Ahrim Han

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RESEARCH INTERESTS

I am a research professor in the Next-generation Game Research Center at the Computer Science Department at Korea University. My main research area has been Software Engineering, and I have special interest in assessing and improving software design quality. My previous research was predicting change-prone parts of software by building a predictive model using metrics measuring software design quality. Recently, I have been working on defining the systematic software refactoring process, especially for identifying the refactoring opportunities for fixing design defects.

Now, I have a plan to work in industries for solving real-world problems and performing more practical research. Based on my research experience, I would like to work on analyzing the large-scale data using statistical, data mining, and automated software analysis techniques. I want to build my expertise as a data scientist.

EDUCATION

Korea Advanced Institute of Science and Technology(KAIST), Daejon, Korea
Ph.D., Computer Science, 2007.3 - 2013.8
Thesis: *Identification and Selection of Refactorings for Improving Maintainability of Object-Oriented Software* (Advisor: Doo-Hwan Bae)

Korea Advanced Institute of Science and Technology(KAIST), Daejon, Korea
M.S., Computer Science, 2005.3 - 2007.2
Thesis: *Behavioral Dependency Measurement in UML 2.0 Sequence Diagrams for Change-proneness Prediction* (Advisor: Doo-Hwan Bae)

Sogang University, Seoul, Korea
B.S., Computer Science, 2000.3 - 2004.2 (**Magna Cum Laude**)

WORK AND RESEARCH PROJECT EXPERIENCE

Korea University, Institute of Convergence IT & Next-generation Game Research Center at Computer Science Department, Seoul, Korea   Sep. 2013 - Present
Position: Research Professor
 – Led the research projects for automating the refactoring identification process as a sole principle investigator
 – Advised graduate students to develop research topics and conduct the experiments

Research Projects
 • "An Approach to Automating Refactoring for Evolvable Software", Funded by *National Research Foundation of Korea (NRF) in Korea*, Nov. 2014 - Apr. 2017 (sole PI)
 • "Research on Automated Software Maintainability Improvement", Funded by *National Research Foundation of Korea (NRF), Daejeon, Korea*, Nov. 2013 - Oct. 2014 (sole PI)

     – Developed the method to improve the efficiency of refactoring identification process by devising an efficient algorithm for calculating the impacts of the application for a large number of refactoring candidates
     – Led to develop tools for automating the refactoring identification process and performed several empirical studies on large-scale open sources

- Published the results to the top tier Software Engineering journal, *IEEE Transactions on Software Engineering*

- "Research on Tools for Highly Assured SW Development and High-Level Education for SW Engineers", Funded by *Ministry of Science, ICT and Future Planning, Korea*, Sep. 2013 - Dec. 2016

  - Provided the consulting to small companies to apply the software engineering principles and methodologies into their development process

KAIST, Department of Computer Science, Daejeon, Korea   Mar. 2005 - Aug. 2013
Position: Graduate student (research assistant)

Research Projects
- "Software Process Improvement and Capability Analysis based on K-Model", Funded by *National IT Industry Promotion Agency (NIPA) in Korea*, Jul. 2008 - Dec. 2008

  - Provided guidelines for collecting data and developed metrics for analyzing improvement and capability of the software processes according to the characteristics of the projects, organizations, and companies

- "Power Consumption Estimation Framework for UML-based Embedded Software Models", *KAIST in Korea*, Jan. 2007 - Oct. 2008

  - Developed the power consumption estimation technique that can be used at the early stage of software development (e.g., approximate power consumption estimation for model elements such as functions and components in UML-based models) and developed the method for visualizing the obtained results

- "Process Tailoring Techniques for Defense Software", Funded by *Agency for Defense Development (ADD) in Korea*, Mar. 2006 - Feb. 2011

  - Developed the systematic method of process tailoring by providing the methods for making process knowledge as assets and managing process knowledge repository

- "Embedded Software Design and Verification Techniques for Multiprocessor System-on-Chip (MPSoC)", Funded by *Ministry of Information and Communication in Korea*, Mar. 2005 - Jan. 2007

  - Developed the static analysis and functional simulation techniques for embedded software models

Teaching Experience
- CS101 "Introduction to Programming", Teaching Assistant, for non-major undergraduate students, in JAVA, Fall 2005, Spring 2006
- CS650 "Advanced Software Engineering", Teaching Assistant, for graduate students, Spring 2007
- CS408 "Computer Science Project", Teaching Assistant, for senior undergraduate students, Fall 2009
- SEP521 "Principles of Software Engineering", Teaching Assistant, for graduate students under software expert program, Spring 2011, Fall 2011, Spring 2012, Fall 2012

- "Intel International Science and Engineering Fair (ISEF)", Mentor, 2008
  The student that I mentored won the best of category award in computer science for top first place winner and the Seaborg SIYSS award and attended the Nobel Prize ceremonies

- "Design and Implementation for High Quality Software", Lecturer, for college professors, 2005.
  Presented UML 2.0, refactoring, testing strategies, requirement engineering, software quality metrics

Peace Corps (Headquarters), Washington, D.C., USA   Aug. 2004 - Oct. 2004
Position: Intern
– Served in organizing and populating the intranet web pages in the Technical Infrastructure and Support Team under the Office of the Chief Information Officer (The Washington Center (TWC) program funded by Human Resources Development Service of Korea)

Zio Interactive, Seoul, Korea   Feb. 2004 - Apr. 2004
Position: Intern
– Worked in the mobile game company and contributed solely to porting an existing soccer game to a new game development environment (SDK from Qualcomm BREW (KT) to SK-VM (SKT))

GRANTS

Individual Basic Science & Engineering Research Program, National Research Foundation of Korea (NRF), $125,000, sole PI, Nov. 2014 - Apr. 2017.
Post-Doctoral Fellowship Grant, National Research Foundation of Korea (NRF), $33,000, sole PI, Nov. 2013 - Oct. 2014.

HONORS AND AWARDS

Best Paper Award, Software Engineering Society of Korean Institute of Information Scientists and Engineers (KIISE), Prize: $1,000, 2016
Best Paper Award, 2015 Korea Conference on Software Engineering, 2015
SAMSUNG Scholarship Program, SAMSUNG Electronics by Video Display Division, 2011 to 2012
Invitation to the Special Issue for Journal of Systems and Software, Top-quality papers of the IEEE International Conference on Computer Software and Applications, 2008
Korean Government Scholarship Program for Graduate Students, KAIST, 2005 to 2010
Magna Cum Laude, Bachelor of Science, Sogang University, 2004
Academic Excellence Scholarship, Sogang University, 2000 to 2002
Admission Excellence Scholarship, Sogang University, 2000

JOURNAL PUBLICATIONS

Ah-Rim Han, Sungdeok Cha, "Two-phase Assessment Approach to Improve the Efficiency of Refactoring Identification", *IEEE Transactions on Software Engineering* **(TSE)**, Online Published at July 25 2017.
(http://dx.doi.org/10.1109/TSE.2017.2731853) (Impact Factor: 3.272)

Kwangsik Song, **Ah-Rim Han**, Sehun Jeong, Sungdeok Cha, "Testing Android Applications considering various contexts inferred from permissions", *Journal of the Korean Institute of Information Scientists and Engineers: Software and Applications* **(KIISE)**, Vol. 42, No. 8, pp. 1021 - 1030, Aug. 2015. (**corresponding author**)
(http://dx.doi.org/10.5626/JOK.2015.42.8.1022)

Ah-Rim Han, Doo-Hwan Bae, Sungdeok Cha, "An efficient approach to identify

multiple and independent Move Method refactoring candidates", ***Information and Software Technology*** **(IST)**, Vol. 59, pp. 53-66, Mar. 2015.
(http://dx.doi.org/10.1016/j.infsof.2014.10.007) (Impact Factor: 1.522)

Ah-Rim Han, Doo-Hwan Bae, "Dynamic profiling-based approach to identifying cost-effective refactorings", ***Information and Software Technology*** **(IST)**, Vol. 55, No. 6, pp. 966-985, Jun. 2013.
(http://dx.doi.org/10.1016/j.infsof.2012.12.002) (Impact Factor: 1.522)

In-Gwon Song, Sang-Uk Jeon, **Ah-Rim Han**, Doo-Hwan Bae, "An approach to identifying causes of implied scenarios using unenforceable orders", ***Information and Software Technology*** **(IST)**, Vol. 53, No. 6, pp. 666-681, Jun. 2011.
(http://dx.doi.org/10.1016/j.infsof.2010.11.007) (Impact Factor: 1.522)

Ah-Rim Han, Sang-Uk Jeon, Doo-Hwan Bae, Jang-Eui Hong, "Measuring behavioral dependency for improving change-proneness prediction in UML-based design models", ***Journal of Systems and Software*** **(JSS)**, Vol. 83, No. 2, pp. 222-234, Feb. 2010.
(http://dx.doi.org/10.1016/j.jss.2009.09.038) (Impact Factor: 1.245)

CONFERENCE PAPERS

Kwangsik Song, **Ah-Rim Han**, Sehun Jeong, Sungdeok Cha, "Generating various contexts from permissions for testing Android applications", **SEKE 15**: Proceedings of 27th International Conference on Software Engineering and Knowledge Engineering, pp. 87-92, Jul. 2015. (http://dx.doi.org/10.18293/SEKE2015-118)

Ah-Rim Han, Doo-Hwan Bae, "An efficient method for assessing the impact of refactoring candidates on maintainability based on matrix computation", **APSEC 14**: Proceedings of 21st Asia-Pacific Software Engineering Conference, pp. 453-460, Dec. 2014.
(27% acceptance ratio, 55/202) (http://dx.doi.org/10.1109/APSEC.2014.69)

Ah-Rim Han, Sang-Uk Jeon, Doo-Hwan Bae, Jang-Eui Hong, "Behavioral Dependency Measurement for Change-proneness Prediction in UML 2.0 Design Models", **COMPSAC 08**: Proceedings of 32nd Annual IEEE International Conference on Computer Software and Applications, pp. 76-83, Jul. 2008. (19.5% acceptance ratio, 46/236) (http://dx.doi.org/10.1109/COMPSAC.2008.80) **(Selected by program committee for recommendation to JSS)**

Referred to as Domestic Papers (Written in Korean)

Kwangsik Song, **Ah-Rim Han**, Sehun Jeong, Sungdeok Cha, "Permission-based Test Condition Generation in Android Application Development", **KCSE 15**: Proceedings of 2015 Korea Conference on Software Engineering, Vol. 17, No. 1, pp. 289-290, Feb. 2015. [**best paper**]

Hyung-In Ihm, **Ah-Rim Han**, Sang-Uk Jeon, Doo-Hwan Bae, Jang-Eui Hong, "Instruction Pattern-Based Power Consumption Estimation for Embedded Software Design Models", **KCSE 09**: Proceedings of 2009 Korea Conference on Software Engineering, Vol. 11, No. 1, pp. 122-129, Feb. 2009.

Hyung-In Ihm, In-Gwon Song, Sang-Uk Jeon, **Ah-Rim Han**, Jang-Eui Hong, Doo-Hwan Bae, "A Technique of Power Consumption Estimation for Embedded Software Design Models", **KCSE 08**: Proceedings of 2008 Korea Conference on Software Engineering, Vol. 10, No. 1, pp. 113-120, Feb. 2008.

Ah-Rim Han, Dong-Won Kang, Hyeon-Jeong Kim, Doo-Hwan Bae, "An Approach to

Extract Similar Process for Knowledge-Based Software Process Tailoring", **JWKSE 07**: Proceedings of 2007 Joint Workshop on Korea Software Engineering Technology, Vol. 5, No. 1, pp. 42-52, Aug. 2007.

Ah-Rim Han, Sang-Uk Jeon, Jang-Eui Hong, Doo-Hwan Bae, "Timing Consistency Checking in UML 2.0 Behavioral Models using OCL", **KCC 06**: Proceedings of 2006 Korea Computer Congress, Vol. 33, No. 1, pp. 181-183, Jun. 2006.

PROFESSIONAL ACTIVITIES

Reviewers

2017, 2 papers, Journal of Systems and Software (JSS) (Invited from Editor)
2016, International Journal of Software Engineering and Knowledge Engineering (IJSEKE)
2015, The 37th International Conference on Software Engineering (ICSE), Demonstrations Track (ICSE 2015) (External Reviewer)
2013, Expert Systems With Application (ESWA) (Invited from Editor)
2013, Information and Software Technology (IST) (Invited from Editor)
2013, The 29th IEEE International Conference on Software Maintenance (ICSM 2013)
2013, The 25th International Conference on Software Engineering and Knowledge Engineering (SEKE 2013)
2012, Journal of Systems and Software (JSS) (Invited from Editor)
2012, The 19th Asia Pacific Software Engineering Conference (APSEC)
2012, The 27th IEEE/ACM International Conference on Automated Software Engineering (ASE)
2012, International Conference on Advanced Software Engineering & Its Applications (ASEA 2012)
2010, The fourth IEEE International Conference on Secure Software Integration and Reliability Improvement (SSIRI)
2010, The 25th Symposium on Applied Computing (SAC)
2009, The 16th Asia Pacific Software Engineering Conference (APSEC)
2009, IEEE Software

Societies
2008 - Present, Member, Institute of Electrical and Electronics Engineers (IEEE)
2007 - Present, Member, Korea Institute of Information Scientists and Engineers (KIISE)

SKILLS

Special research area: Software engineering — Refactoring, Performance-driven architecture, Software design quality assessment and measurement, Software defect prediction, Maintainability improvement
Programming languages and statistical tools: Java, Python, R, SPSS, SQL, Latex
Modeling languages: Unified Modeling Language, Specification and Description Language, System Dynamics
Machine learning and data mining techniques: K-means clustering algorithm, Linear regression and Logistic regression, Decision trees, Principal component analysis, Genetic algorithm, Search and optimization
Language: Korean (native) and English

REFERNCES

Doo-Hwan Bae
Professor
ICSE 2020 General Chair, served as a director of ITRC Software Process Improvement Center and the first president of Software Engineering Society
Department of Computer Science, KAIST,
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Served as a director of Center for Engineering and Education of Dependable Software
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