

# Jooyong Yi (Lee), Ph.D.

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## SUMMARY

- My research areas are in *software engineering* and *programming languages*.
- I develop pragmatic methodologies and tools to *detect and fix software bugs automatically*.
- An automatic bug fixing tool I co-developed can fix the Heartbleed bug of OpenSSL automatically. In this sense, my research is also related to *software security*.
- My work has been published in ICSE, TOSEM, FSE, ASE (conference), ASE (journal), ISSTA, AOSD, IST, ICSME, and so on.
- I worked as a lecturer for four semesters in 2010 and 2011 at Korea University.

## EDUCATION

- Ph.D., Computer Science
  - BRICS,<sup>1</sup> 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

## PUBLICATIONS

- Refereed Journal Articles

### J1. Software Change Contracts

Jooyong Yi, Dawei Qi, Shin Hwei Tan, and Abhik Roychoudhury  
*ACM Transactions on Software Engineering and Methodology (TOSEM'15)*. 24(3), 2015

### J2. A case for dynamic reverse-code generation to debug non-deterministic programs

Jooyong Yi  
*Electronic Proceedings in Theoretical Computer Science (EPTCS'13) 129 – Semantics, Abstract Interpretation, and Reasoning about Programs: Festschrift for Dave Schmidt*, pages 419–428, 2013.

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

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- J3. Efficient and formal generalized symbolic execution  
Xianghua Deng, Jooyong Lee, and Robby  
*Automated Software Engineering (ASE'12)*, 19(3): pages 233-301, 2012.
- J4. 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  
*Software Tools for Technology Transfer (STTT'10)*, 12(6): pages 429–446, 2010.
- J5. Filtering false alarms of buffer overflow analysis using SMT solvers  
Youil Kim, Jooyong Lee, Hwansoo Han, and Kwang-Moo Choe  
*Information and Software Technology (IST'10)*, 52(2): pages 210–219, February 2010.
- Refereed International Conference Publications
  - C1. Angelix: Scalable Multiline Program Patch Synthesis via Symbolic Analysis  
Sergey Mechtaev, Jooyong Yi, and Abhik Roychoudhury  
*ACM/IEEE International Conference on Software Engineering (ICSE'16)*, pages 691–701  
2016.
  - C2. DirectFix: Looking for Simple Program Repairs  
Sergey Mechtaev, Jooyong Yi, and Abhik Roychoudhury  
*ACM/IEEE International Conference on Software Engineering (ICSE'15)*, pages 448–458,  
2015.
  - C3. Dynamic Inference of Change Contracts  
Tien-Duy B. Le, Jooyong Yi, David Lo, Ferdian Thung, and Abhik Roychoudhury  
*IEEE International Conference on Software Maintenance and Evolution (ICSME'14)*, pages  
451–455, 2014.
  - C4. Expressing and checking intended changes via software change contracts  
Jooyong Yi, Dawei Qi, Shin Hwei Tan, and Abhik Roychoudhury  
*ACM International Symposium on Software Testing and Analysis (ISSTA'13)*, pages 1–11,  
2013.
  - C5. Past expression: encapsulating pre-states at post-conditions by means of AOP  
Jooyong Yi, Robby, Xianghua Deng, and Abhik Roychoudhury  
*ACM International Conference on Aspect-Oriented Software Development (AOSD'13)*, pages  
133–144, 2013.
  - C6. Software change contracts  
Dawei Qi, Jooyong Yi, and Abhik Roychoudhury  
*ACM SIGSOFT Symposium on Foundations of Software Engineering (FSE'12)*, NIER track,  
Article No. 22, 2012.
  - C7. Bogor/Kiasan: A k-bounded symbolic execution for checking strong heap properties of open  
systems  
Xianghua Deng, Jooyong Lee, and Robby  
*IEEE/ACM International Conference on Automated Software Engineering (ASE'06)*, pages  
157–166, 2006.
  - C8. Linkage of model checking to debugger using extended JPDA.  
Joo-Yong Lee, Ki-Seok Bang, and Jin-Young Choi.  
*International Conference on Computer and Information Science (ICIS'02)*, pages 197–201,  
2002.
  - C9. Systematic testing of Java programs using extended JPDA and reflection.  
Joo-Yong Lee, Ki-Seok Bang, and Jin-Young Choi  
*Software Engineering Research and Practice (SERP'02)*, 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.

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W2. Reverse code generation for Java program model checking.

Jooyong Lee.

*Winter School on MOdelling and VERifying parallel Processes (MoVeP)*, 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, Available at

<http://www.nii.ac.jp/shonan/wp-content/uploads/2011/09/No.2013-3.pdf>

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

- Reviewer (Journals)

- IEEE Transactions on Software Engineering (TSE), 2013, 2015, 2016.
- International Journal on Software Tools for Technology Transfer (STTT), 2016.
- Information and Software Technology (IST), 2014.
- Aircraft Engineering and Aerospace Technology, 2013

- PC Member

- PSC (Programming for Separation of Concerns) track of the ACM Symposium on Applied Computing (SAC), 2015.
- Foundations of Software Engineering (FSE2014) Artifact Evaluation.
- PSC (Programming for Separation of Concerns) track of the ACM Symposium on Applied Computing (SAC), 2014.
- International Workshop on Harnessing Theories for Tool Support in Software (TTSS 2013).

- External Reviewer

- International Symposium on Software Testing and Analysis (ISSTA 2016)
- International Symposium on Software Testing and Analysis (ISSTA 2016) Artifact Evaluation
- International Conference on Software Engineering (ICSE 2016)
- International Symposium on Software Testing and Analysis (ISSTA 2015)
- International Conference on Automated Software Engineering (ASE 2014)

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- International Symposium on Formal Methods (FM 2014)
- European Symposium on Programming (ESOP 2014)
- International Symposium on Software Testing and Analysis (ISSTA 2013)
- International Conference on Automated Software Engineering (ASE 2013)
- International Conference on Fundamental Approaches to Software Engineering (FASE 2013)
- India Software Engineering Conference (ISEC 2013)
- Conference on Object-Oriented Programming Systems, Languages, and Applications (OOP-SLA 2009)
- European Symposium on Programming (ESOP 2007)
- International Static Analysis Symposium (SAS 2006)

## **WORK EXPERIENCE**

- (Senior) Research Fellow
  - School of Computing, National University of Singapore
  - December 2011 – Present (promoted to a Senior Research Fellow as of January 2014)
- Research Professor
  - College of Information and Communications, Korea University
  - March 2011 – December 2011
- Research Fellow
  - College of Information and Communications, Korea University
  - March 2010 – February 2011
- Research Fellow
  - SAnToS, Department of Computing and Information Sciences, Kansas State University
  - February 2008 – February 2010
- Research Fellow
  - Division of Computer Science, KAIST
  - August 2007 – January 2008

## **TEACHING EXPERIENCE**

- Part-time Lecturer
  - Introduction to Information and Society (CNCE150)
    - Korea University, fall 2011
    - Undergraduate, elective, 2 credits, 45 enrollments
  - Software Security (CRE641)
    - Korea University, spring 2011
    - Graduate, 3 credits, 30 enrollments
  - Theory and Models in Systems (CRE512)
    - Korea University, fall 2010
    - Graduate, 3 credits, 39 enrollments
  - Media Programming (ND26000)
    - Sungshin Women's University, fall 2010

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- Undergraduate, required, 2 credits, 27 enrollments
- Advanced Simulation Modeling (CRE602)
  - Korea University, spring 2010
  - Graduate, 3 credits, 21 enrollments
- Teaching Assistant
  - Software Testing and Debugging (CS4218)
    - National University of Singapore, spring 2015
    - Undergraduate, 4 credits, 53 enrollments
    - Role: tutor for two of three lab groups (group size: 14 and 21 students, respectively)
  - Parallel and Concurrent Programming (CS3211)
    - National University of Singapore, spring 2013
    - Undergraduate, 4 credits, 45 enrollments
    - Role: tutor for one of three tutorial groups (group size: 16 students)

## STUDENT SUPERVISION

- PhD Students
  - Sergey Mechtaev (Co-supervised with Abhik Roychoudhury)
  - Shin Hwei Tan (Co-supervised with Abhik Roychoudhury)
  - Youil Kim (Co-supervised with Hwansoo Han)

## SOFTWARE

- 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

## AWARDS

- Graduate Study Abroad Program funded by NRF (National Research Foundation of Korea), 2003–2006

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## REFERENCES

- **Prof. Abhik Roychoudhury**

- Relationship: current supervisor
- Address: National University of Singapore  
13 Computing Drive  
Singapore 117417  
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- Webpage: <http://www.comp.nus.edu.sg/~abhik/>

- **Prof. Olivier Danvy**

- Relationship: PhD supervisor
- Address: Aarhus University  
Department of Computer Science  
Aabogade 34, DK-8200 Aarhus N  
Denmark
- Phone: +45 8942 9339
- Email: danvy@cs.au.dk
- Website: <http://cs.au.dk/~danvy/>

- **Prof. Gary T. Leavens**

- Address: University of Central Florida  
College of Engineering and Computer Science  
Dept. of Electrical Engineering and Computer Science, 437D Harris Center  
4000 Central Florida Blvd.  
Orlando, Florida 32816-2362 USA
- Phone: +1 407 823 4758
- Email: leavens@eecs.ucf.edu
- Webpage: <http://www.eecs.ucf.edu/~leavens/homepage.html>

- **Prof. Reiner Hähnle**

- Address: Technische Universität Darmstadt  
Fachbereich Informatik  
Fachgebiet Software Engineering  
Hochschulstr. 10  
64289 Darmstadt Germany
- Phone: +49-6151-16-21361
- Email: haehnle@cs.tu-darmstadt.de
- Webpage: <https://www.se.tu-darmstadt.de/se/group-members/reiner-haehnle/>