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## Prof. Kwangkeun Yi

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### Current Position

Professor, School of Computer Science and Engineering  
Seoul National University

### Education

- 1993: Ph.D. (Computer Science) Univ. of Illinois at Urbana-Champaign
- 1990: M.S. (Computer Science) Univ. of Illinois at Urbana-Champaign
- 1987: B.S. (Computer Science & Statistics) Seoul National University

### Experience

- 4/2007 – present: Full Professor, Seoul National University
- 8/2003 – 3/2007: Associate Professor, Seoul National University
- 3/2001 – 7/2003: Associate Professor, Korea Advanced Institute of Science & Technology
- 2/1995 – 2/2001: Assistant Professor, Korea Advanced Institute of Science & Technology
- 8/1993 – 11/1994: Member of Technical Staff(regular), Software Principles Research Department, Bell Labs., Murray Hill, New Jersey, U.S.A.
  
- 4/2008 – 7/2008: Invited Visiting Professor, Laboratory for Computer Science & Artificial Intelligence, M.I.T., Cambridge, U.S.A. (host: Prof. Martin Rinard)
- 1/2008 – 4/2008: Invited Visiting Professor, Computer Science Department, Carnegie-Mellon University, Pittsburgh, U.S.A. (host: Prof. Edmund Clarke)
- 7/2002 – 8/2002: Invited Visiting Professor, École Normale Supérieure, Paris, France (host: Prof. Patrick Cousot)
- 7/1998 – 8/1998: Visiting Research Consultant, Software Principles Research Department, Bell Labs., Murray Hill, New Jersey, U.S.A.
  
- 9/2008 – present: Director, ROSAEC Center (Research On Software Analysis for Error-free Computing), Engineering Research Center of Excellence, Korea Science & Engineering Foundation
- 9/1998 – 7/2003: Director, ROPAS Center (Research On Program Analysis System), National Creative Research Initiative Center, Korea Science & Engineering Foundation

### Researches

semantics-based program analysis  
programming language theory  
static analysis  
higher-order and typed programming language system  
programming systems application of static analysis technology

## Softwares

- Sparrow: an industrialized static analyzer for static detection of memory errors in C and C++ program sources. It shows superior performance edges against existing competitors in the market. (<http://www.spa-arrow.com>)
- Airac: a static analyzer for automatic verification of buffer overrun errors in C program sources (<http://ropas.snu.ac.kr/airac5>).
- nML Programming Language System: a dialect of ML (<http://ropas.snu.ac.kr/n>). Its compiler system has been used in SNU's and KAIST's programming language classes since Spring 2000. The Airac analyzer has been implemented in nML.
- SML Exception Analyzer: a static analyzer for detecting may-uncaught exceptions in Standard ML programs. This analyzer has been embedded in the SML/NJ 110 compiler system and released August 1998.
- System Z1, Z2, and Zoo: static program analyzer generator that builds semantic-based static program analyzers from very high-level specifications.

## Invited Talks and Visits

- Invited seminar, SUN Microsystems, Burlington, MA, U.S.A., 2008/6/10
- Invited seminar, MIT Lincoln Laboratory, U.S.A., 2008/6/2
- Invited seminar, Laboratory for Computer Science and Artificial Intelligence, MIT, U.S.A., 2008/5/9
- Invited seminar, Computer Science Department, Carnegie Mellon University, Pittsburgh, U.S.A., 2008/2/15
- Invited talk, 30 Years of Abstract Interpretation, 2008/1/9, San Francisco, POPL-affiliated workshop
- Invited seminar, School of Computing, National University of Singapore, 2007/10/25
- Invited seminar, National Institute of Informatics, Tokyo, Japan, 2008/7/17
- Invited seminar, Dagstuhl Seminar 06281 on "The Challenge of Software Verification", 2006/7/8 - 2006/7/15, Germany
- Invited seminar, Dagstuhl Seminar 03101 on "Reasoning about Shape", 2003/3/2 - 2003/3/7, Germany
- Invited seminar, CRISTAL group, Institut National de Recherche en Informatique et en Automatique(INRIA), France, 2002/7/4
- Invited Visiting Professor, Computer Science Departemnt, École Normale Supérieure, Paris, 2002/7/1 - 2002/8/31
- Invited seminar, Computer Science Departemnt, École Normale Supérieure, Paris, 2001/7/12 - 2001/7/14 "System Zoo: towards a realistic program analyzer generator"
- Invited seminar, Dept. of Information Science, Univ. of Tokyo, 2000/3/17 - 2000/3/20
- Invited seminar, "Static Analysis for Code Compaction and Safety Assurance", Research Institute of Mathematical Sciences, Kyoto Univ., 1999/3/15 - 1999/3/16
- Invited speaker, "Static Value Slicing", The 1st Japanese Programming and Programming Languages Workshop, 1999/3/17 - 1999/3/19
- Visiting Research Consultant, Software Principles Research Department, Bell Labs, Murray Hill, New Jersey, 1998/7/30 - 1998/8/25
- Invited seminar, New Jersey Programming Languages and Systems Seminar Series, Bell Laboratories, Murray Hill, New Jersey, 1997/7/20 - 1997/7/29

## Program Committee Member

- ESOP'09, The European Symposium on Programming 2009
- SAS'07, The 14th International Static Analysis Symposium
- AWCVS'06, The 1st Asian Working Conference on Verified Software
- SAS'06(**program chair**), The 13th International Static Analysis Symposium
- CC'06, The 15th International Conference on Compiler Construction
- ML'05, The 2005 ACM SIGPLAN Workshop on ML
- APLAS'05(**program chair**), The 3rd Asian Symposium on Programming Languages and Systems 2005
- ESOP'04, The European Symposium on Programming 2004
- FLOPS'02, The 6th International Symposium on Functional and Logic Programming 2002
- SAS'01, The 8th International Static Analysis Symposium 2001
- ICFP'01, ACM SIGPLAN International Conference on Functional Programming 2001
- APLAS'03,'04, Asian Symposium on Programming Languages and Systems
- ASIAN'98, Asian Computer Science Conference 1998

## Publications [International Journals]

- “Goal-Directed Weakening of Abstract Interpretation Results”, Hongseok Yang and Sunae Seo and Kwangkeun Yi and Taisook Han, **ACM Transactions on Programming Languages and Systems**, Vol.29, No.6, Article No.39, October, 2007
- “Proofs About A Folklore Let-Polymorphic Type Inference Algorithm”, Oukseh Lee and Kwangkeun Yi, **ACM Transactions on Programming Languages and Systems**, Vol.20, No.4, pp. 707-723, July 1998
- “A Cost-effective Estimation of Uncaught Exceptions in SML Programs”, Kwangkeun Yi and Sukyoung Ryu, **Theoretical Computer Science**, Vol.277, No.1-2, pp.185-217, 2002
- “Proof-Directed Debugging Revisited for a First-Order Version” Education Pearl, Kwangkeun Yi, **Journal of Functional Programming**, Vol.16, No.06, pp.663-670, 2006
- “Static Insertion of Safe and Effective Memory Reuse Commands into ML-like Programs”, Oukseh Lee and Hongseok Yang and Kwangkeun Yi, **Science of Computer Programming**, Vol.58, No.1-2, pp.141-178, 2005
- “An Abstract Interpretation for Estimating Uncaught Exceptions in Standard ML Programs”, Kwangkeun Yi, **Science of Computer Programming**, Vol.31, No.1, 147-173, 1998
- “Static Extensivity Analysis for Lambda-Definable Functions over Lattices”, Hyunjun Eo and Kwangkeun Yi and Kwangmoo Choe, **New Generation Computing**, Vol. 24, No.1, pp.53-78, 2006
- “Proofs of a Set of Hybrid Let-Polymorphic Type Inference Algorithms”, Hyunjun Eo and Oukseh Lee and Kwangkeun Yi, **New Generation Computing**, Vol.22, No.1, pp.1-36, 2004
- “An Empirical Study on Classification Methods for Alarms from a Bug-Finding Static C Analyzer”, Jaewhang Kim and Hosik Choi and Kwangkeun Yi and Yongdae Kim, **Information Processing Letters**, Vol.102, No.2-3, pp.118-123, 2007
- “A Proof Method for the Correctness of Modularized OCFA”, Oukseh Lee and Kwangkeun Yi, **Information Processing Letters**, 81, pp.179-185, 2002

- “Engaging Students with Theory through ACM Collegiate Programming Contests”, Nikolay V. Shilov and Kwangkeun Yi, **Communications of the ACM**, Vol.45, No.9, pp.98-101, September 2002
- “Uncaught Exception Analysis for Java”, Jangwoo Jo, Byeong-Mo Chang, Kwangkeun Yi, Kwang-Moo Choe, **Journal of Systems and Software**, Vol.72, No.1, pp.59-69, 2004
- “Puzzles for Learning Model Checking, Model Checking for Programming Puzzles, Puzzles for Testing Model Checkers”, Nikolay Shilov and Kwangkeun Yi, **Electronic Notes in Theoretical Computer Science**, Vol 43, 2001
- “Unified Interprocedural Parallelism Detection”, Jay Hoeflinger and Yunheung Paek and Kwangkeun Yi, **International Journal of Parallel Programming**, Vol.29, No.2, pp.185-215, 2001 (invited paper)
- “Efficient Computation of Fixpoints that Arise in Complex Program Analysis”, Li-ling Chen, Luddy Harrison and Kwangkeun Yi, **Journal of Programming Languages**, Vol.3, No.1, pp.31-68, 1995

#### [Book Chapters]

- “How to find a coin: propositional program logics made easy”, Nikolay Shilov and Kwangkeun Yi, *Current Trends in Theoretical Computer Science, Vol.2: Formal Models and Semantics*, pp.181-214, April 2004, World Scientific, Edited by G. Paun, G. Rozenberg, and A. Salomaa

#### [International Conferences]

- “A Polymorphic Modal Type System for Lisp-like Multi-Staged Languages”, Ik-Soon Kim and Kwangkeun Yi and Cristiano Calcagno, **POPL 2006: The 33rd Annual ACM Symposium on Principles of Programming Languages**, pp.257-269, January 2006.
- “Automatic Generation and Management of Interprocedural Program Analyses”, Kwangkeun Yi and Luddy Harrison, **POPL’93: The Twentieth Annual ACM Symposium on Principles of Programming Languages**, pp.246-259, January 1993.
- “Automatic Verification of Pointer Programs Using Grammar-Based Shape Analysis”, Oukseh Lee and Hongseok Yang and Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol.3444, pp.124-140, **ESOP 2005: The European Symposium on Programming**, Edinburgh, April 2-10, 2005
- “Taming False Alarms from a Domain-Unaware C Analyzer by a Bayesian Statistical Post Analysis”, Yungbum Jung and Jaehwang Kim and Jaeho Shin and Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol.3672, pp.203-217, **SAS 2005: The 12th International Static Analysis Symposium**, London, September 7-9, 2005
- “Inserting Safe Memory Reuse Commands into ML-like Programs”, Oukseh Lee, Hongseok Yang, Kwangkeun Yi *Lecture Notes in Computer Science*, Vol.2694, pp.171-188, **SAS 2003: Tenth Annual International Static Analysis Symposium**, San Diego, June 11-13, 2003
- “Towards A Cost-Effective Estimation of Uncaught Exceptions in SML Programs”, Kwangkeun Yi and Sukyoung Ryu, *Lecture Notes in Computer Science*, Vol. 1302, pp.98-113, **SAS 1997: The 4th International Static Analysis Symposium**, Paris, Sept. 1997
- “Compile-time Detection of Uncaught Exceptions in Standard ML Programs”, Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol. 864, pp.238-254, **SAS 1994: The 1st International Static Analysis Symposium**, Namur, Sept. 1994
- “Static Monotonicity Analysis for Lambda-definable Functions over Lattices”, Andrzej Murawski and Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol.2294, pp.139-153, **VMCAI 2002: Third International Workshop on Verification, Model Checking and Abstract Interpretation**, Venice, January 21-22, 2002

- “Type and Effect System for Multi-Staged Exceptions” Hyunjun Eo and Ik-Soon Kim and Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol.4279, pp.61-78, **APLAS 2006**: The 4th Asian Symposium on Programming Languages and Systems, November 8-10, 2006
- “Automatic Construction of Hoare Proofs from Abstract Interpretation Results”, Sunae Seo and Hongseok Yang and Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol.2895, pp.230-245, **APLAS 2003**: The First Asian Symposium on Programming Languages and Systems, Beijing, November 27-29, 2003
- “Proving Syntactic Properties of Exceptions in an Ordered Logical Framework”, Jeff Polakow and Kwangkeun Yi, *Lecture Notes in Computer Science*, Vol.2024, pp. 61-77, **FLOPS 2001**: Proceedings of the 5th International Symposium on Functional and Logic Programming, March, 2001
- “Soundness by Static Analysis and False-alarm Removal by Statistical Analysis: Our Airac Experience”, Yungbum Jung and Jaehwang Kim and Jaeho Shin and Kwangkeun Yi, **Bugs 2005**: Workshop on the Evaluation of Software Defect Detection Tools, Chicago, June 12, 2005
- “Experiments on the Effectiveness of an Automatic Insertion of Safe Memory Reuses into ML-like Programs”, Oukseh Lee and Kwangkeun Yi, **ISMM 2004**: The 2004 ACM International Symposium on Memory Management, Vancouver, October 24-25, 2004 (also at SPACE 2004, the Second ACM/SIGPLAN Workshop on Semantics, Program Analysis, and Computing Environments for Memory Management, Venice, January 12, 2004)
- “Assessing the Overhead of ML Exceptions by Selective CPS Transformation”, Jung-taek Kim, Kwangkeun Yi, Olivier Danvy, **ML 1998**: *The 1998 ACM SIGPLAN Workshop on ML*, pp.103-114, Baltimore, Sept., 1998
- “Exception Analysis for Multithreaded Java Programs”, Sukyoung Ryu and Kwangkeun Yi, **APAQS 2001**: The Second Asia-Pacific Conference on Quality Software, Hongkong, pp.23-32, December 2001
- “Interconnecting Between CPS Terms and Non-CPS Terms”, **CW 2001**: *The Proceedings of the Third ACM SIGPLAN Workshop on Continuations*, Jung-taek Kim and Kwangkeun Yi, January, 2001
- “Interprocedural Exception Analysis for Java”, Byeong-Mo Chang and Jangwoo Jo and Kwangkeun Yi and Kwang-Moo Choe, *The Proceedings of the 16th ACM Symposium on Applied Computing*, March, 2001
- “Constraint-based Analysis for Java”, Byeong-Mo Chang and Kwangkeun Yi and Jangwoo Jo, *SSGRR Conference on Computers and E-Business*, L’Aquila, Italy, August, 2000 (invited presentation)
- “Escape Analysis for Stack Allocation in Java”, Eunsun Cho and Kwangkeun Yi, *ECOOP’00 Workshop on Formal Techniques for Java Programs*, June, 2000
- “Exception Analysis for Java”, Kwangkeun Yi and Byeong-Mo Chang, *Lecture Notes in Computer Science*, Vol.1743, pp.111-112 *ECOOP’99 Workshop on Formal Techniques for Java Programs*, June, 1999
- “SUIF Program Analysis Using System Z2”, Seong-Hoon Kim, Kwangkeun Yi, Hyun-jun Eo, Kwang-Moo Choe, *Proceedings of The Second SUIF Compiler Workshop*, Aug., 1997
- “Estimating Uncaught Exceptions in Standard ML Programs from Type-based Equations”, Kwangkeun Yi and Sukyoung Ryu and Ki-Hyun Pyun, *Proceedings of the 20th Annual International Computer Software and Applications Conference*, pp. 455-460, Seoul, August 1996
- *Automatic Generation and Management of Program Analyses*, Kwangkeun Yi, Ph.D. Thesis, Report UIUCDCS-R-93-1828, Univ. of Illinois at Urbana-Champaign, August 1993.
- “On-the-fly Circuits to Measure the Average Working Set Size” Kwangkeun Yi and Luddy Harrison, *Proceedings of the IEEE International Conference on Computer Design: VLSI in Computers and Processors*, Cambridge, September 1990.

## Teaching Classes

- SNU 4541.664A: Program Analysis (graduate)
- SNU 4541.780: Topics in Programming Language (graduate)
- SNU 4190.310: Programming Languages (undergraduate)
- SNU 4190.210: Principles of Programming (undergraduate)
- SNU 400.02: Engineering Math II: Logic in Computing (undergraduate)
- SNU 010.142: Basics in Computing (undergraduate)

## Hosting Visiting Ph.D. Students & Post-docs

- Pascal Cuoq, 12/2002 - 12/2003, Ph.D., INRIA, France
- Andrzej Murawski, 7/6/2001 - 8/5/2001, Ph.D. student, Oxford Univ.
- Jeff Sarnat, 6/4/2001 - 8/19/2001, senior undergraduate, Carnegie-Mellon University
- Jeff Polakow, 6/20/2000 - 8/20/2000, Ph.D. student, Carnegie-Mellon University
- Fermin Reig, 7/21/2000 - 10/20/2000, Ph.D. student, Univ. of Glasgow
- Charles Hymans, 8/1/1999 - 1/30/2000, Ph.D. student, École Normale Supérieure

## Honors

- 6/2007: 17th Annual Distinguished Scientific and Technological Paper Award, The Korea Federation of Science and Technology Societies
- 9/1998 – 7/2003: Directorship, Center for Research On Program Analysis System, National Creative Research Initiative Grant Program, Korea Ministry of Science and Technology
- 9/2001: Kaheon Academic Excellence Award, Korea Information Science Society
- 1984 – 1986: Undergraduate Fellow, Korea Foundation for Advanced Studies
- 1983: 1st-ranked in entrance exam, Division of Mathematics, Computer Science, and Statistics, College of Natural Science, Seoul National University