Sicun Gao

Assistant Professor
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Positions

– University of California, San Diego (July 2017 – Present)
  Assistant Professor, Computer Science and Engineering

– Massachusetts Institute of Technology (October 2014 – June 2017)
  Postdoctoral Researcher, Computer Science and Artificial Intelligence Laboratory

– Carnegie Mellon University (November 2012 – September 2014)
  Postdoctoral Researcher, Computer Science Department

Education

– Ph.D. in Logic, Carnegie Mellon University (October 2012)
  Advisors: Edmund M. Clarke and Jeremy Avigad

  Ph.D. Thesis: Computable Analysis, Hybrid Automata, and Decision Procedures
  M.S. Thesis: Counting Zeros in Finite Fields with Gröber Bases

– B.S. in Logic and B.S. in Mathematics, Peking University (July 2006)

Awards

– Gödel Research Prize Fellowship Silver Medal, Kurt Gödel Society (2014)

– CMU School of Computer Science Distinguished Doctoral Dissertation Honorable Mention (2013)

Publications

– K. Bae and S. Gao, "Modular SMT-Based Analysis of Nonlinear Hybrid Systems," *Proceedings of the 17th International Conference on Formal Methods in Computer-Aided Design (FMCAD)*, 2017

– S. Dathathri, N. Arechiga, S. Gao, and R. Murray, "Learning-Based Abstractions for Nonlinear Constraint Solving," *Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI)*, 2017

– S. Gao and D. Zufferey, "Interpolants in Nonlinear Theories over the Reals," *Proceedings of the 22nd International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2016.

– M. O'Kelly, H. Abbas, S. Gao, S. Shiraishi, S. Kato, and R. Mangharam, "APEX: A Tool for Autonomous Vehicle Plan Verification and Execution," *Proceedings of the Society of Automotive Engineers (SAE) World Congress and Exhibition*, 2016.

– K. Bae, P. Olveczky, S. Kong, and S. Gao, "SMT-Based Analysis of Virtually Synchronous Distributed Hybrid Systems," *Proceedings of the 19th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, 2016

– S. Gao, L. Xie, A. Solar-Lezama, D. Serpanos, and H. Shrobe, "Automated Vulnerability Analysis of AC State Estimation under Constrained False Data Injection in Electric Power Systems," *Proceedings of the 54th IEEE Conference on Decision and Control (CDC)*, 2015.

– D. Bryce, S. Gao, D. Musliner, and R. Goldman, "SMT-Based Nonlinear PDDL+ Planning," *Proceedings of the 29th AAAI Conference on Artificial Intelligence (AAAI)*, 2015.

– Q. Wang, P. Zuliani, S. Kong, S. Gao, E. M. Clarke, "SReach: A Probabilistic Bounded Delta-Reachability Analyzer for Stochastic Hybrid Systems," *Proceedings of the 13th Conference on Computational Methods in Systems Biology (CMSB)*, 2015.

– B. Liu, S. Kong, S. Gao, P. Zuliani, and E. M. Clarke, "Towards Personalized Prostate Cancer Therapy Using Delta-Reachability Analysis," *Proceedings of the 18th International Conference on Hybrid Systems: Computation and Control (HSCC)*, 2015.

– S. Kong, S. Gao, W. Chen, and E. M. Clarke, "dReach: Delta-Reachability Analysis for Hybrid Systems," *Procceddings of the 21st International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2015.

– B. Liu, S. Kong, S. Gao, P. Zuliani, and E. M. Clarke, "Parameter Synthesis for Cardiac Cell Hybrid Models Using Delta-Decisions," *Proceedings of the 12th Conference on Computational Methods in Systems Biology (CMSB)*, 2014.

– S. Gao, S. Kong, and E. M. Clarke, "Proof Generation from Delta-Decisions," *Proceedings of the 16th International Conference on Symbolic and Numerical Algorithms for Scientific Computing (SYNASC)*, 2014.

– S. Gao, S. Kong, and E.M. Clarke, "Satisfiability Modulo ODEs," *Proceedings of the 13th International Conference on Formal Methods in Computer Aided Design (FMCAD)*, 2013.

– S. Gao, S. Kong, and E.M. Clarke, "dReal: An SMT Solver for Nonlinear Theories over the Reals," *Proceedings of the 24th International Conference on Automated Deduction (CADE)*, 2013.

– S. Gao, J. Avigad, and E.M. Clarke, "Delta-Complete Decision Procedures for Satisfiability over the Reals," *Proceedings of the 6th International Joint Conference on Automated Reasoning (IJCAR)*, 2012.

– S. Gao, J. Avigad, and E.M. Clarke, "Delta-Decidability over the Reals," *Proceedings of the 27th Annual ACM/IEEE Symposium on Logic in Computer Science (LICS)*, 2012.

– S. Gao, A, Platzer, and E.M. Clarke, "Quantifier Elimination over Finite Fields with Gröbner Bases," *Proceedings of the 4th International Conference on Algebraic Informatics (CAI)*, 2011.

– S. Gao, M. Ganai, F. Ivančić, A. Gupta, and E.M. Clarke, "Integrating ICP with DPLL(T) for Nonlinear Real Arithmetic," *Proceedings of the 10th International Conference on Formal Methods in Computer Aided Design (FMCAD)*, 2010.

– W. Klieber, S. Sapra, S. Gao, and E.M. Clarke, "A Non-Prenex DPLL-Based QBF Solver with Game-State Learning," *Proceedings of the 13th International Conference on Theory and Applications of Satisfiability Testing (SAT)*, 2010.

Grants

– Co-Principal Investigator, "CyberHeart: Compositional, Approximate, and Quantitative Reasoning for Medical Cyber-Physical Systems," National Science Foundation Cyber-Physical Systems Frontier (Large) Project, 2015-2020. Lead-PI: Scott Smolka.

Service

– Editorial board member, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems.

– Program co-chair, ACM-IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE), 2018.

– Program committee member, International Conference on Computer Aided Verification (CAV), 2018.

– Program committee member, ACM International Conference on Hybrid Systems Computation and Control (HSCC), 2017, 2018.

– Program committee member, 23rd International Conference on on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2017.

– Program committee member, 13th International Conference on Computability and Complexity in Analysis (CCA), 2016.

– External review committee member, ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2016.

– Journal referee: Journal of ACM, ACM Operating Systems Review, Formal Methods in Systems Design, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, Journal of Symbolic Computation, Logical Methods in Computer Science, Minds and Machines.

– Conference referee: AAAI Conference on Artificial Intelligence (AAAI), International Conference on Automated Software Engineering (ASE), International Conference on Computer Aided Verification (CAV), International Conference on Automated Deduction (CADE), International Conference on Constraint Programming (CP), Design, Automation and Test in Europe (DATE), Hybrid Systems Computation and Control (HSCC), ACM/IEEE Symposium on Logic in Computer Science (LICS), ACM Symposium on Principles of Programming Languages (POPL), International Conference on Satisfiability Testing (SAT).