

Madhusudan Parthasarathy

Curriculum Vitae

Department of Computer Science
Univ. of Illinois at Urbana-Champaign

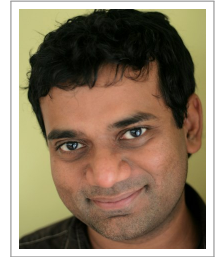
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Education

- 1994 **Bachelor of Science (B.Sc.) in Mathematics**, Loyola College, Madras University, Chennai, India.
- 1996 **Master of Science (M.Sc.) in Theoretical Computer Science**, Institute of Mathematical Sciences, Anna University, Chennai, India.
- 2001 **Doctor of Philosophy (Ph.D) in Theoretical Computer Science**, Institute of Mathematical Sciences, University of Madras, Chennai, India.

Research Interests

Automated software verification, formal methods, program synthesis, security, programming languages, software engineering, logic, and automata theory.

Academic Positions

- 2011-present Associate Professor, Dept. of Computer Science, University of Illinois at Urbana-Champaign
- 2005-2011 Assistant Professor, Dept. of Computer Science, University of Illinois at Urbana-Champaign
- 2002-2004 Postdoctoral Researcher, Department of Computer and Information Sciences, University of Pennsylvania

Experience

- Oct 2012 – **Visiting Researcher**, MICROSOFT RESEARCH, Bangalore, India.
- Aug 2013 Part of Sabbatical year. Initiated and was involved in developing a MOOC platform for India called Massively Empowered Classrooms (MEC) that provides online resources in a blended learning platform for CS undergraduates in India. Also directed first course on this platform on Design and Analysis of Algorithms. <https://www.mecr.org/>
- 2000 **Research Assistant**, RWTH, Aachen, Germany.
~9 month visit during Ph.D. visiting the research group of Prof. Wolfgang Thomas, and helping teach a course on model-checking.

Online bibliography databases

- I publish usually under the name "P. Madhusudan", and sometimes under "Madhusudan Parthasarathy" or "Parthasarathy Madhusudan"
- DBLP: <http://dblp.org/pid/m/PMadhusudan>
- Google Scholar: <https://scholar.google.com/citations?user=V828uG8AAAAJ> ; h-index: 39
- Semantic Scholar: <https://www.semanticscholar.org/author/P-Madhusudan/5085067>

Awards, Honors, and Highlights

- 2008 National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award
- 2009 List of Teachers Ranked as Excellent by Their Students (for CS373: Theory of Computation: Spring 2009)
- 2009 Served on an NSF Panel
- 2010 Best paper award for paper titled: "*VEX: Vetting Browser Extensions For Security Vulnerabilities*", USENIX Security Symposium. Washington D.C, USA, August 2010.
- 2011 Invited paper for Research Highlight in the Communications of the ACM: "*Vetting browser extensions for security vulnerabilities with VEX*"
- 2012 PC Co-Chair, International Conference on Computer Aided Verification, Berkeley, CA, 2012.
- 2012 Invited talk at IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS) on *Automated Reasoning and Natural Proofs for Programs Manipulating Data Structures*, Hyderabad, India.
- 2015 Tutorial at Conference on Computer Aided Verification on *Machine-learning based methods for synthesizing invariants.*, 2015.
- 2016 Served on an NSF Panel
- 2017 Tutorial at Conference on Runtime Verification on *Machine-learning State Properties*, 2017.

Invited talks and lectures

- "Making the Stack Visible: Visibly Pushdown Automata," *Logic and Computational Complexity (LCC) 2005 Workshop with LICS*, Chicago, IL, June 2005.
- "Mining Dynamic Interfaces," *Foundations of Interface Technologies (FIT) 2005 Workshop with CONCUR*, San Francisco, CA, August 2005.
- "Automata theory for nested structures," *GALOP'06: Games for Logic and Programming Languages, part of FLoC (Federated Logic Conference)*, Seattle, WA, 2006.
- "Visibly pushdown automata for XML," *EROW: Workshop on Emerging Research Opportunities in Web Data Management (held with ICDT)*, Barcelona, Spain, January 2007.
- "Learning Algorithms and Formal Verification," Invited tutorial, *8th Int'l Conference on Verification, Model Checking and Abstract Interpretation (VMCAI)*, Nice, France, January 2007.
- "Learning algorithms and formal verification," *Institute of Mathematic Sciences*, Chennai, India, February, 2007.
- "Logic, Automata, and Algorithms," *Invited course at Universita degli Studi di Salerno*, Salerno, Italy,

June 2007.

- “Multi-stack Automata: A New Tractable Subclass,” *Microsoft Research*, Redmond, WA, May 2007.
- “Analysing heaps using automata,” *IFIP Working Group 2.2 (International Federation for Information Processing)*, Nancy, France, September, 2007.
- “Monitoring Serializability,” *Microsoft Research*, Redmond, WA, August 2008.
- “Finding Concurrency Bugs through Atomicity Violations,” *UPCRC Seminar (audience: UIUC, Microsoft, Intel)*, Urbana, IL, October, 2008.
- “Annotations for race-freedom,” *Dagstuhl Workshop on Design and Validation of Concurrent Systems*, Dagstuhl, Germany, September 2009.
- “Annotations for Race-freedom,” Chennai Mathematical Institute (CMI), Chennai, India, August, 2009.
- “Provable annotations for race-freedom,” *Technische Universitat Darmstadt (Darmstadt University)*, Darmstadt, Germany, September, 2009.
- “Correctness projects in UPCRC,” *UPCRC Summit (audience: UIUC, Microsoft, Intel)*, Urbana, IL, March, 2010.
- “Deciding automata with auxiliary storage,” *Invited talk at International Conference on Implementation and Application of Automata (CIAA)*, Winnipeg, Canada, August, 2010.
- “The role of automata theory in software verification,” *CS Dept, University of Wisconsin*, Madison, Wisconsin, September 2010.
- “The role of automata theory in software verification,” *CERIAS Security Seminar, University of Purdue*, Purdue, Indiana, October, 2010.
- “Synthesizing Programs using Bounded Domains and Occam’s Razor,” *Invited talk at the 1st Workshop on Synthesis (SYNT 2012)*, Berkeley, California, July 2012.
- “Automated Reasoning and Natural Proofs for Programs Manipulating Data Structures”, *Invited talk at 32nd International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS)*, Hyderabad, India, December, 2012.
- “Synthesizing Programs over Bounded Data Domains,” *Workshop on Verification of Infinite-State Systems*, co-held with FSTTCS, Hyderabad, India, December, 2012.
- “Automata and Learning Based Methods in Software Verification,” *Invited Series of lectures for the AlgoSyn: Fall School on Algorithmic Game Theory and Learning*, a series of lectures on learning based techniques for program verification to a group of graduate students who gathered from all over Germany and some from other parts of Europe, RWTH Aachen, Aachen, Germany, October, 2013.
- “Machine-learning based methods for synthesizing invariants,” *Tutorial at Conference on Computer Aided Verification (CAV 2015)*, San Francisco, CA, July 20, 2015.
Material available at <http://madhu.cs.illinois.edu/CAV15Tutorial/>
- Multiple talks at the NSF Expeditions ExCAPE meetings held semi-annually in the years 2013-2017.
- “Foundations for Natural Proofs and Quantifier Instantiation” *Talk at Microsoft Research*, Seattle, WA, 2017.
- “Machine-learning State Properties,” *Invited tutorial at the 17th International Conference on Runtime Verification*, Seattle, WA, 2017.
- Upcoming invited talk, February 8-9, 2018. Invited talk at a workshop on Program Synthesis and Machine Learning, University of Washington, Seattle.

Funding

Several grants of which my share is ~\$2.36M.

- NSF Small: Automating Software Verification using Natural Proofs, single PI, \$500K, 2015-2018.
- NSF Expeditions in Computing: ExCAPE: Expeditions in Computer Augmented Program Engi-

neering, multi-PI grant, \$10M, (my share: \$500K plus some central funds and centrally funded postdocs), 2012-2017.

- Intel Parallel Center, \$2M, (my share \sim 9%, i.e., \$180K), 2012-2013.
- NSF TC: Small: TC: Collaborative Research: Formal Security Analysis of Access Control Models and Extensions, \$475K (my share: \$200K), 2009-2012.
- UPCRC: Universal Parallel Computing Research Center (Lead: Correctness group), Microsoft/Intel, \$10M (my share \sim 5%, i.e., \$300K), 2008-2011.
- NSF TC: Small: Keeping Jack in the Box: Confining the Role of Untrusted Inputs in Web Scenarios, 2 PIs, \$450K (my share: \$225K), 2009-2012.
- NSF CSR-EHCS (EHS), TM:Compositional Technology for Safety-Critical Modular Systems, multi-PI grant, \$300K (my share: \sim \$50K), 2008-2009.
- NSF Career Grant, single PI, "The Automata Theoretic Method in Software Verification", \$400K, 2008-2012.
- Gift from Microsoft Research, unrestricted funds, \$10K, 2005.

Conference Program Committees

- Program Committee, FORMATS and FTRTFT 2004 Joint Conference on Formal Modelling and Analysis of Timed Systems (FORMATS) and Formal Techniques in Real-Time and Fault Tolerant System (FTRTFT).
- Program Committee, Games in Design and Verification (GDV), 2005 (with CAV 2005). Program Committee, 17th Int'l Conference on Computer Aided Verification (CAV), Edinburgh, Scotland, 2005.
- Program Committee, 25th Int'l Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS), Hyderabad, India, 2005.
- Program Committee, ACM Symposium on Applied Computing (SAC): Technical Track on Software Verification, 2006.
- Program Committee, 34th International Colloquium on Automata, Languages and Programming (ICALP), Wroclaw, Poland, 2007.
- Program Committee, 19th International Conference on Concurrency Theory (CONCUR), Toronto, Canada, 2008.
- Program Committee, Sixth ASIAN Symposium on Programming Languages and Systems (APLAS), Bangalore, India, 2008.
- Program Committee, Annual IEEE Symposium on Logic in Computer Science (LICS), Los Angeles, USA, 2009.
- Program Committee: 16th International Symposium on Temporal Representation and Reasoning (TIME), Brixen-Bressanone, Italy, 2009.
- Program Committee: 21st Int'l Conf on Computer Aided Verification (CAV), Grenoble, France, 2009. External Review Committee: ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), Dublin, Ireland, 2009.
- Program Committee, 27th Symposium on Theoretical Aspects of Computer Science (STACS), Nancy, France, 2010.
- Program Committee: 8th Int'l Symposium on Automated Technology for Verification and Analysis (ATVA), Singapore, 2010.
- Program Committee: 30th Int'l Conference on Foundations of Software Tech. and Theoretical Comp. Sc. (FSTTCS), Chennai, India, 2010.
- Program Committee: 23rd Int'l Conf on Computer Aided Verification (CAV), Snowbird, UT, USA,

2011.

- Program Committee: Automated Technology for Verification and Analysis, 9th International Symposium, ATVA, Taipei, Taiwan, 2011.
- Program Committee: IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS), Mumbai, India, 2011.
- Program Committee: 18th International Conference on Logic for Programming, Artificial Intelligence, and Reasoning (LPAR), MÃ¡rida, Venezuela, 2012.
- Program Committee: 39th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL), Philadelphia, USA, 2012.
- Program Committee: 38th Int'l Symp. on Mathematical Foundations of Computer Science (MFCS), IST Austria, Austria, 2013.
- Program Committee: 25th Int'l Conf on Computer Aided Verification (CAV), Saint Petersburg, Russia, 2013.
- Program Committee: Conference on Highlights of Logic, Games, and Automata, Paris, France, 2013.
- Program Committee: 21st International Static Analysis Symposium (SAS), Munich, Germany, 2014.
- Program Committee: 25th Conference on Concurrency Theory (CONCUR), Rome, Italy, 2014.
- Program Committee: 35th annual ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), Edinburgh, UK, 2014.
- Program Committee: 42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL), Mumbai, India, 2015.
- Program Committee: 10th Symposium of the Trustworthy Global Computing (TGC), Madrid, Spain, 2015.
- Program Committee: 36th annual ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), Portland, OR, USA, 2015.
- External Review Committee: 28th International Conference on Computer Aided Verification (CAV), Toronto, Canada, 2016.
- Program Committee: 43rd International Colloquium on Automata, Languages, and Programming (ICALP), Rome, Italy, 2016.
- Program Committee: 23rd International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), Uppsala, Sweden, 2017.
- Program Committee: 5th Conference on Highlights of Logic, Automata and Games, London, UK, September 12–15, 2017.
- Program Committee: The 17th International Conference on Runtime Verification (RV 2017), Seattle, Washington, September 13-16, 2017.
- Program Committee, Workshop on Automated Deduction for Separation Logics (ADSL), affiliated with the 33rd Annual ACM/IEEE Symposium on Logic in Computer Science (LICS 2018) and part of the Federated Logic Conference 2018 (FLOC 2018), Oxford, UK, 2018.
- Program Committee, Workshop on Logic and Learning, affiliated with the 33rd Annual ACM/IEEE Symposium on Logic in Computer Science (LICS 2018) and part of the Federated Logic Conference 2018 (FLOC 2018), Oxford, UK, 2018.
- Program Committee, 29th International Conference on Concurrency Theory (CONCUR 2018), Beijing, China, 2018.

Conferences Chaired or Organized

- Program Chair (Organizer), Workshop on Software Verification, 2005 (part of FSTTCS 2005) Program Chair, Workshop on Games in Design and Verification (GDV'06); co-located with FLoC (Federated Logic Conference), Seattle, USA, 2006.
- Program Chair, 9th International Workshop on Verification of Infinite-State Systems, (INFINITY), Lisbon, Portugal, 2007.
- Organizer, Workshop on Security and Reliability in Software Systems, with FSTTCS, Bangalore, India, 2008.
- Organizer: Dagstuhl Workshop on Design and Validation of Concurrent Systems, Dagstuhl, Germany, August, 2009.
- Program Co-Chair, 24th Int'l Conf on Computer Aided Verification (CAV), Berkeley, USA, 2012. Program Co-Chair and co-Organizer: SYNT 2015: 4th Workshop on Synthesis (with Conference on Computer Aided Verification-CAV), San Francisco, USA, 2015.
- Program Co-Chair, Workshop on Formal Methods and Security, held with PLDI 2016, Santa Barbara, USA, 2016.
- Program Co-Chair, Workshop on Formal Methods and Security, held with PLDI 2018 (upcoming), Philadelphia, USA, 2018.

Courses taught at Illinois

- Spring 2005: CS598mp: Algorithmic Software Verification
- Fall 2005: CS598mp: Automata and Logic in Verification
- Spring 2006: CS498mp: Software Model-Checking
- Fall 2006: CS273: Introduction to the Theory of Computation
- Fall 2007: CS273: Introduction to the Theory of Computation
- Spring 2008: CS477: Formal Software Development Methods
- Fall 2008: CS498: Logic in Computer Science
- Spring 2009: CS373: Introduction to Theory of Computation
- Spring 2010: CS373: Introduction to Theory of Computation
- Fall 2010: CS598: Software Verification
- Spring 2011: CS477: Formal Methods in Software Development
- Fall 2011: CS373: Intro to Theory of Computation
- Fall 2013: CS173: Discrete Structures
- Spring 2014: CS498: Logic in Computer Science
- Fall 2014: CS173: Discrete Structures
- Spring 2015: CS 477: Formal Software Development Methods
- Fall 2015: CS598MP: Software Verification, focusing on *Applications of techniques from software verification, logic, machine learning, and program synthesis to exciting new domains*
- Spring 2016: CS173: Discrete Structures
- Fall 2016: CS477: Formal Software Development Methods
- Spring 2017: CS498: Logic in Computer Science
- Fall 2017: CS173: Discrete Structures

Publications

Conference Publications

- [1] Daejun Park, Daniel Neider, Shambwaditya Saha, Pranav Garg, and P. Madhusudan. Invariant synthesis for incomplete verification engines. To appear in *Tools and Algorithms for the Construction and Analysis of Systems - 22nd International Conference, TACAS 2018, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2018, Thessaloniki, Greece*.
- [2] Christof Löding, P. Madhusudan, and Lucas Peña. Foundations for Natural Proofs and Quantifier Instantiation. To appear in *45th Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, POPL 2018, Los Angeles, CA, USA*.
- [3] Alex Gyori, Pranav Garg, Edgar Pek, and P. Madhusudan. Efficient incrementalized runtime checking of linear measures on lists. In *2017 IEEE International Conference on Software Testing, Verification and Validation, ICST 2017, Tokyo, Japan, March 13-17, 2017*, pages 310–320. IEEE Computer Society, 2017.
- [4] Pranav Garg, Daniel Neider, P. Madhusudan, and Dan Roth. Learning invariants using decision trees and implication counterexamples. In Rastislav Bodík and Rupak Majumdar, editors, *Proceedings of the 43rd Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, POPL 2016, St. Petersburg, FL, USA, January 20 - 22, 2016*, pages 499–512. ACM, 2016.
- [5] Christof Löding, P. Madhusudan, and Daniel Neider. Abstract learning frameworks for synthesis. In Marsha Chechik and Jean-François Raskin, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 22nd International Conference, TACAS 2016, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2016, Eindhoven, The Netherlands, April 2-8, 2016, Proceedings*, volume 9636 of *Lecture Notes in Computer Science*, pages 167–185. Springer, 2016.
- [6] Daniel Neider, Shambwaditya Saha, and P. Madhusudan. Synthesizing piece-wise functions by learning classifiers. In Marsha Chechik and Jean-François Raskin, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 22nd International Conference, TACAS 2016, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2016, Eindhoven, The Netherlands, April 2-8, 2016, Proceedings*, volume 9636 of *Lecture Notes in Computer Science*, pages 186–203. Springer, 2016.
- [7] Shambwaditya Saha, Pranav Garg, and P. Madhusudan. Alchemist: Learning guarded affine functions. In Daniel Kroening and Corina S. Pasareanu, editors, *Computer Aided Verification - 27th International Conference, CAV 2015, San Francisco, CA, USA, July 18-24, 2015, Proceedings, Part I*, volume 9206 of *Lecture Notes in Computer Science*, pages 440–446. Springer, 2015.
- [8] Shambwaditya Saha, Santhosh Prabhu, and P. Madhusudan. Netgen: synthesizing data-plane configurations for network policies. In Jennifer Rexford and Amin Vahdat, editors, *Proceedings of the 1st ACM SIGCOMM Symposium on Software Defined Networking Research, SOSR '15, Santa Clara, California, USA, June 17-18, 2015*, pages 17:1–17:6. ACM, 2015.

- [9] Pranav Garg, Christof Löding, P. Madhusudan, and Daniel Neider. ICE: A robust framework for learning invariants. In Armin Biere and Roderick Bloem, editors, *Computer Aided Verification - 26th International Conference, CAV 2014, Held as Part of the Vienna Summer of Logic, VSL 2014, Vienna, Austria, July 18-22, 2014. Proceedings*, volume 8559 of *Lecture Notes in Computer Science*, pages 69–87. Springer, 2014.
- [10] Anna Lisa Ferrara, P. Madhusudan, Truc L. Nguyen, and Gennaro Parlato. Vac - verifier of administrative role-based access control policies. In Armin Biere and Roderick Bloem, editors, *Computer Aided Verification - 26th International Conference, CAV 2014, Held as Part of the Vienna Summer of Logic, VSL 2014, Vienna, Austria, July 18-22, 2014. Proceedings*, volume 8559 of *Lecture Notes in Computer Science*, pages 184–191. Springer, 2014.
- [11] Andrew Cross, B. Ashok, Srinath Bala, Edward Cutrell, Naren Datha, Rahul Kumar, Viraj Kumar, P. Madhusudan, Siddharth Prakash, Sriram K. Rajamani, Satish Sangameswaran, Deepika Sharma, and William Thies. Online learning versus blended learning: an exploratory study. In Mehran Sahami, Armando Fox, Marti A. Hearst, and Micheline T. H. Chi, editors, *First (2014) ACM Conference on Learning @ Scale, L@S 2014, Atlanta, GA, USA, March 4-5, 2014*, pages 179–180. ACM, 2014.
- [12] Ankush Desai, Pranav Garg, and P. Madhusudan. Natural proofs for asynchronous programs using almost-synchronous reductions. In Andrew P. Black and Todd D. Millstein, editors, *Proceedings of the 2014 ACM International Conference on Object Oriented Programming Systems Languages & Applications, OOPSLA 2014, part of SPLASH 2014, Portland, OR, USA, October 20-24, 2014*, pages 709–725. ACM, 2014.
- [13] Edgar Pek, Xiaokang Qiu, and P. Madhusudan. Natural proofs for data structure manipulation in C using separation logic. In Michael F. P. O’Boyle and Keshav Pingali, editors, *ACM SIGPLAN Conference on Programming Language Design and Implementation, PLDI ’14, Edinburgh, United Kingdom - June 09 - 11, 2014*, pages 440–451. ACM, 2014.
- [14] Haohui Mai, Edgar Pek, Hui Xue, Samuel Talmadge King, and P. Madhusudan. Verifying security invariants in expressos. In Vivek Sarkar and Rastislav Bodík, editors, *Architectural Support for Programming Languages and Operating Systems, ASPLOS ’13, Houston, TX, USA - March 16 - 20, 2013*, pages 293–304. ACM, 2013.
- [15] Pranav Garg, Christof Löding, P. Madhusudan, and Daniel Neider. Learning universally quantified invariants of linear data structures. In Natasha Sharygina and Helmut Veith, editors, *Computer Aided Verification - 25th International Conference, CAV 2013, Saint Petersburg, Russia, July 13-19, 2013. Proceedings*, volume 8044 of *Lecture Notes in Computer Science*, pages 813–829. Springer, 2013.
- [16] Xiaokang Qiu, Pranav Garg, Andrei Stefanescu, and P. Madhusudan. Natural proofs for structure, data, and separation. In Hans-Juergen Boehm and Cormac Flanagan, editors, *ACM SIGPLAN Conference on Programming Language Design and Implementation, PLDI ’13, Seattle, WA, USA, June 16-19, 2013*, pages 231–242. ACM, 2013.
- [17] Pranav Garg, P. Madhusudan, and Gennaro Parlato. Quantified data automata on skinny trees: An abstract domain for lists. In Francesco Logozzo and Manuel Fähndrich, editors, *Static Analysis - 20th International Symposium, SAS 2013, Seattle, WA, USA, June 20-22, 2013*.

Proceedings, volume 7935 of *Lecture Notes in Computer Science*, pages 172–193. Springer, 2013.

- [18] Anna Lisa Ferrara, P. Madhusudan, and Gennaro Parlato. Policy analysis for self-administrated role-based access control. In Nir Piterman and Scott A. Smolka, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 19th International Conference, TACAS 2013, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2013, Rome, Italy, March 16-24, 2013. Proceedings*, volume 7795 of *Lecture Notes in Computer Science*, pages 432–447. Springer, 2013.
- [19] Anna Lisa Ferrara, P. Madhusudan, and Gennaro Parlato. Security analysis of role-based access control through program verification. In Stephen Chong, editor, *25th IEEE Computer Security Foundations Symposium, CSF 2012, Cambridge, MA, USA, June 25-27, 2012*, pages 113–125. IEEE Computer Society, 2012.
- [20] P. Madhusudan. Automated reasoning and natural proofs for programs manipulating data structures. In Deepak D'Souza, Telikepalli Kavitha, and Jaikumar Radhakrishnan, editors, *IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science, FSTTCS 2012, December 15-17, 2012, Hyderabad, India*, volume 18 of *LIPICs*, pages 34–35. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2012.
- [21] P. Madhusudan, Xiaokang Qiu, and Andrei Stefanescu. Recursive proofs for inductive tree data-structures. In John Field and Michael Hicks, editors, *Proceedings of the 39th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, POPL 2012, Philadelphia, Pennsylvania, USA, January 22-28, 2012*, pages 123–136. ACM, 2012.
- [22] Emre Uzun, Vijayalakshmi Atluri, Shamik Sural, Jaideep Vaidya, Gennaro Parlato, Anna Lisa Ferrara, and P. Madhusudan. Analyzing temporal role based access control models. In Vijay Atluri, Jaideep Vaidya, Axel Kern, and Murat Kantarcioglu, editors, *17th ACM Symposium on Access Control Models and Technologies, SACMAT '12, Newark, NJ, USA - June 20 - 22, 2012*, pages 177–186. ACM, 2012.
- [23] Azadeh Farzan, P. Madhusudan, Niloofar Razavi, and Francesco Sorrentino. Predicting null-pointer dereferences in concurrent programs. In Will Tracz, Martin P. Robillard, and Tefvik Bultan, editors, *20th ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE-20), SIGSOFT/FSE'12, Cary, NC, USA - November 11 - 16, 2012*, page 47. ACM, 2012.
- [24] Rohit Chadha, P. Madhusudan, and Mahesh Viswanathan. Reachability under contextual locking. In Cormac Flanagan and Barbara König, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 18th International Conference, TACAS 2012, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2012, Tallinn, Estonia, March 24 - April 1, 2012. Proceedings*, volume 7214 of *Lecture Notes in Computer Science*, pages 437–450. Springer, 2012.
- [25] P. Madhusudan. Synthesizing reactive programs. In Marc Bezem, editor, *Computer Science Logic, 25th International Workshop / 20th Annual Conference of the EACSL, CSL 2011, September 12-15, 2011, Bergen, Norway, Proceedings*, volume 12 of *LIPICs*, pages 428–442. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2011.

- [26] P. Madhusudan and Gennaro Parlato. The tree width of auxiliary storage. In Thomas Ball and Mooly Sagiv, editors, *Proceedings of the 38th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, POPL 2011, Austin, TX, USA, January 26-28, 2011*, pages 283–294. ACM, 2011.
- [27] P. Madhusudan, Gennaro Parlato, and Xiaokang Qiu. Decidable logics combining heap structures and data. In Thomas Ball and Mooly Sagiv, editors, *Proceedings of the 38th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, POPL 2011, Austin, TX, USA, January 26-28, 2011*, pages 611–622. ACM, 2011.
- [28] Rajesh K. Karmani, P. Madhusudan, and Brandon M. Moore. Thread contracts for safe parallelism. In Calin Cascaval and Pen-Chung Yew, editors, *Proceedings of the 16th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, PPOPP 2011, San Antonio, TX, USA, February 12-16, 2011*, pages 125–134. ACM, 2011.
- [29] P. Madhusudan and Xiaokang Qiu. Efficient decision procedures for heaps using STRAND. In Eran Yahav, editor, *Static Analysis - 18th International Symposium, SAS 2011, Venice, Italy, September 14-16, 2011. Proceedings*, volume 6887 of *Lecture Notes in Computer Science*, pages 43–59. Springer, 2011.
- [30] Pranav Garg and P. Madhusudan. Compositionality entails sequentializability. In Parosh Aziz Abdulla and K. Rustan M. Leino, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 17th International Conference, TACAS 2011, Held as Part of the Joint European Conferences on Theory and Practice of Software, ETAPS 2011, Saarbrücken, Germany, March 26-April 3, 2011. Proceedings*, volume 6605 of *Lecture Notes in Computer Science*, pages 26–40. Springer, 2011.
- [31] Salvatore La Torre, P. Madhusudan, and Gennaro Parlato. Model-checking parameterized concurrent programs using linear interfaces. In Tayssir Touili, Byron Cook, and Paul B. Jackson, editors, *Computer Aided Verification, 22nd International Conference, CAV 2010, Edinburgh, UK, July 15-19, 2010. Proceedings*, volume 6174 of *Lecture Notes in Computer Science*, pages 629–644. Springer, 2010.
- [32] Salvatore La Torre, P. Madhusudan, and Gennaro Parlato. The language theory of bounded context-switching. In Alejandro López-Ortiz, editor, *LATIN 2010: Theoretical Informatics, 9th Latin American Symposium, Oaxaca, Mexico, April 19-23, 2010. Proceedings*, volume 6034 of *Lecture Notes in Computer Science*, pages 96–107. Springer, 2010.
- [33] Francesco Sorrentino, Azadeh Farzan, and P. Madhusudan. PENELOPE: weaving threads to expose atomicity violations. In Gruia-Catalin Roman and Kevin J. Sullivan, editors, *Proceedings of the 18th ACM SIGSOFT International Symposium on Foundations of Software Engineering, 2010, Santa Fe, NM, USA, November 7-11, 2010*, pages 37–46. ACM, 2010.
- [34] Sruthi Bandhakavi, Samuel T. King, P. Madhusudan, and Marianne Winslett. VEX: vetting browser extensions for security vulnerabilities. In *19th USENIX Security Symposium, Washington, DC, USA, August 11-13, 2010, Proceedings*, pages 339–354. USENIX Association, 2010.
- [35] Azadeh Farzan, P. Madhusudan, and Francesco Sorrentino. Meta-analysis for atomicity violations under nested locking. In Ahmed Bouajjani and Oded Maler, editors, *Computer*

- Aided Verification, 21st International Conference, CAV 2009, Grenoble, France, June 26 - July 2, 2009. Proceedings*, volume 5643 of *Lecture Notes in Computer Science*, pages 248–262. Springer, 2009.
- [36] Salvatore La Torre, P. Madhusudan, and Gennaro Parlato. Reducing context-bounded concurrent reachability to sequential reachability. In Ahmed Bouajjani and Oded Maler, editors, *Computer Aided Verification, 21st International Conference, CAV 2009, Grenoble, France, June 26 - July 2, 2009. Proceedings*, volume 5643 of *Lecture Notes in Computer Science*, pages 477–492. Springer, 2009.
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Journal Publications

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- [2] Pranav Garg, Christof Löding, P. Madhusudan, and Daniel Neider. Quantified data automata for linear data structures: a register automaton model with applications to learning invariants of programs manipulating arrays and lists. *Formal Methods in System Design*, 47(1):120–157, 2015.
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- [11] Rajeev Alur, Salvatore La Torre, and P. Madhusudan. Modular strategies for recursive game graphs. *Theor. Comput. Sci.*, 354(2):230–249, 2006.
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Workshop Publications

- [1] Edgar Pek and P. Madhusudan. Explicit and symbolic techniques for fast and scalable points-to analysis. In Steven Arzt and Raúl A. Santelices, editors, *Proceedings of the 3rd ACM SIGPLAN International Workshop on the State Of the Art in Java Program analysis, SOAP 2014, Edinburgh, UK, Co-located with PLDI 2014, June 12, 2014*, pages 4:1–4:6. ACM, 2014.

- [2] Salvatore La Torre, P. Madhusudan, and Gennaro Parlato. Sequentializing parameterized programs. In Sebastian S. Bauer and Jean-Baptiste Raclet, editors, *Proceedings Fourth Workshop on Foundations of Interface Technologies, FIT 2012, Tallinn, Estonia, 25th March 2012.*, volume 87 of *EPTCS*, pages 34–47, 2012.

Edited Volumes

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- [2] Pavol Cerný, Viktor Kuncak, and Parthasarathy Madhusudan, editors. *Proceedings Fourth Workshop on Synthesis, SYNT 2015, San Francisco, CA, USA, 18th July 2015*, volume 202 of *EPTCS*, 2016.

Papers under submission

- [1] Edgar Pek, Pranav Gag, Muntasir Rahman, Karl Palmskog, Indranil Gupta, and P. Madhusudan. Inferring Formal Properties of Production Key-Value Stores. Available at <http://madhu.cs.illinois.edu/pub.html>.
- [2] P. Madhusudan, Dirk Nowotka, Aayush Rajasekaran, and Jeffrey Shallit. Lagrange's Theorem for Binary Squares arXiv:1710.04247 , Available at <https://arxiv.org/abs/1710.04247>
- [3] P. Ezudheen, Pranav Garg, Daniel Neider, Deepak D'Souza, P. Madhusudan. Horn-ICE Learning for Synthesizing Invariants and Contracts. Available at <http://madhu.cs.illinois.edu/pub.html>.
- [4] P. Madhusudan, Umang Mathur, Shambwaditya Saha, Mahesh Viswanathan. A Decidable Fragment of Second Order Logic With Applications to Program Synthesis. arXiv:1712.05513, Available at <https://arxiv.org/abs/1712.05513>

Committees served at Illinois

- Graduate and Undergrad Advisors Committee: 2005–2006, 2006–2007, 2007–2008, 2008–2009, 2009–2010, 2010–2011, 2011–2012, 2012–2013, 2013–2014, 2014–2015, 2015–2016
- Fellowship, Assistantships and Admissions (FAA): 2006–2007, 2007–2008, 2008–2009, 2009–2010.
- Area chair, Programming Languages, Formal Methods, Software Eng, 2011–2012, 2016–2017
- Faculty Recruiting Committee, 2014–2015, 2015–2016, 2016–2017
- Undergraduate Study Committee, 2012–2013, 2014–2015, 2015–2016

Thesis Committees at Illinois

- *Ph.D. thesis final committees of the following students:* Viraj Kumar, Azadeh Farzan, Lars E. Olson, Long Wang, Traian Florin Serbanuta, Sruthi Bandhakavi, Swarup Kumar Sahoo, Xiaokang Qiu, Haohui Mai, John T Criswell, Francesco Sorrentino, Pranav Garg, Edgar Pek, Andrei Stefanescu, Stephen Thomas Heumann, Dileep Raghunath Kini, Gabriel-Alexandru Gyori, Minas Charalambides.
- *Ph.D. thesis preliminary exam committees of the following students:* Viraj Kumar, Azadeh Farzan, Lars E. Olson, Long Wang, Traian Florin Serbanuta, Sruthi Bandhakavi, Swarup Kumar

Sahoo, Xiaokang Qiu, Haohui Mai, John T Criswell, Francesco Sorrentino, Pranav Garg, Edgar Pek, Andrei Stefanescu, Stephen Thomas Heumann, Dileep Raghunath Kini, Gabriel-Alexandru Gyori, Jason William Croft, Sihan Li.

———— Doctoral Students Advised or Co-advised

- Sruthi Bandhakavi, graduated 2012, worked on finding security vulnerabilities, now at Google.
- Xiaokang Qiu, graduated 2013, worked on natural proofs in program verification, now an Assistant Professor at University of Purdue.
- Francesco Sorrentino, graduated 2014, worked on finding errors in concurrent software, now working in industry.
- Pranav Garg, graduated 2015, worked on automatic invariant synthesis, now in Amazon Research.
- Edgar Pek, graduated 2015, worked on building verified systems, now at Oracle Labs.
- Shambwaditya Saha working on techniques for program synthesis (current)
- Adithya Murali (current)

———— Post-doctoral Researchers Mentored

- Gennaro Parlato, for several years on theoretical aspects of program verification, now a professor at University of Southampton, UK.
- Daniel Neider, for two to three years, on learning techniques in program verification, now a Research Group Leader at Max Plank Institute for Software Systems, Kaiserslautern, Germany.
- Karl Palmskog (current)