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SUMMARY

- My research areas are in *software engineering* and *programming languages*.
- In particular, I have expertise in *software specification, testing, verification, and repair*.
- Notably, I have been making major contributions to the field of *automated program repair (a.k.a., automated bug fixing)*.
- My colleagues and I showed that Heartbleed of OpenSSL can be fixed automatically. In this sense, my research is also related to *software security*.
- Recently, I also worked on *empirical software engineering*, expanding research areas and methodologies.
- My work has been published in ICSE, FSE, ASE, ISSTA, TOSEM, EMSE, and so on.
- I have been serving the scientific community as a PC member of major software engineering conferences such as FSE and ISSTA, reviewer of major software engineering journals such as TSE or organizer/participant of scientific meetings such as Dagstuhl Seminar and NII Shonan Meeting.

EDUCATION

- Ph.D., Computer Science
 - BRICS,¹ Aarhus University, Aarhus, Denmark
 - September 2003 – April 2007
 - Thesis: Program Validation by Symbolic and Reverse Execution
 - Advisers: Prof. Mogens Nielsen and Prof. Olivier Danvy
- M.Sc., Computer Science and Engineering
 - Theory and Formal Methods Lab., Korea University, Seoul, South Korea
 - September 2000 – August 2002
 - Thesis: Linkage of Model Checking to Debugger Using Extended JPDA
 - Adviser: Prof. Jin-Young Choi
- B.Sc., Computer Science and Engineering
 - Korea University, Seoul, South Korea
 - March 1996 – August 2000

¹BRICS, a Centre for Basic Research in Computer Science, specialized on Algorithmics and Mathematical Logic

PUBLICATIONS

- Refereed Journal Articles

- J1. A Correlation Study between Automated Program Repair and Test-Suite Metrics
Jooyong Yi, Shin Hwei Tan, Sergey Mechtaev, Marcel Böhme, and Abhik Roychoudhury
EMSE (Empirical Software Engineering). 23(5), pages 2948–2979, 2018
- J2. Software Change Contracts
Jooyong Yi, Dawei Qi, Shin Hwei Tan, and Abhik Roychoudhury
TOSEM (ACM Transactions on Software Engineering and Methodology). 24(3), Article No. 18, pages 18:1–18:43, 2015
- J3. A case for dynamic reverse-code generation to debug non-deterministic programs
Jooyong Yi
EPTCS (Electronic Proceedings in Theoretical Computer Science) 129 – Semantics, Abstract Interpretation, and Reasoning about Programs: Festschrift for Dave Schmidt, pages 419–428, 2013.
- J4. Efficient and formal generalized symbolic execution
Xianghua Deng, Jooyong Lee, and Robby
ASE (Automated Software Engineering), 19(3): pages 233-301, 2012.
- J5. Towards an industrial grade IVE for Java and next generation research platform for JML
Patrice Chalin, Robby, Perry R. James, Jooyong Lee, and George Karabotsos
STTT (Software Tools for Technology Transfer), 12(6): pages 429–446, 2010.
- J6. Filtering false alarms of buffer overflow analysis using SMT solvers
Youil Kim, Jooyong Lee, Hwansoo Han, and Kwang-Moo Choe
IST (Information and Software Technology), 52(2): pages 210–219, February 2010.

- Refereed International Conference Publications

- C1. Design and Validation of Precooked Developer Dashboards
Vladimir Ivanov, Vladislav Pischulin, Alan Rogers, Giancarlo Succi, Jooyong Yi and Vasiliy Zorin
ESEC/FSE (The joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering), Industry Track, 2018, To Appear
- C2. Understanding the Impact of Software Processes on the Minds of Developers
Sara Busechian, Vladimir Ivanov, Alan Rogers, Ilyas Sirazitdinov, Giancarlo Succi, Alexander Tormasov and Jooyong Yi
ICSE (ACM/IEEE International Conference on Software Engineering) NIER track, pages 85–88, 2018
- C3. Precooked Developer Dashboards: What to Show and How to Use
Vladimir Ivanov, Alan Rogers, Giancarlo Succi, Jooyong Yi and Vasiliy Zorin
ICSE (ACM/IEEE International Conference on Software Engineering) poster track, pages 402–403, 2018
- C4. Toward a Better Understanding of How to Develop Software Under Stress – Drafting the Lines for Future Research
Joseph Alexander Brown, Vladimir Ivanov, Alan Rogers, Giancarlo Succi, Alexander Tormasov, and Jooyong Yi
ENASE (Evaluation of Novel Approaches to Software Engineering), pages 398–405, 2018
- C5. A New Architecture and Implementation Strategy for Non-Invasive Software Measurement Systems
Anton Bykov, Vladimir Ivanov, Alan Rogers, Alexandr Shunevich, Alberto Sillitti, Giancarlo Succi, Alexander Tormasov, Jooyong Yi, Albert Zabirov and Denis Zaplatnikov
SAC (ACM Symposium on Applied Computing), pages 1832–1839, 2018

- C6. A Feasibility Study of Using Automated Program Repair for Introductory Programming Assignments
Jooyong Yi, Umair Ahmed, Amey Karkare, Shin Hwei Tan and Abhik Roychoudhury
ESEC/FSE (The joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering), pages 740–751, 2017
- C7. What Do Software Engineers Care About? Gaps between Research and Practice
Vladimir Ivanov, Alan Rogers, Giancarlo Succi, Jooyong Yi, and Vasili Zorin
ESEC/FSE (The joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering), Industry Track, pages 890–895, 2017
- C8. Codeflaws: A Programming Competition Benchmark for Evaluating Automated Program Repair Tools
Shin Hwei Tan, Jooyong Yi, Yulis Yulis, Sergey Mechtaev and Abhik Roychoudhury
ICSE (ACM/IEEE International Conference on Software Engineering), Companion Volume, pages 180–182, 2017
- C9. Angelix: Scalable Multiline Program Patch Synthesis via Symbolic Analysis
Sergey Mechtaev, Jooyong Yi, and Abhik Roychoudhury
ICSE (ACM/IEEE International Conference on Software Engineering), pages 691–701, 2016.
- C10. Towards Non-invasive Software Measurement System: Architecture and Implementation
Anton Bykov, Vladimir Ivanov, Marat Mingazov, Alan Rogers, Alexandr Shunevich, Alberto Sillitti, Giancarlo Succi, Alexander Tormasov, Jooyong Yi, Albert Zabirov, and Denis Zaplatnikov
Software Engineering for Defence Applications, pages 149–165, 2016.
- C11. DirectFix: Looking for Simple Program Repairs
Sergey Mechtaev, Jooyong Yi, and Abhik Roychoudhury
ICSE (ACM/IEEE International Conference on Software Engineering), pages 448–458, 2015.
- C12. Dynamic Inference of Change Contracts
Tien-Duy B. Le, Jooyong Yi, David Lo, Ferdian Thung, and Abhik Roychoudhury
ICSME (IEEE International Conference on Software Maintenance and Evolution), pages 451–455, 2014.
- C13. Expressing and checking intended changes via software change contracts
Jooyong Yi, Dawei Qi, Shin Hwei Tan, and Abhik Roychoudhury
ISSTA (ACM International Symposium on Software Testing and Analysis), pages 1–11, 2013.
- C14. Past expression: encapsulating pre-states at post-conditions by means of AOP
Jooyong Yi, Robby, Xianghua Deng, and Abhik Roychoudhury
AOSD (ACM International Conference on Aspect-Oriented Software Development), pages 133–144, 2013.
- C15. Software change contracts
Dawei Qi, Jooyong Yi, and Abhik Roychoudhury
FSE (ACM SIGSOFT Symposium on Foundations of Software Engineering), NIER track, Article No. 22, pages 1–4, 2012.
- C16. Bogor/Kiasan: A k-bounded symbolic execution for checking strong heap properties of open systems
Xianghua Deng, Jooyong Lee, and Robby
ASE (IEEE/ACM International Conference on Automated Software Engineering), pages 157–166, 2006.
- C17. Linkage of model checking to debugger using extended JPDA.
Joo-Yong Lee, Ki-Seok Bang, and Jin-Young Choi.
ICIS (International Conference on Computer and Information Science), pages 197–201, 2002.

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- C18. Systematic testing of Java programs using extended JPDA and reflection.
Joo-Yong Lee, Ki-Seok Bang, and Jin-Young Choi
SERP (Software Engineering Research and Practice), pages 301–306, 2002.
- Refereed International Workshop Publications
 - W1. Dynamic reverse code generation for backward execution.
Jooyong Lee.
Proceedings of the Workshop on Verification and Debugging, pages 37–54, 2006.
 - W2. Reverse code generation for Java program model checking.
Jooyong Lee.
MoVeP (Winter School on MOdelling and VERifying parallel Processes), pages 89–95, 2004.
- Refereed Local Conference Publications
 - L1. Model Checking Object-Oriented Software Using Bandera Toolset
Ki-Seok Bang, Joo-Yong Lee, and Jin-Young Choi
KIISE (Korea Institute of Information Scientists and Engineers) Conference, pages 466–468, 2001.
 - L2. A Study on Formal Verification of complex network protocol
Joo-Yong Lee, Ki-Seok Bang, and Jin-Young Choi
KIPS (Korea Information Processing Society) Conference, pages 673–676, 2001.
 - L3. Case Study on Development Methodology of Safety-Critical System Using Formal Method
ChangHun Sung, JooYong Lee, Na-Young Lee, and Jin-Young Choi
KIPS (Korea Information Processing Society) Conference, pages 595–597, 2001.
- Reports
 - R1. The Java Modeling Language (JML).
Gary T. Leavens, Peter H. Schmitt, and Jooyong Yi.
NII Shonan Meeting Report No. 2013-3, 2013.
 - R2. Tutorial on JIR (JML Intermediate Representation).
Jooyong Lee, Robby, and Patrice Chalin. 2010.

PROFESSIONAL ACTIVITIES

- Organizer
 - The NII Shonan meeting on JML, 2013 with Gary T. Leavens and Peter H. Schmitt
- PC Member
 - ISSTA (ACM International Symposium on Software Testing and Analysis), 2019
 - ESEC/FSE (ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering) – Research track, 2018
 - SAC (ACM Symposium on Applied Computing) – Programming for Separation of Concerns track, 2014, 2015.
 - FSE (ACM Foundations of Software Engineering) – Artifact Evaluation track, 2014
 - TTSS (International Workshop on Harnessing Theories for Tool Support in Software), 2013.
- Reviewer (Journals)
 - TSE (IEEE Transactions on Software Engineering), 2018, 2017, 2016, 2015, 2013.
 - STTT (International Journal on Software Tools for Technology Transfer), 2016.
 - IST (Information and Software Technology), 2014.
 - Aircraft Engineering and Aerospace Technology, 2013

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- External Reviewer
 - ESEC/FSE (Joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering) 2017
 - ISSTA (International Symposium on Software Testing and Analysis) 2016, 2015, 2013
 - ISSTA Artifact Evaluation 2016
 - ICSE (International Conference on Software Engineering) 2016
 - ASE (International Conference on Automated Software Engineering) 2014
 - FM (International Symposium on Formal Methods) 2014
 - ESOP (European Symposium on Programming) 2014
 - ASE (International Conference on Automated Software Engineering) 2013
 - FASE (International Conference on Fundamental Approaches to Software Engineering) 2013
 - ISEC (India Software Engineering Conference) 2013
 - OOPSLA (Conference on Object-Oriented Programming Systems, Languages, and Applications) 2009
 - ESOP (European Symposium on Programming) 2007
 - SAS (International Static Analysis Symposium) 2006
- Invitation to Scientific Meetings
 - Dagstuhl seminars ²
 - The Java Modeling Language (09292), Automated Program Repair (17022), Genetic Improvement of Software (18052), Program Equivalence (18151)
 - NII Shonan meeting
 - The Java Modeling Language (organzier)
 - Lorentz Center workshop
 - JML: Advancing Specification Language Methodologies

WORK EXPERIENCE

- Assistant Professor
 - Innopolis University
 - January 2017 – Present
- (Senior) Research Fellow
 - School of Computing, National University of Singapore
 - December 2011 – December 2016 (promoted to a Senior Research Fellow as of January 2014)
- Research Professor
 - College of Informatics, Korea University
 - March 2011 – December 2011
- Research Fellow
 - College of Informatics, Korea University
 - March 2010 – February 2011
- Research Fellow
 - SAnToS, Department of Computing and Information Sciences, Kansas State University

²I could not accept the last three invitations due to personal restrictions.

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- February 2008 – February 2010
- Research Fellow
 - Division of Computer Science, KAIST
 - August 2007 – January 2008

PROJECTS

- TSUNAMi: Trustworthy Systems from UN-trusted component AMalgamations
 - Funding: National Research Foundation, Singapore
 - Funding amount: 6.1M SGD
 - Role: Senior Research Fellow
- Analysis and Test Generation for Evolving Software
 - Funding: Ministry of Education (MOE), Singapore
 - Funding amount: 831K SGD
 - Role: Senior Research Fellow
- A JML Community Infrastructure – Revitalizing Tools and Documentation to Aid Formal Methods Research
 - Funding: National Science Foundation (NSF)
 - Funding amount: 895K USD
 - Role: Research Fellow
- Scalable Buffer Overflow Analysis for Large System Software
 - Funding: Korea Research Foundation (KRF)
 - Role: Research Fellow

TEACHING EXPERIENCE

- Distributed Systems and Cloud Computing
 - Innopolis University, fall 2018
 - Undergraduate, core, 6 ECTS, 101 enrollments
- Data Structures & Algorithms
 - Innopolis University, spring 2018
 - Undergraduate, core, 6 ECTS, 210 enrollments
- Software Verification & Testing
 - Innopolis University, spring 2018
 - Undergraduate, core, 6 ECTS, 36 enrollments
- Automated Software Testing
 - Innopolis University, spring 2017
 - Undergraduate, elective, 6 ECTS, 25 enrollments
- Software Testing and Debugging (Tutorial)
 - National University of Singapore, spring 2015
 - Undergraduate, 4 credits, 53 enrollments

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- Parallel and Concurrent Programming (Tutorial)
 - National University of Singapore, spring 2013
 - Undergraduate, 4 credits, 45 enrollments
- Introduction to Information and Society
 - Korea University, fall 2011
 - Undergraduate, elective, 2 credits, 45 enrollments
- Software Security
 - Korea University, spring 2011
 - Graduate, 3 credits, 30 enrollments
- Theory and Models in Systems
 - Korea University, fall 2010
 - Graduate, 3 credits, 39 enrollments
- Media Programming
 - Sungshin Women's University, fall 2010
 - Undergraduate, required, 2 credits, 27 enrollments
- Advanced Simulation Modeling
 - Korea University, spring 2010
 - Graduate, 3 credits, 21 enrollments

TEACHER EDUCATION

- I received certificates for the following teacher education programs.
 - ISW (Instructional Skills Workshop) Program
 - Teaching Excellence Program (Provided by InnovaHiEd)

STUDENT SUPERVISION

- PhD Students
 - Sergey Mechtaev (Co-supervised with Abhik Roychoudhury)
 - Shin Hwei Tan (Co-supervised with Abhik Roychoudhury)
 - Dawei Qi (Co-supervised with Abhik Roychoudhury)
 - Youil Kim (Co-supervised with Hwansoo Han)
- Undergraduate Students (Thesis Supervision)
 - Bulat Gabdrakhmanov
 - Alexey Tolkachev
- Undergraduate Students (Summer Internship)
 - Dmitry Konev

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SOFTWARE

- ITSP: an early prototype of an intelligent tutoring system for programming
- Angelix: a scalable semantics-based automatic program repair tool
- DirectFix: a semantics-based automatic program repair tool generating provably minimal repairs
- SemFix: the first semantics-based automatic program repair tool
- Extension of OpenJML – a flagship tool set for JML (Java Modeling Language)
 - Extension for software change contracts
 - Extension for past expressions
- JmlEclipse: an Eclipse-based tool set for JML
- OpenJIR: a bridge tool between OpenJML and JmlEclipse via JIR.
 - JIR (JML Intermediate Representation) is an intermediate representation introduced to decouple the front-end (e.g., parsing) and the back-end (e.g., checking) of JML tools
- Kiasan: a JML checker based on an efficient symbolic execution technique
- Raccoon: an abstract interpretation tool used for the study of false alarm filtering