Shin Hong

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Research interests

Software testing, analysis and verification, especially on automated test generation support for **systems software**. Develop **automated testing techniques**, **dynamic/static analysis techniques** for bridging software engineering theories and software practices.

Educations and Experiences

Mar 2016—Present	**Assistant professor, School of Computer Science & Electrical Engineering, Handong Global University** (HGU)
Aug 2015—Feb 2016	**Postdoctoral researcher**, **School of Computing, KAIST** (director: Prof. Moonzoo Kim)
Feb 2011—Aug 2015	**Ph.D in Computer Science, KAIST** (advisor: Prof. Moonzoo Kim) • Dissertation: Effective and Efficient Test Generation for Multithreaded Programs Using Concurrency Coverage Metrics
Feb 2010—Feb 2011	**Researcher, Computer Science Department, KAIST**
Mar 2007—Jan 2010	**M.S in Computer Science, KAIST** (advisor: Prof. Moonzoo Kim) • Thesis: Concurrency Bug Detection through Improved Bug Pattern Matching Using Semantic Information
Mar 2003—Feb 2007	**B.S in Computer Science, KAIST**

Publications

- **Refereed journal articles**

[1] **S. Hong**, T. Kwak, B. Lee, Y. Jeon, B. Ko, Y. Kim, M. Kim, MUSEUM: Debugging Real-World Multilingual Programs Using Mutation Analysis, Information and Software Technology, 82, pp. 80—95, Feb 2017

[2] W. Kim, H. Choi, **S. Hong**, Application of M/G/c/c Queueing Models to Optimize Book Circulation Process in University Library, Journal of the Korea Management Engineering Society, Dec 2016 (written in Korean)

[3] Y. Jeon, Y. Kim, **S. Hong**, M. Kim, Mutagen4J: Effective Mutation Generation Tool for Java Programs, Journal of KIISE (JOK), 43(9), pp. 974—982, Sep 2016 (written in Korean)

[4] **S. Hong**, M. Staats, J. Ahn, M. Kim, G. Rothermel, Are Concurrency Coverage Metrics Effective for Testing: A Comprehensive Empirical Investigation, Software Testing, Verification and Reliability (STVR), 25(4), pp.334-370, Jun 2015 **(invited article)**

[5] **S. Hong**, M. Kim, A Survey of Race Bug Detection Techniques for Multithreaded Programmes, Software Testing, Verification and Reliability (STVR), 25(3), pp.191—217, May 2015

[6] **S. Hong**, M. Kim, Effective Pattern-driven Concurrency Bug Detection for Operating Systems, Journal of Systems and Software (JSS), 86(2), pp. 377—388, Feb 2013

[7] Y. Park, **S. Hong**, M. Kim, Performance Bug Detection in Web Applications through Cross-browser Profiling, Journal of KIISE: Computing Practices and Letters, Vol. 19(11), Nov 2013 (written in Korean)

[8] M. Kim and **S. Hong**, Model-based Kernel Testing (MOKERT) Framework, Journal of KIISE: Software and Applications, Vol. 36(7), pp. 523—530, Jul 2009 (written in Korean)

- **Refereed international conference papers**

[9] Y. Kim, **S. Hong**, B. Ko, M. Kim, Invasive Software Testing: Mutating Target Programs to Achieve High Test Coverage, International Conference on Software Testing, Verification and Validation (ICST), Apr 9-11, 2018 (acceptance rate: 25%, **Distinguished paper awarded)**

[10] **S. Hong**, B. Lee, T. Kwak, Y. Jeon, B. Ko, Y. Kim, M. Kim, Mutation Based Fault Localization for Real-World Multilingual Programs, 30th IEEE/ACM International Conference on Automated Software Engineering (ASE), Nov 9-13, 2015 (acceptance rate: 19%)

[11] Y. Park, **S. Hong**, M. Kim, D. Lee, and J. Cho, Systematic Testing of Reactive Software with Non-deterministic Events: A Case Study on LG Electric Oven, 37th International Conference on Software Engineering (ICSE), Software Engineering in Practice (SEIP), May 2015 (acceptance rate: 22.5%)

[12] **S. Hong**, Y. Park, M. Kim, Detecting Concurrency Errors in Client-side JavaScript Web Applications, 7th IEEE International Conference on Software Testing, Verification and Validation (ICST), Mar 31-Apr 4, 2014 (acceptance rate: 28%)

[13] **S. Hong**, M. Staats, J. Ahn, M. Kim, G. Rothermel, Impact of Concurrent Coverage Metrics on Testing Effectiveness, 6th IEEE International Conference on Software Testing, Verification and Validation (ICST), Mar 13-22, 2013 (acceptance rate: 25%)

[14] M. Staats, **S. Hong**, M. Kim, and G. Rothermel, Understanding User Understanding: Determining Correctness of Generated Program Invariants, International Symposium on Software Testing and Analysis (ISSTA), Jul 15-20, 2012 (acceptance rate: 28.7%)

[15] **S. Hong**, J. Ahn, S. Park, M. Kim, and M. J. Harrold, Testing Concurrent Programs to Achieve High Synchronization Coverage, International Symposium on Software Testing and Analysis (ISSTA), Jul 15-20, 2012 (acceptance rate: 28.7%)

[16] M. Kim, **S. Hong**. C. Hong, T. Kim, Model-based Kernel Testing for Concurrency Bugs through Counter Example Replay, Model-based Testing (ENTCS volume 253, issue 2), York, UK, Mar 2009

- **Refereed domestic conference papers (written in Korean)**

[17] H. Choe, **S. Hong**, A Classification of Unit Test Bugs in Java Programs, Korean Congress of Computing (KCC), Jun 20-22, 2018, (**Best paper awarded**)

[18] J. Lee, **S. Hong**, Detecting Memory Bloats of Java Programs by Monitoring Repeated Unit Test Executions: A Case Study with Apache Commons VFS, Korean Software Engineering Conference (KCSE), Jan 19-21, 2018

[19] J. Lim and **S. Hong**, Effective Korean-English Parallel Sentence Extraction from Wikipedia by Consecutive Sentence Sequence Matching, Korean Congress of Computing (KCC), Jun 18-21, 2017

[20] Y. Park, **S. Hong**, M. Kim, J. Cho, D. Lee, H. Jang, 이벤트 기반 임베디드 소프트웨어를 위한 자동화 테스팅 기법: LG전자 오븐 제어 소프트웨어 사례 연구, Korea Conference on Software Engineering (KCSE), Jan 28-30, 2015 (**Best paper awarded**)

[21] **S. Hong**, M. Kim, M. Staats, Validating Inferred Invariants using Symbolic Execution, Korea Conference on Software Engineering (KCSE), Feb 8—10, 2012

[22] J. Ahn, **S. Hong**, M. Kim, 동시성 프로그램 테스트를 위한 구조 커버리지 기법 조사, Korea Conference on Software Engineering (KCSE), Feb 8—10, 2012

[23] M. Kim, C. Hong and **S. Hong**, 검증 반례 재연을 통한 모델 기반 커널 테스팅, Korea Conference on Software Engineering (KCSE), Feb. 9-11, 2009 (**Best paper awarded**)

Student Supervision

1. Hansol Choe, Master's Degree Program, Mar 2018—present

Projects

- **Government funded projects** (selected)

1. Project investigator, Developing Automated Software Test Generation Techniques Using Data-driven Analyses, National Research Foundation of Korea (NRF), May 2017–present
2. Project manager, Intelligent Automation Techniques for Fullstack Software Debugging, Next-Generation Information Computing Development Program, National Research Foundation (NRF), May 2017-present
3. Project investigator, Detecting Software Performance Bugs Using Automated Unit Test Generation Techniques, National Research Foundation of Korea (NRF), Nov 2015—Oct 2016
4. Research assistant, Testing Technique for Detecting Concurrency Bugs of Multi-threaded Programs, National Research Foundation of Korea (NRF), Sep 2012—Aug 2015
5. Research assistant, Performance Bug Detection Framework for JavaScript Programs, IT/SW Creative Research Project funded by MKE and MSRA, Aug 2012—Jun 2013
6. Research assistant, Improved Automated Test Case Generation through Parallelized Concolic Testing Technique, National Research Foundation of Korea (NRF), May 2010—Apr 2011
7. Research assistant, Concurrency Bug Detection through Improved Pattern Matching Using Semantic Information, National Research Foundation of Korea (NFR), May 2009—Apr 2010 (final project evaluation: **S-grade** (top 5% quality))
8. Research assistant, 타겟 아키텍쳐 투명성 지원을 위한 타겟 독립 크로스 개발 기법 연구, 한국전자통신연구원 (ETRI), Jul 2008—Jan 2009

- **Industry funded project**

1. Project manager, Runtime Analysis of Embedded Multithreaded Programs, Samsung Electronics, Apr—Oct 2018
2. Project manager, Automation of Static Analysis Warning Classification based on Developer's Warning Classification Records, Samsung Electronics through KAIST, May 2017—Nov 2017
3. Research assistant, Testing and Debugging Framework for Multithreaded Programs using Concurrency Coverage Metrics, Samsung Electronics, Jun 2014—Dec 2014
4. Research assistant, Automated Test Generation for Concurrent Programs, Samsung Electronics, Jul 2014—Dec 2014
5. Research assistant, Modeling and Verification Technique for Embedded Software, FormalWorks Inc., Dec 2011—Dec 2012
6. Research assistant, Formal Verification of Flash Memory Software, Samsung Electronics, Oct 2007—Jul 2008

Patents

1. Co-inventor, Paten application No. 10-2017-0028701 in Korea, Monitoring System and Method of the Handicap Parking Zone Using Visual Display, Mar 7, 2017
2. Co-inventor, Patent No. 1016852990000 in Korea, Automated Testing Method and Apparatus for Program Processable Non-deterministic Events, Jul 30, 2015
3. Co-inventor, Patent No. 1015194500000 in Korea, Auto-Test Generation Device, Method and Recording Medium Using Test Coverage Information for Multi-Thread Program, Jul 12, 2015

Teaching Experience

1. Instructor, Handong Global University, 2016—present
   - Software engineering (undergraduate level), 2016, 2017, 2018
   - Open source software (undergraduate level), 2017, 2018
   - Problem solving with computational thinking (undergraduate level), 2016, 2017
   - Database system (undergraduate level), 2016, 2017
   - Compiler theory (undergraduate level), 2017
   - Discrete mathematics (undergraduate level), 2017
   - Digital logic design (undergraduate level), 2016
2. Undergraduate Capstone Project Supervision, Handong Global University, 2016—present
   - PicKey: Secure Password Management System with Image-Hint, Jun 2018
   - Synthesizing Git Commit Message Using Neural Translations, Jun 2018
   - Developing FindSecurityBugs Checkers for Korean Security Vulnerability Inspection Guideline, Dec 2017
   - TrashMon: Precise Trash Dumping Detection Using Image Processing Techniques, Jun 2017
   - Extracting Korean-English Parallel Sentence Corpus from Open Source Bilingual Texts, Jun 2017
3. Teaching assistant, Software Testing and Verification, CS, KAIST, Sep 2014—Dec 2014 **(Excellent teaching assistant award)**
4. Teaching assistant, Analysis of Concurrent Programs, CS, KAIST, Mar 2014—Jun 2014
5. Teaching assistant, Introduction to Logic for Computer Science, CS, KAIST, Sep 2007—Dec 2007, Feb 2011—May 2011, Mar 2012—Jun 2012, Mar 2013—Jun 2013
6. Teaching assistant (co-assist), Undergraduate Research Program (Junhee Lee), KAIST, Dec 2007—Jun 2008 (final evaluation: **silver prize**)
7. Teaching assistant, Introduction to Programming, CS, KAIST, Mar 2007—Jun 2007

Awards and Scholarships

1. Best Paper Award, Korea Computer Congress (KCC), Jun 2018
2. Honorable Mention Award, Undergraduate Student Research Competition, Korea Computer Congress (KCC), Jun 2018
   - For a project titled with “Safe and Effective Password Management Systems Using Image Hints” with advisees Gundo Park, Suho Kim and Haebin Jang
3. Distinguished Paper Award, 11th IEEE International Conference on Software Testing, Verification and Validation (ICST), Apr 11, 2018
4. Best Paper Award, Korea Management Engineers Society, Nov 2017
5. Excellent Teaching Assistant Award, CS, KAIST, Mar 2015
   - CS453 Software Testing and Verification, Sep to Dec 2014
6. Best paper award (short paper), Korea Conference on Software Engineering (KCSE), 2015
7. Best paper award, Korean Institute of Information Scientists and Engineers, 33rd Student Research Paper Competition (graduate student track), Jun 2014
   - **S. Hong**, Y. Park, Effective Testing of Concurrent Programs using Combinatorial Concurrent Coverage
8. Qualcomm Fellowship Award, Aug 2013
   - **S. Hong** and Y. Park, WAVE: Testing Framework to Detect Concurrency Bugs in Dynamic Web Applications
9. Bronze award, Samsung HumanTech Thesis Competition, 2012
   - **S. Hong**, COBET: Pattern-driven Concurrency Bug Detection Framework
10. Best paper award, Korea Conference on Software Engineering (KCSE), 2009
11. Korea Presidential Science Scholarship, Mar 2003 to Feb 2007

Professional Activities

- **Organizing committee**
  - Web Co-Chair, International Conference on Software Engineering (ICSE), 2020
- **International conferences program committee**
  - International Conference on Software Testing, Verification and Validation (ICST), 2018, 2019
  - Artifact Evaluation Committee, International Symposium on Software Testing and Analysis (ISSTA), 2015, 2018
  - International Workshop on Empirical Software Engineering in Practice (IWSEP) 2017, 2018
  - Asia-Pacific Software Engineering Conference (APSEC) 2016
- **Reviewer of international journals**
  - IEEE Transactions on Software Engineering (TSE), 2016, 2017
  - Empirical Software Engineering (ESEM), 2017
  - Journal of Systems and Software (JSS), 2017
  - Journal of Computing Science and Engineering, 2017
  - The Frontiers of Computer Science Journal, 2016
  - IEEE Transactions on Parallel and Distributed Systems (TPDS), 2016
  - Journal of Computer Science and Technology (JCST), 2016
- **External reviewer (co-/sub-reviewer) for international journals and conferences**
  - International Conference on Software Testing and Analysis (ISSTA), 2017
  - International Conference on Software Engineering (ICSE), 2014, 2015, 2016
  - IEEE Transactions on Software Engineering (TSE), 2013, 2015
  - Information and Software Technology (IST), 2015
  - International Conference on Software Testing, Verification, and Validation (ICST), 2015
  - IEEE Transactions on Parallel and Distributed Systems (TPDS), 2014
  - International Symposium on Software Testing and Analysis (ISSTA), 2014
  - Verified Software: Theories, Tools, Experiments (VSTTE) 2014
  - International Conference on Automated Software Engineering (ASE), Tool track, 2013
  - Symposium on Principles of Programming Languages (POPL), 2013
  - International Symposium on Automated Technology for Verification and Analysis (ATVA), 2012, 2013
  - IEEE Transactions on Computers (TC), 2011
  - Software Testing, Verification and Reliability Journal (STVR), 2011
- **Industry**
  - Technical Advisory Committee, TrinitySoft Inc., Jul 2018--present

Technical Presentations

1. Invasive Software Testing: Mutating Target Programs to Achieve High Test Coverage, ICST, Apr 10, 2018
2. Go with the Mutants: Automated Debugging and Test Generation Using Software Mutation Analyses, New Faculty Session, KCSE, Jan 19, 2018
3. Developing and Testing Multithreaded Programs Systematically, Software Center at Samsung Electronics, Nov 27 and Dec 11, 2017
4. Automated Software Debugging: A Mutation-based Approach, New Faculty Session, KIISE Annual Conference, Dec 22, 2016
5. Automated Software Debugging: A Mutation-based Approach, POSTECH CSE Seminars, Oct 26, 2016
6. Mutation Based Fault Localization for Real-World Multilingual Programs, ASE, Nov 12, 2015
7. Systematic Testing of Reactive Software with Non-deterministic Events: A Case Study on LG Electric Oven, ICSE SEIP Track, May 20, 2015
8. Detecting Concurrency Errors in Client-side JavaScript Web Applications, ICST, Apr 1, 2014
9. Impact of Concurrent Coverage Metrics on Testing Effectiveness, ICST, Mar 20, 2013
10. Testing Concurrent Programs to Achieve High Synchronization Coverage, ISSTA, Jul 18, 2012

Activities

1. President of CS Undergraduate Students, Mar 2005—Feb 2006
2. Vice-president of CS Undergraduate Sophomores, Mar 2004—Feb 2005

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