

Curriculum Vitae

Contact Information

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Summary

- My research areas are in *software engineering* and *program analysis*, focusing on **automated debugging** and **big-code analysis**.
- PAR, an automatic patch generation tool I co-developed, can fix common program bugs with a more acceptable structure to developers in practice.
- My work has been published in top-tier journals and conferences such as ICSE (with an ACM SIGSOFT Distinguished Paper Award), TSE (as a featured article), EMSE, ISSTA, and so on.
- Currently, I am leading a research project (499K EUR) on automated program repair as PI (funded by Luxembourg National Research Fund).

Education

Ph.D. in Computer Science and Engineering, March 2005 – August 2010.
 Sogang University, Seoul, Korea
 Thesis: Quality-based Dynamic Software Architecture Selection Using Genetic Algorithms

Master of Engineering in Computer Science, March 2003. 3 – February 2005.
 Sogang University, Seoul, Korea, GPA: 3.98/4.3
 Thesis: A Self-Adaptive Software Development Framework using Role and Port based Software Architecture

Bachelor of Engineering in Computer Science, March 2000. 3 – February 2003.
 Sogang University, Seoul, Korea, GPA: 3.82/4.3 **Summa Cum Laude**

Publications

Peer-Reviewed Journal Papers

- [J7] Kui Liu, **Dongsun Kim**, Tegawendé F. Bissyandé, Shin Yoo, Yves Le Traon, “Mining Fix Patterns for FindBugs Violations” (submitted).
- [J6] Daoyuan Li, Li Li, **Dongsun Kim**, Tegawendé F. Bissyandé, David Lo, and Yves Le Traon, “Watch out for This Commit! A Study of Influential Software Changes” (submitted).
- [J5] Jaekwon Lee, **Dongsun Kim**, Woosung Jung, “Cost-aware Clustering of Bug Reports by Using a Genetic Algorithm,” *Journal of Information Science and Engineering* (accepted in 2017 – to appear).
- [J4] Raphael Sirres, Tegawendé F. Bissyandé, **Dongsun Kim**, David Lo, Jacques Klein, and Yves Le Traon, “Augmenting and Structuring User Queries to Support Efficient Free-Form Code Search,” *Empirical Software Engineering Journal* (accepted in 2017 – to appear). Accepted as a Journal-first paper at the 40th International Conference on Software Engineering (ICSE 2018).
- [J3] Suntae Kim and **Dongsun Kim**, "Automatic Identifier Inconsistency Detection Using Code Dictionary," *Empirical Software Engineering Journal*, Vol. 21, No. 2, pp. 565-604 (2015).
- [J2] **Dongsun Kim**, Yida Tao, Sunghun Kim, and Andreas Zeller, "Where Should We Fix This Bug?: A Two-phase Recommendation Model," *the IEEE Transactions on Software Engineering*, Vol. 39, No. 11, pp. 1597-1610 (2013).
- [J1] **Dongsun Kim**, Xinming Wang, Sunghun Kim, and Andreas Zeller, Shing-chi Cheung, Sooyong Park, "Which Crashes Should I Fix First?: Predicting Top Crashes at an Early Stage to Prioritize Debugging Efforts," *the IEEE Transactions on Software Engineering*, Vol. 37, No. 3, pp. 430-447 (2011). Selected as the featured article of the issue.

Peer-Reviewed Conference Papers

- [C15] Jaekwon Lee, Dongsun Kim, Tegawendé F. Bissyandé, Woosung Jung and Yves Le Traon, “IR-based Bug Localization: Reproducibility Study on the Performance of State-of-the-Art Approaches”, in *Proceedings of the 27th International Symposium on Software Testing and*

- Analysis (ISSTA 2018), Amsterdam, Netherlands, July 16 – 21, 2018. Acceptance rate: 19.2%.
- [C14] Kisub Kim, **Dongsun Kim**, Tegawendé F. Bissyandé, Eunjong Choi, Li Li, Jacques Klein and Yves Le Traon, “FaCoY – A Code-to-Code Search Engine”, in Proceedings of the 40th International Conference on Software Engineering (ICSE 2018), Gothenburg, Sweden, May 27-June 3. Acceptance rate: 20.9%.
- [C13] Anil Koyuncu, Tegawendé F. Bissyandé, **Dongsun Kim**, Jacques Klein, Martin Monperrus, and Yves Le Traon, “Impact of Tool Support in Patch Construction,” in Proceedings of the 26th International Symposium on Software Testing and Analysis (ISSTA 2017), Santa Barbara, California, United States, July 10-14, 2017. Acceptance rate: 26%.
- [C12] Jorge Augusto Meira, Eduardo Cunha de Almeida, **Dongsun Kim**, Edson Ramiro Lucas Filho, and Yves Le Traon, "Overloaded! --- A Model-based Approach to Database Stress Testing," in Proceedings of the 27th International Conference on Database and Expert Systems Applications (DEXA 2016), Porto, Portugal, Sep 5-8, 2016, pp. 207-222. Acceptance rate: 28.5%.
- [C11] Deokyeon Ko, Kyeongwook Ma, Sooyong Park, Suntae Kim, **Dongsun Kim**, and Yves Le Traon, "API Document Quality for Resolving Deprecated APIs," in Proceedings of the 21th Asian-Pacific Software Engineering Conference (APSEC 2014), Jeju Island, South Korea, Dec 1-4, 2014, pp. 27-30. Acceptance rate: 30%.
- [C10] **Dongsun Kim**, Jaechang Nam, Jaewoo Song, and Sunghun Kim, “Automatic Patch Generation Learned from Human-written Patches,” in Proceedings of the 35th International Conference on Software Engineering (ICSE 2013), San Francisco, May 18-26, 2013, pp. 802–811. Acceptance rate: 18.5%. ACM SIGSOFT Distinguished Paper Award Winner.
- [C9] **Dongsun Kim**, Seokhwan Kim, and Sooyong Park, "Usage History-based Architectural Scheduling," in Proceedings of the 33rd Annual IEEE International Computer Software and Applications Conference (COMSAC 2009), Seattle, Washington, July 20-24, 2009, pp. 443-451. Acceptance rate: 20%.
- [C8] **Dongsun Kim** and Sooyong Park, "Reinforcement Learning-Based Dynamic Adaptation Planning Method for Architecture-based Self-Managed Software," in Proceedings of the Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2009), Vancouver, BC, Canada, May 18-19, 2009, pp. 76-85. Acceptance rate: 48%.
- [C7] **Dongsun Kim** and Sooyong Park, "Dynamic Architectural Selection: A Genetic Algorithm Based Approach," Proceedings of the 1st International Symposium on Search Based Software Engineering (SSBSE 2009), Cumberland Lodge, Windsor, UK, May 13-15, 2009, pp. 59-68, Acceptance rate: 40.9%.
- [C6] **Dongsun Kim**, Suntae Kim, Seokhwan Kim, and Sooyong Park, "Software Engineering Education Toolkit for Embedded Software Architecture Design Methodology Using Robotic Systems," in Proceedings of 15th Asia-Pacific Software Engineering Conference, Beijing, China, December 3-5, 2008, pp. 317-324. Acceptance rate: 29.8%.
- [C5] **Dongsun Kim** and Sooyong Park, "A Q-learning-Based On-line Planning Approach to Autonomous Architecture Discovery for Self-Managed Software," in Proceedings of 7th International Workshop On System/Software Architectures (IWSSA 2008), Monterrey, Mexico, Nov 9 - 14, 2008, pp.432-441. Acceptance rate: 61%.
- [C4] **Dongsun Kim**, Sooyong Park, Muntaek Choi, and Munsang Kim, "Applying Dynamic Software Architecture Management to Home Service Robot Software," in Proceedings of 16th IEEE International Symposium on Robot and Human Interactive Communication, Jeju Island, Korea, August 26-29, 2007, pp. 285-290.
- [C3] **Dongsun Kim** and Sooyong Park, “Designing Dynamic Software Architecture for Home Service Robot Software,” in Proceedings of the 2006 IFIP International Conference on Embedded And Ubiquitous Computing (EUC 2006), Seoul, Korea, August 1-4, 2006, pp. 437–448. Acceptance rate: 25%.
- [C2] **Dongsun Kim**, Sooyong Park, Youngkyun Jin, Hyeongsoo Chang, Yu-Sik Park, In-Young Ko, Kwanwoo Lee, Junhee Lee, Yeon-Chool Park, and Sukhan Lee, “SHAGE: A Framework for Self-managed Robot Software,” in Proceedings of the 2006 International Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2006), Shanghai, China, May 21-22, 2006, pp. 79-85. Acceptance rate: 59%.
- [C1] **Dongsun Kim** and Sooyong Park, “AlchemistJ: A Framework for Self-adaptive Software,” in Proceedings of the 2005 IFIP International Conference on Embedded And Ubiquitous Computing (EUC 2005), LNCS3824, Nagasaki, Japan, December 6-9, 2005, pp. 98–109. Acceptance rate: 30%.

- [O7] Daoyuan Li, Li Li, **Dongsun Kim**, Tegawendé F Bissyandé, David Lo, and Yves Le Traon, "Watch out for This Commit! A Study of Influential Software Changes," Interdisciplinary Centre for Security, Reliability and Trust (SNT), University of Luxembourg, Technical Report TR-SnT-2016-6, June, 2016.
- [O6] **Dongsun Kim**, "A Framework for Self-managed Software," Proceedings of the Joint Workshop on Embedded Software Development, October, 2007, pp.139-160 (invited talk).
- [O5] **Dongsun Kim** and Sooyong Park, "Self-Healing, Adaptive, and Growing Technologies for Intelligent Robots," Proceedings of the 4th COE-CIR Joint Workshop on Future Technologies of Mechatronics for its Growing Role in Symbiotic Society with Human, September, 2007, p.73.
- [O4] **Dongsun Kim** and Soonyong Park, "Self-managed Robot Software," in Proceedings of International Workshop for Future Software Technology (IWFST 2006), Beijing, China, October, 2006 (invited talk).
- [O3] **Dongsun Kim**, Jaesun Kim, and Sooyong Park, "AlchemistJ: A Framework for Self-Managed Software," in Proceedings of International Workshop for Future Software Technology (IWFST 2005), Shanghai, China, November 8 - 10, 2005. (invited talk).
- [O2] **Dongsun Kim** and Sooyong Park, "Self-Growing, Adaptation and Healing Technologies for Intelligent Robots," in Proceedings of the 2nd COE-CIR Joint Workshop on Future Technologies of Mechatronics for its Growing Role in Symbiotic Society with Human, August 28-29, 2005, p. 88.
- [O1] Sooyong Park, **Dongsun Kim**, and Jaesun Kim, "A Framework for Self-adaptive Software," in Proceedings of the 17th International Conference on Software Engineering and Knowledge Engineering (SEKE 2005), Taipei, Taiwan, Republic of China, July 14-16, 2005, p. 793, (invited talk).

Honors and Awards

Best Paper, ACM SIGSOFT Distinguished Paper Award Winner, the 35th International Conference on Software Engineering, 2013. 5.
Featured Article, IEEE Transactions on Software Engineering, 2011. 5.
KFAS (The Korea Foundation for Advanced Studies) Scholarship, 2004. 8 - 2008.2.

Funding

- University of Luxembourg, Internal Research Project (IRP), "Automated Fixing of Program Vulnerabilities in the Android Ecosystem", 127,000EUR, Sep. 2017-Aug. 2019, **Co-PI**.
- Luxembourg National Research Fund (FNR), CORE Junior Grant, "Automated Program Repair using Fix Patterns Learned from Human-written Patches", 499,000EUR, Nov. 2015-Oct. 2018, **sole PI**.
- National Research Foundation of Korea (NRF), Post-Doctoral Fellowship Grant, "Crash Prioritization and Automated Crash-fix Generation", \$30,000, 2011-2012, **sole PI**.
- Samsung Electronics Co., Ltd., "Topic and Sentiment Analysis of Open Source Communities for Consumer Electronic Products", \$80,000, May-Dec. 2012, **Co-PI**.

Professional Activities

Journal and Conference Reviewer:

- IEEE Transactions on Software Engineering
- ACM Transactions on Software Engineering and Methodology
- International Journal of Empirical Software Engineering
- IEEE Software
- Information Sciences
- IEICE Transactions on Information and Systems
- Journal of Software Testing, Verification and Reliability
- Journal of Information Science and Engineering
- Journal of Software Practice and Experience
- Journal of Systems and Software
- Journal of Computer Science and Technology
- Science of Computer Programming
- ACM SIGSOFT Symposium on the Foundations of Software Engineering
- International Working Conference on Mining Software Repositories
- International Conference on Software Maintenance
- IEEE International Conference on Program Comprehension
- International Workshop on Recommendation Systems for Software Engineering
- India Software Engineering Conference
- Workshop on Developing Tools as Plug-ins

Program Committee:

- International Symposium on Search-Based Software Engineering, 2014–2016.
- International Workshop on Emerging Trends in Software Metrics, 2016.
- International Conference on Software Engineering 2015, Demonstrations Track.
- IEEE International Conference on Software Analysis, Evolution, and Reengineering, 2016–2018.
- RefTest Workshop, 2013, 2014.

Publicity Committee:

- International Symposium on Search-Based Software Engineering, 2013 (<http://ssbse.org/2013/>)

Invited Talk:

- “Impact of Tool Support in Patch Construction”, at the following venues: NAIST (2017) and Osaka University (2017).
- “Looking at the Big Picture: Towards More Effective Software Engineering Research”, at the following venues: KAIST (2015) and Chungbuk National University (2015).
- “A New Room: Another Debugging Begins”, at the following venues: KAIST (2013) and Korea University (2014).
- Keynote at the International Workshop on Empirical Software Engineering in Practice, 2013 (IWESep 2013, <https://sites.google.com/site/iwesep2013/>), Title: “Good Hunting: Locating, Prioritizing, and Fixing Bugs Automatically”
- “Good Hunting: Locating, Prioritizing, and Fixing Bugs Automatically”, at the following venues: Ajou University (2013), Sogang University (2013), Chungbuk National University (2013), Korea University (2013), KAIST (2013), LG Electronics (2014), Faoo.com (2014), Hanyang University (2014).
- “Automated Patch Generation: a pattern-based approach”, at the Dagstuhl seminar 11062 on Self-Repairing Programs (<http://www.dagstuhl.de/11062/>), 2011.

Invited Lectures/Seminars:

- Tutorial on “Applying SAFE to Big-Code” as a part of “Bug detection in JavaScript web apps using the SAFE framework (<https://pdi17.sigplan.org/event/pdi-2017-workshops-and-tutorials-bug-detection-in-javascript-web-apps-using-the-safe-framework>)”, at the 38th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2017).
- Dagstuhl Seminar 17022 on Automated Program Repair, Dagstuhl, Germany, January 8-13, 2017.
- Dagstuhl Seminar 15472 on Programming with Big Code, Dagstuhl, Germany, November 15-18, 2015.
- Dagstuhl Seminar 11062 on Self-Repairing Programs, Dagstuhl, Germany, February 6-11, 2011.
- “Why do need to write a program?”, (invited lecture by The Korea Foundation for Advanced Studies), Gyeongnam Science High School, Korea, May, 2017.
- “Programming and your life”, (invited lecture by The Korea Foundation for Advanced Studies), KFAS Headquarter, Korea, September, 2016.
- “Software for Everybody”, (invited lecture by The Korea Foundation for Advanced Studies), Sunrin Internet High School, Korea, March, 2016.
- “Open Source and Crowdsourcing” (invited lecture by The Korea Foundation for Advanced Studies), Sungnam High School, Korea, December, 2014.
- “Software and Bugs” (invited lecture by The Korea Foundation for Advanced Studies), Kumi High School, Korea, October 2013.

**Work
Experience****The University of Luxembourg, Luxembourg***Position: Research Associate*

November 2013 – Present

Led invention, design, and implementation of program repair and testing techniques to facilitate debugging activities in the Interdisciplinary Centre for Security, Reliability and Trust (SnT). These techniques leverage machine learning and computational optimization algorithms. To evaluate those techniques, I have conducted several empirical studies such as change pattern mining and developer behavior analysis. In addition, I have advised several graduate students. This includes group research projects and PhD thesis advisory. In particular, I have led a research project (“FIXPATTERN: Automated Program Repair using Fix Patterns Learned from Human-written Patches”) funded by Luxembourg National Research Fund (FNR) as sole-PI since December, 2015. This project investigates common fix patterns extracted from human-written patches. The patterns help repair programs automatically.

The Hong Kong University of Science and Technology, Hong Kong*Position: Post-Doctoral Fellow*

September 2010 – June 2013.

Led invention, design, and implementation of automated debugging techniques such as bug localization, crash prioritization, and program repair. During this period, I have published two TSE papers and one ICSE paper with the best paper award. Machine learning and computational optimization techniques are used for implementing them. In addition, I have advised several undergraduate and graduate students. This includes group research projects and MPhil thesis advisory.

Position: Co-Principal Investigator

May 2012 – December 2012.

Led an industrial project commissioned by Samsung Electronics, “Topic and Sentiment Analysis of Open Source Communities for Consumer Electronic Products”. In this project, as a Co-PI, I have designed and implemented topic modeling and sentiment analysis engines dedicated for developer communities such as *xdadevelopers.com* and *engadget.com*. These engines have been highly recognized by Samsung engineers and used for extracting and analyzing the topic and sentiment trend of mobile application developers.

Sogang University, Seoul, Korea*Position: Research Lead*

July 2005 – August 2010.

Research on "Self-Healing, Adaptive, and Growing Technologies for Intelligent Robots" (funded by CIR (Center for Intelligent Robots), Ministry of Commerce, Industry and Energy, Korea).

Led invention, design, and implementation of SHAGE (Self-Healing, Adaptive, and Growing softwarE) Framework as a research lead. The framework supports robot software systems to adapt to changing requirements, fix its malfunction & errors, and evolve its software architecture. In particular, the framework applied computational intelligence such as reinforcement learning and case-based reasoning to generate adaptation plans. This research also includes defining software components and constructing software architectures for robots.

Position: Research Lead

April 2007 – January 2008.

Development of "Dynamic Architecture Middleware for Multi-Mobile Platforms" (funded by Ministry of Information and Communication, Korea).

Led invention, design, and implementation of dynamic architecture for mobile application and middleware, which executes dynamic architecture-based mobile applications on multi-mobile platforms (e.g. WIPI — Wireless Internet Platform for Interoperability and J2ME) as a research lead. The result of this research supports software systems on mobile platforms to adapt to its dynamically changing environments and user requirements. This research includes dynamic architecture construction, situation detection, adaptation planning, and run-time architecture reconfiguration on mobile platforms.

Position: Research Assistant

January 2004 – June 2005.

Development of "Supporting Technology for Software Development" (funded by SPIC (Software Process Improvement Center) of ITRC (IT Research Center), Ministry of Information and Communication, Korea), Co-invented and led design and implementation of "Requi-exito" which is a requirements management tool that supports requirements elicitation from stakeholders, the documentation of the requirements, and impacts analysis when the requirements change.

Position: Research Assistant

January 2004 – June 2005.

Research on "Requirements and Domain Analysis Methodology" (funded by Electronics and Telecommunications Research Institute, Daejeon, Korea), 2003. 1. - 2003. 12.

Co-invented and co-designed "Integrated Requirements Analysis Method" based on goals and scenarios which efficiently and effectively support requirements elicitation and domain-specific knowledge analysis.

Position: Teaching Assistant, Spring 2003 - Fall 2004

Responsibilities included leading discussion sections and grading assignments for the following classes: 43-115: Software Engineering (Spring 2003), 10-058: C Language (Fall 2003 and Fall 2004), 43-013: Personal Computer Laboratory I (Spring 2004), and 43-152: Advanced Software Practice I (Fall 2004). Led designing and developing coursework and materials for CSE4115: Software Engineering (Spring 2007).

- Kisub Kim, PhD degree supervisor, “Source Code Search for Semantically Similar Functionalities”, since Aug 2017.

- Kui Liu, PhD degree supervisor, “Automated Program Repair using Fix Patterns”, since Aug 2016.
- Raphael Sirres, Master degree thesis advisor (Prof. Y. Le Traon being the supervisor), “Resolving the Vocabulary Mismatch Problem in Free-Form Code Search”, Sep 2015.

Teaching

- “Experimental Methods for Computer Science” (BPINFOR-75, co-teaching), the University of Luxembourg, Postgraduate School, Spring semester, 2014, 2015, and 2016.
- “Big Data” (BPINFOR-82, co-teaching), the University of Luxembourg, Undergraduate School, Autumn semester, 2014 and 2015.

References

Letters of referral from the following people can be provided on request.

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