Soonho Kong

Research Scientist
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Research Interests

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

Education

Carnegie Mellon University Aug 2010 – Jun 2016
Ph.D. in Computer Science Department (All But Dissertation)
Advisor: Prof. Edmund M. Clarke

Seoul National University Mar 2007 – Aug 2009
Master of Science in Computer Science and Engineering
Advisor: Prof. Kwangkeun Yi

Seoul National University Mar 2000 – Feb 2007
Bachelor of Science in Computer Science and Engineering

Publications

[1] Delta-decision procedures for exists-forall problems over the reals. Soonho Kong, Armando Solar-Lezama, and Sicun Gao. In Hana Chockler and Georg Weissenbacher, editors, *Computer Aided Verification*, pages 219–235, Cham, 2018. Springer International Publishing.

[2] SMT-based analysis of virtually synchronous distributed hybrid systems. Kyungmin Bae, Peter Csaba Ölveczky, Soonho Kong, Sicun Gao, and Edmund M. Clarke. In *Proceedings of the 19th International Conference on Hybrid Systems: Computation and Control*, HSCC '16, pages 145–154, New York, NY, USA, 2016. ACM.

[3] A network-driven approach for genome-wide association mapping. Seunghak Lee, Soonho Kong, and Eric P. Xing. *Bioinformatics*, 32(12):i164–i173, 2016.

[4] Bifurcation analysis of cardiac alternans using delta-decidability. Md. Ariful Islam, Greg Byrne, Soonho Kong, Edmund M. Clarke, Rance Cleaveland, Flavio H. Fenton, Radu Grosu, Paul L. Jones, and Scott A. Smolka. In Ezio Bartocci, Pietro Lio, and Nicola Paoletti, editors, *Computational Methods in Systems Biology*, pages 132–146, Cham, 2016. Springer International Publishing.

[5] dReach: Delta-reachability analysis for hybrid systems. Soonho Kong, Sicun Gao, Wei Chen, and Edmund Clarke. In *Proceedings of the 21st International Conference on Tools and Algorithms for the Construction and Analysis of Systems - Volume 9035*, pages 200–205, New York, NY, USA, 2015. Springer-Verlag New York, Inc.

[6] Towards personalized prostate cancer therapy using delta-reachability analysis. Bing Liu, Soonho Kong, Sicun Gao, Paolo Zuliani, and Edmund M. Clarke. In *Proceedings*

of the 18th International Conference on Hybrid Systems: Computation and Control, HSCC '15, pages 227–232, New York, NY, USA, 2015. ACM.

[7] The lean theorem prover (system description). Leonardo de Moura, Soonho Kong, Jeremy Avigad, Floris van Doorn, and Jakob von Raumer. In Amy P. Felty and Aart Middeldorp, editors, *Automated Deduction - CADE-25*, pages 378–388, Cham, 2015. Springer International Publishing.

[8] SReach: A probabilistic bounded delta-reachability analyzer for stochastic hybrid systems. Qinsi Wang, Paolo Zuliani, Soonho Kong, Sicun Gao, and Edmund M. Clarke. In Olivier Roux and Jérémie Bourdon, editors, *Computational Methods in Systems Biology*, pages 15–27, Cham, 2015. Springer International Publishing.

[9] Parameter synthesis for cardiac cell hybrid models using δ-decisions. Bing Liu, Soonho Kong, Sicun Gao, Paolo Zuliani, and Edmund M. Clarke. In Pedro Mendes, Joseph O. Dada, and Kieran Smallbone, editors, *Computational Methods in Systems Biology*, pages 99–113, Cham, 2014. Springer International Publishing.

[10] Proof generation from delta-decisions. Sicun Gao, Soonho Kong, and Edmund M. Clarke. In *2014 16th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing*, pages 156–163, Sept 2014.

[11] Automatically inferring loop invariants via algorithmic learning. Yungbum Jung, Soonho Kong, Cristina David, Bow-Yaw Wang, and Kwangkeun Yi. *Mathematical Structures in Computer Science*, 25(4):892–915, 2015.

[12] Satisfiability modulo ODEs. Sicun Gao, Soonho Kong, and Edmund M. Clarke. *2013 Formal Methods in Computer-Aided Design*, pages 105–112, 2013.

[13] dReal: An SMT solver for nonlinear theories over the reals. Sicun Gao, Soonho Kong, and Edmund M. Clarke. In *Proceedings of the 24th International Conference on Automated Deduction*, CADE'13, pages 208–214, Berlin, Heidelberg, 2013. Springer-Verlag.

[14] Compositional sequentialization of periodic programs. Sagar Chaki, Arie Gurfinkel, Soonho Kong, and Ofer Strichman. In *Proceedings of the 14th International Conference on Verification, Model Checking, and Abstract Interpretation - Volume 7737*, VMCAI 2013, pages 536–554, New York, NY, USA, 2013. Springer-Verlag New York, Inc.

[15] Automatically inferring quantified loop invariants by algorithmic learning from simple templates. Soonho Kong, Yungbum Jung, Cristina David, Bow-Yaw Wang, and Kwangkeun Yi. In *Proceedings of the 8th Asian Conference on Programming Languages and Systems*, APLAS'10, pages 328–343, Berlin, Heidelberg, 2010. Springer-Verlag.

[16] Deriving invariants by algorithmic learning, decision procedures, and predicate abstraction. Yungbum Jung, Soonho Kong, Bow-Yaw Wang, and Kwangkeun Yi. In *Proceedings of the 11th International Conference on Verification, Model Checking, and Abstract Interpretation*, VMCAI'10, pages 180–196, Berlin, Heidelberg, 2010. Springer-Verlag.

[17] Abstract parsing for two-staged languages with concatenation. Soonho Kong, Wontae Choi, and Kwangkeun Yi. In *Proceedings of the Eighth International Conference on Generative Programming and Component Engineering*, GPCE '09, pages 109–116, New York, NY, USA, 2009. ACM.

[18] PCC framework for program-generators. Soonho Kong, Wontae Choi, and Kwangkeun Yi. In *Workshop on Proof-Carrying Code and Software Certification*, 2009.

[19] Automated testing of environment-dependent programs - a case study of modeling the file system for Pex. Soonho Kong, Nikolai Tillmann, and Jonathan de Halleux. In *2009 Sixth International Conference on Information Technology: New Generations*, pages 758–762, April 2009.

Software

I have been contributing to the following open-source systems:

Drake : A planning, control, and analysis toolbox for nonlinear dynamical systems
dReal : SMT Solver for Nonlinear Theories of the Reals

Honors & Awards

Kwanjeong Scholarship Aug 2010 – May 2015
Kwanjeong Education Foundation

National Graduate Science & Technology Scholarship Sep 2008 – Aug 2009
Korea Student Aid Foundation(KOSAF)

Brain Korea 21 Global Internship (MSR & MSRA) Aug 2008 – Nov 2008
Korea Research Foundation 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
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Leonardo de Moura
Principal Researcher
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Jeremy Avigad
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Department of Philosophy and the Department of Mathematical Sciences
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