2018**: International Joint Conference on Artificial Intelligence. June 2018
9. Sooyoung Cha, Seongjoon Hong, Junhee Lee, and Hakjoo Oh. *Automatically Generating Search Heuristics for Concolic Testing*. **ICSE 2018**: International Conference on Software Engineering. May 2018
10. 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 (to appear)
11. 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 (to appear)
12. 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
13. 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.
14. 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.
15. Sunbeom So and Hakjoo Oh. *Synthesizing Imperative Programs from Examples Guided by Static Analysis*. **SAS 2017**: Static Analysis Symposium. 2017
16. 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.
17. 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.
18. Kihong Heo, Hakjoo Oh, and Kwangkeun Yi. *Machine-Learning-Guided Selectively Unsound Static Analysis*. **ICSE 2017**: International Conference on Software Engineering, May 2017

19. 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
20. 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
21. 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
22. 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**)
23. 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
24. Sol Kim, Kihong Heo, Hakjoo Oh, and Kwangkeun Yi. *Widening with Thresholds via Binary Search*. **SP&E: Software: Practice and Experience** 2016
25. 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
26. 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.
27. 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.
28. 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
29. Woosuk Lee, Hakjoo Oh, and Kwangkeun Yi. *A Progress Bar for Static Analyzers*. **SAS 2014: Static Analysis Symposium**, 2014
30. 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
31. Hakjoo Oh, and Kwangkeun Yi. *Access-based Abstract Memory Localization in Static Analysis*. **SCP: Science of Computer Programming** 78(9):1701-1727, 2013
32. 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**)

33. 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
34. Hakjoo Oh, and Kwangkeun Yi. *Access-based Localization with Bypassing*. **APLAS 2011**: Asian Symposium on Programming Languages and Systems, December 2011
35. 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
36. Hakjoo Oh. *Large Spurious Cycles in Global Static Analysis and Its Algorithmic Mitigation*. **APLAS 2009**: Asian Symposium on Programming Languages and Systems, December 2009
37. 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

## Selected Talks

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1. Introduction to Software Research at Korea University. S-Core. June. 11, 2018.
2. Data-Driven Program Analysis. KAIST. Oct 30, 2017.
3. Data-Driven Program Analysis. SNU. Sep 29, 2017.
4. Data-Driven Static Analysis. NII Shonan Meeting on Memory Abstractions: Emerging Techniques and Applications. Sep 12, 2017.
5. Automatically Generating Search Heuristics for Concolic Testing. SW Center, Samsung Electronics. Aug. 8, 2017.
6. Data-Driven Program Analysis. Postech CSE Seminars. Nov. 9, 2016.
7. Machine-Learning-Guided Adaptive Program Analysis. The Seventh Workshop on Tools for Automatic Program Analysis (**TAPAS 2016**), Edinburgh, UK. September 7, 2016.
8. Machine-Learning-Guided Adaptive Program Analysis. SIGPL Summer School. Aug. 19, 2016.
9. Learning a Strategy for Adapting a Program Analysis via Bayesian Optimization. Paper presentation at *ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA 2015)*, Pittsburgh, USA. October 29 2015.
10. Selective Context-Sensitivity Guided by Impact Pre-Analysis. Paper presentation at *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2014)*, Edinburgh, Scotland. June 11 2014.
11. Selective-X Analysis Guided by Impact Pre-Analysis. *Workshop on Analysis and Verification of Cyber Physical Software*, Seoul, Korea. Dec 23 2013.
12. Sparse Analysis Framework. Dagstuhl Seminar 13162 on Pointer Analysis, Dagstuhl, Germany. Apr 18 2013.

13. Spatial and Temporal Localization Techniques for Global Static Analysis  
*Workshop on Analysis and Verification of Cyber Physical Software*, Changsha, China. Oct 25 2012.
14. Design and Implementation of Sparse Global Analyses for C-like Languages  
Paper presentation at *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2012)*, Beijing, China. June 12 2012.
15. Static Program Analysis for Million Lines of Code  
Tutorial at Korea Computer Congress, Jeju, Korea. June 28 2012.
16. Cost-reduction Techniques for Static Program Analysis  
SIGPL Winter School, Gyeongbuk, Korea. February 03-04 2012.
17. Access-analysis-based Tight Localization of Abstract Memories  
Paper presentation at *The Twelves International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2011)*. Austin, Texas, USA. January 23 2011.
18. Access-based Localization with Bypassing  
Paper presentation at *The Ninth Asian Symposium on Programming Languages and Systems (APLAS 2011)*. Kenting, Taiwan. December 05 2011.
19. Global Static Analysis of Million Lines of Code  
Lightning talk at *ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2012)*, Philadelphia, USA. Jan 25 2012.
20. Large Spurious Cycles in Global Static Analysis and Its Algorithmic Mitigation  
Paper presentation at *The Seventh Asian Symposium on Programming Languages and Systems (APLAS 2009)*. Seoul, Korea. December 14 2009.
21. Avoiding Spurious Cycles Matters for Scalable Analysis  
Poster presentation at *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2008)*. Poster Session. Tucson, Arizona, USA. June 8, 2008

## Academic Activities

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### Program Committee (PC) members

- ▶ CAV 2019: 31st International Conference on Computer-Aided Verification
- ▶ ATVA 2019: 17th International Symposium on Automated Technology for Verification and Analysis
- ▶ APLAS 2018: 16th Asian Symposium on Programming Languages and Systems
- ▶ SAS 2018: 25th Static Analysis Symposium
- ▶ OOPSLA 2018: ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications
- ▶ APLAS 2017: 13th Asian Symposium on Programming Languages and Systems
- ▶ APLAS 2015: 13th Asian Symposium on Programming Languages and Systems
- ▶ SAC 2015: 30th ACM Symposium on Applied Computing (Programming Languages Track)
- ▶ SAC 2014: 29th ACM Symposium on Applied Computing (Programming Languages Track)

- ▶ APLAS 2013: 11th Asian Symposium on Programming Languages and Systems

#### Invited participant

- ▶ NII Shonan Meeting on Memory Abstraction, Emerging Techniques and Applications, September 10–14, 2017.
- ▶ Dagstuhl Seminar 13162 on Pointer Analysis, April 2013 (<http://www.dagstuhl.de/13162>)

## Software

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I have contributed as a main developer to the following software projects:

- ▶ Sparrow: an industrial-strength static analyzer for detecting memory bugs in C programs
  - Academic version: <https://github.com/ropas/sparrow>
  - Commercialized version: <http://sparrowfasoo.com/product/sast>