

Soonho Kong

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Research Interests

Automated reasoning and its applications toward robust CPS (Cyber-Physical Systems).

Education

Carnegie Mellon University Ph.D. in Computer Science Department (All But Dissertation) Advisor: Prof. Edmund M. Clarke	Aug 2010 – Jun 2016
Seoul National University Master of Science in Computer Science and Engineering Advisor: Prof. Kwangkeun Yi	Mar 2007 – Aug 2009
Seoul National University Bachelor of Science in Computer Science and Engineering	Mar 2000 – Feb 2007

Publications

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- [1] Soonho Kong, Armando Solar-Lezama, and Sicun Gao. “Delta-Decision Procedures for Exists-Forall Problems over the Reals”. In: *Computer Aided Verification*. Ed. by Hana Chockler and Georg Weissenbacher. CAV’18. Cham: Springer International Publishing, 2018, pp. 219–235.
 - [2] Kyungmin Bae, Peter Csaba Ölveczky, Soonho Kong, Sicun Gao, and Edmund M. Clarke. “SMT-Based Analysis of Virtually Synchronous Distributed Hybrid Systems”. In: *Hybrid Systems: Computation and Control*. HSCC’16. Vienna, Austria: ACM, 2016, pp. 145–154.
 - [3] Md. Ariful Islam, Greg Byrne, Soonho Kong, Edmund M. Clarke, Rance Cleaveland, Flavio H. Fenton, Radu Grosu, Paul L. Jones, and Scott A. Smolka. “Bifurcation Analysis of Cardiac Alternans Using delta-Decidability”. In: *Computational Methods in Systems Biology*. Ed. by Ezio Bartocci, Pietro Lio, and Nicola Paoletti. CMSB’16. Cham: Springer International Publishing, 2016, pp. 132–146.
 - [4] Seunghak Lee, Soonho Kong, and Eric P. Xing. “A network-driven approach for genome-wide association mapping”. In: *Bioinformatics* 32.12 (2016), pp. i164–i173.
 - [5] Yungbum Jung, Soonho Kong, Cristina David, Bow-Yaw Wang, and Kwangkeun Yi. “Automatically inferring loop invariants via algorithmic learning”. In: *Mathematical Structures in Computer Science* 25.4 (2015), pp. 892–915.

- [6] Soonho Kong, Sicun Gao, Wei Chen, and Edmund Clarke. “dReach: Delta-Reachability Analysis for Hybrid Systems”. In: *Tools and Algorithms for the Construction and Analysis of Systems*. TACAS’15. New York, NY, USA: Springer-Verlag New York, Inc., 2015, pp. 200–205.
- [7] Bing Liu, Soonho Kong, Sicun Gao, Paolo Zuliani, and Edmund M. Clarke. “Towards Personalized Prostate Cancer Therapy Using Delta-reachability Analysis”. In: *Hybrid Systems: Computation and Control*. HSCC’15. Seattle, Washington: ACM, 2015, pp. 227–232.
- [8] Leonardo de Moura, Soonho Kong, Jeremy Avigad, Floris van Doorn, and Jakob von Raumer. “The Lean Theorem Prover (System Description)”. In: *Automated Deduction*. Ed. by Amy P. Felty and Aart Middeldorp. CADE’15. Cham: Springer International Publishing, 2015, pp. 378–388.
- [9] Qinsi Wang, Paolo Zuliani, Soonho Kong, Sicun Gao, and Edmund M. Clarke. “SReach: A Probabilistic Bounded Delta-Reachability Analyzer for Stochastic Hybrid Systems”. In: *Computational Methods in Systems Biology*. Ed. by Olivier Roux and Jérémie Bourdon. CMSB’15. Cham: Springer International Publishing, 2015, pp. 15–27.
- [10] Sicun Gao, Soonho Kong, and Edmund M. Clarke. “Proof Generation from Delta-Decisions”. In: *Symbolic and Numeric Algorithms for Scientific Computing*. SYNASC’14. Sept. 2014, pp. 156–163.
- [11] Bing Liu, Soonho Kong, Sicun Gao, Paolo Zuliani, and Edmund M. Clarke. “Parameter Synthesis for Cardiac Cell Hybrid Models Using δ -Decisions”. In: *Computational Methods in Systems Biology*. Ed. by Pedro Mendes, Joseph O. Dada, and Kieran Smallbone. CMSB’14. Cham: Springer International Publishing, 2014, pp. 99–113.
- [12] Sagar Chaki, Arie Gurfinkel, Soonho Kong, and Ofer Strichman. “Compositional Sequentialization of Periodic Programs”. In: *Verification, Model Checking, and Abstract Interpretation*. VMCAI’13. Rome, Italy: Springer-Verlag New York, Inc., 2013, pp. 536–554.
- [13] Sicun Gao, Soonho Kong, and Edmund M. Clarke. “dReal: An SMT Solver for Non-linear Theories over the Reals”. In: *Automated Deduction*. CADE’13. Lake Placid, NY: Springer-Verlag, 2013, pp. 208–214.
- [14] Sicun Gao, Soonho Kong, and Edmund M. Clarke. “Satisfiability modulo ODEs”. In: *Formal Methods in Computer-Aided Design*. FMCAD’13. 2013, pp. 105–112.
- [15] Yungbum Jung, Soonho Kong, Bow-Yaw Wang, and Kwangkeun Yi. “Deriving Invariants by Algorithmic Learning, Decision Procedures, and Predicate Abstraction”. In: *Verification, Model Checking, and Abstract Interpretation*. VMCAI’10. Madrid, Spain: Springer-Verlag, 2010, pp. 180–196.
- [16] Soonho Kong, Yungbum Jung, Cristina David, Bow-Yaw Wang, and Kwangkeun Yi. “Automatically Inferring Quantified Loop Invariants by Algorithmic Learning from Simple Templates”. In: *Asian Conference on Programming Languages and Systems*. APLAS’10. Shanghai, China: Springer-Verlag, 2010, pp. 328–343.
- [17] Soonho Kong, Wontae Choi, and Kwangkeun Yi. “Abstract Parsing for Two-staged Languages with Concatenation”. In: *Generative Programming and Component Engineering*. GPCE’09. Denver, Colorado, USA: ACM, 2009, pp. 109–116.
- [18] Soonho Kong, Wontae Choi, and Kwangkeun Yi. “PCC Framework for Program-Generators”. In: *Workshop on Proof-Carrying Code and Software Certification*. 2009.

- [19] Soonho Kong, Nikolai Tillmann, and Jonathan de Halleux. “Automated Testing of Environment-Dependent Programs - A Case Study of Modeling the File System for Pex”. In: *Information Technology: New Generations*. ITNG’09. Apr. 2009, pp. 758–762.

Software

Drake : A planning, control, and analysis toolbox for nonlinear dynamical systems

dReal : SMT Solver for Nonlinear Theories of the Reals

Honors & Awards

Kwanjeong Scholarship Kwanjeong Education Foundation	Aug 2010 – May 2015
National Graduate Science & Technology Scholarship Korea Student Aid Foundation(KOSAF)	Sep 2008 – Aug 2009
Brain Korea 21 Global Internship (MSR & MSRA) Korea Research Foundation	Aug 2008 – Nov 2008 Aug 2007 – Feb 2008

Professional Activities

Program Committee Member:

- ▶ WSC 2018: Winter Simulation Conference 2018 (Cyber-Physical Systems track)
- ▶ DARS 2018: Third Workshop on Design and Analysis of Robust Systems

External Reviewer: ATVA 2015, ASE 2014, FoSSaCS 2013, POPL 2013, APLAS 2012, SAS 2012, GPCE 2010, SPLASH 2010, CAV 2010, VMCAI 2010, SAS 2009, DEFECTS 2009, APLAS 2007

References

Edmund M. Clarke Professor Computer Science Department Carnegie Mellon University Email: emc@cs.cmu.edu	Leonardo de Moura Principal Researcher Research in Software Engineering Group Microsoft Research Email: leonardo@microsoft.com
Kwangkeun Yi Professor School of Computer Science Seoul National University Email: kwang@ropas.snu.ac.kr	Jeremy Avigad Professor Department of Philosophy and the Department of Mathematical Sciences Carnegie Mellon University Email: avigad@cmu.edu
