

Curriculum Vitae

Rupak Majumdar

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Research Interests

Formal verification: Algorithmic issues in the verification and control of reactive, probabilistic, and hybrid systems.

Software verification, program analysis, and testing.

Theoretical foundations: Logic, automata theory, and game theoretic methods in formal verification.

Embedded systems: Formal methods for controller design and implementation. Hardware logic synthesis.

Employment

June, 2010 - present	Scientific Member and Director, Max Planck Institute for Software Systems Saarbrücken and Kaiserslautern, Germany
2013 - present	Co-founder and Chief Scientist, Quaddra Software http://www.quaddrasoftware.com
July, 2012 - present	Adjunct Professor, Department of Computer Science, University of California, Los Angeles, CA 90095
2010 - present	Honorary Professor, University of Kaiserslautern
2004-2012	Assistant (04-08), Associate (08-10), and Full Professor (10-12), Department of Computer Science, University of California, Los Angeles, CA 90095

Education

- May 1998 B.Tech in Computer Science,
Indian Institute of Technology, Kanpur
- September 2003 Ph.D. in Computer Science,
Department of Computer Science,
University of California, Berkeley, CA 94720
(Graduate Advisor: Thomas A. Henzinger)

Awards and Honors

1. ERC Synergy award on “ImPACT: Privacy, Accountability, Compliance, and Trust in tomorrow’s Internet,” with co-PIs Michael Backes, Peter Druschel, and Gerhard Weikum.
2. ACM SIGPLAN Most Influential Paper Award for POPL 2004 paper “Abstractions from proofs,” 2014.
3. ACM TODAES Best Paper Award, 2011.
4. ACM SIGPLAN Most Influential Paper Award for PLDI 2001 paper “Automatic abstraction of C programs,” 2011.
5. ACM SIGBED Best Paper Award, EMSOFT 2010.
6. Sloan Foundation Fellowship, 2010.
7. EAPLS Best Paper award at the European Theory and Practice of Software (ETAPS) conference, 2009 and 2012.
8. NSF CAREER Award, 2006.
9. Leon O. Chua Award for Research in Nonlinear Science, Department of EECS, University of California, Berkeley, 2002.
10. Best paper award at 12th International Conference on Concurrency Theory (CONCUR), 2001.
11. Microsoft Research Fellowship, Microsoft Corp, 2001.
12. President’s Gold Medal, Indian Institute of Technology, Kanpur, 1998.

Grants

1. National Science Foundation ITR: Event driven software quality. PI: Jens Palsberg, co-PIs: Eddie Kohler, Rupak Majumdar, Todd Millstein. 2004–2008.
2. National Science Foundation: CAREER: Modular verification of software. 2006–2011.

3. National Science Foundation: CPA: Software verification for hardware models. 2007–2010.
4. National Science Foundation: EHS: Directed real-time testing. 2007–2010.
5. DARPA: CSSG: Systematic testing of safety-critical systems. 2009–2011.
6. National Science Foundation: SHF: Closing the gap in controller synthesis. 2009–2011.
7. National Science Foundation: CPS: Towards robust cyber-physical systems, 2010–2012.
8. Sloan Foundation Fellowship, 2010.
9. ERC Synergy award: ImPACT: Privacy, accountability, compliance, and trust in tomorrow’s Internet. 2015–2021.
10. Industrial gifts from Intel, Microsoft, Toyota, and Altera.

Software

1. BugAssist: Localization of program errors (<http://bugassist.mpi-sws.org>)
2. Splat and LLSplat: Directed dynamic test case generator
3. BLAST: Software model checker
4. jMocha: Compositional model checker
5. The Vampire Proof-generating Theorem Prover

Recent Invited Talks

- “The Analysis of Asynchronous Programs,” Distinguished Lecture, Max Planck Institute for Software Systems, Germany, 2008 and at EPFL, Switzerland, 2008.
- “Systematic Testing for Control Applications,” Invited Lecture, Memocode, 2010.
- Lectures on Software Verification, TECSWeek Winter School, 2011.
- Lectures on Software Verification, Spring School in Tarragona, 2011.
- Lectures on Software Verification, Marktoberdorf Summer School, 2011.
- “End-to-end arguments in Embedded Control Systems,” Ershov Memorial Conference, 2011.
- “The Marriage of deduction and exploration,” VSTTE, 2012.
- “The Analysis of Asynchronous Programs,” ICFEM 2015.

Publications

Please see <http://www.mpi-sws.org/~rupak/> for a current list.

Edited Books and Proceedings

- [1] Klaus Havelund, Rupak Majumdar, and Jens Palsberg. Model Checking Software: 15th International SPIN Workshop Proceedings. Lecture Notes in Computer Science 5156, Springer, 2008.
- [2] Rupak Majumdar and Paulo Tabuada. Hybrid Systems: Computation and Control, 12th International Conference. Lecture Notes in Computer Science 5469, Springer, 2009.
- [3] Javier Esparza and Rupak Majumdar. Tools and Algorithms for the Construction and Analysis of Systems (TACAS). Lecture Notes in Computer Science, Springer, 2010.
- [4] Martin Franz, Andreas Holzer, Rupak Majumdar, Bryan Parno, Helmut Veith. The first workshop on language support for privacy-enhancing technologies (PETShop'13). ACM Conference on Computer and Communications Security 2013: 1485-1486.
- [5] Ezio Bartocci and Rupak Majumdar. Runtime verification (RV). Lecture Notes in Computer Science, Springer, 2015.

Refereed Journal Publications

- [1] T.A. Henzinger, R. Majumdar, and J.-F. Raskin. A classification of symbolic transition systems. In *ACM Transactions on Computational Logic*, 6(1):1–32. 2005.
- [2] L. de Alfaro and R. Majumdar. Quantitative Solution of Concurrent Games. In *Journal of Computer and Systems Sciences*, 68, pages 374–397, 2004.
- [3] K. Chatterjee, D. Ma, R. Majumdar, T. Zhao, T.A. Henzinger and J. Palsberg. Stack size analysis for interrupt-driven programs. In *Information and Computation*, 194(2): 144–174. 2004.
- [4] J.L. Wong, R. Majumdar, and M. Potkonjak. Watermarking of SAT using combinatorial isolation lemmas. In *IEEE Transactions on Computer-Aided Design of Integrated Circuits*, 2004.
- [5] T.A. Henzinger, O. Kupferman, and R. Majumdar. On the complexity of the universal and existential μ -calculus. In *Theoretical Computer Science*, 2006.
- [6] L. de Alfaro, M. Faella, T.A. Henzinger, R. Majumdar, and M. Stoelinga. Model checking discounted temporal properties. In *Theoretical Computer Science*, 2006.

- [7] K. Chatterjee, R. Majumdar, and T.A. Henzinger. Stochastic limit-average games are in EXPTIME. In *International Journal of Game Theory*, to appear.
- [8] D. Beyer, T.A. Henzinger, R. Jhala, and R. Majumdar. Software engineering with Blast. In *Software Tools for Technology Transfer*, 2007.
- [9] L. de Alfaro, R. Majumdar, V. Raman, and M. Stoelinga. Game relations and metrics. In *Logical Methods in Computer Science*, 2008.
- [10] Y. Hu, V. Shih, R. Majumdar, and L. He. Efficient SAT-Based Boolean Matching for Heterogeneous FPGA Technology Mapping. *IEEE Transactions on Computer-Aided Design of Integrated Circuits*, 27(10): 1751–1760, 2008.
- [11] R. Jhala and R. Majumdar. Software model checking. *ACM Computing Surveys*, 2009.
- [12] Jason Cong, Bin Liu, Rupak Majumdar, and Zhiru Zhang. Behavior-Level Observability Analysis for Operation Gating in Low-Power Behavioral Synthesis. *ACM Trans. Design Autom. Electr. Syst.*, 16(1): 4 (2010).
- [13] Krishnendu Chatterjee, Luca de Alfaro, Rupak Majumdar, and Vishwanath Raman. Algorithms for Game Metrics. *Logical Methods in Computer Science*, 6(3) (2010).
- [14] Gunes Ercal, Rafit Izhak-Ratzin, Rupak Majumdar, and Adam Meyerson. VCG with Communities on Random Ad Hoc Networks. *IJDSN* 2011.
- [15] , Pierre Ganty and Rupak Majumdar. Algorithmic verification of asynchronous programs. *ACM Trans. Program. Lang. Syst.*, 34(1): 6 (2012).
- [16] Krishnendu Chatterjee and Rupak Majumdar. Discounting and Averaging in Games across Time scales. *Int. J. Found. Comput. Sci.* 23(3): 609-625 (2012).
- [17] Pierre Ganty, Rupak Majumdar, and Benjamin Monmege. Bounded underapproximations. *Formal Methods in System Design* 40(2): 206-231 (2012).
- [18] Krishnendu Chatterjee, Luca de Alfaro, Marco Faella, Rupak Majumdar, and Vishwanath Raman. Code aware resource management. *Formal Methods in System Design* 42(2): 146-174 (2013).
- [19] Krishnendu Chatterjee, Luca de Alfaro, and Rupak Majumdar. The Complexity of Coverage. *Int. J. Found. Comput. Sci.* 24(2): 165-186 (2013).
- [20] Majid Zamani, Nathan van de Wouw, and Rupak Majumdar. Backstepping controller synthesis and characterizations of incremental stability. *Systems & Control Letters* 62(10): 949-962 (2013).
- [21] Ashutosh Gupta, Rupak Majumdar, and Andrey Rybalchenko. From tests to proofs. *STTT* 15(4): 291-303 (2013).
- [22] Rupak Majumdar, Elaine Render, Paulo Tabuada: A theory of robust omega-regular software synthesis. *ACM Trans. Embedded Comput. Syst.* 13(3): 48 (2013).

- [23] Majid Zamani, Peyman Mohajerin Esfahani, Rupak Majumdar, Alessandro Abate, John Lygeros. Symbolic Control of Stochastic Systems via Approximately Bisimilar Finite Abstractions. *IEEE Trans. Automat. Contr.* 59(12): 3135-3150 (2014).
- [24] Paulo Tabuada, Sina Yamac Caliskan, Matthias Rungger, Rupak Majumdar. Towards Robustness for Cyber-Physical Systems. *IEEE Trans. Automat. Contr.* 59(12): 3151-3163 (2014).

Refereed Conference Publications

- [1] R. Majumdar and R.K. Shyamasundar. Design of controllers for linear hybrid systems, In *ASIAN 96: Concurrency and Parallelism, Programming, Networking, and Security: Second Asian Computing Science Conference*, Lecture Notes in Computer Science, vol 1179, pages 309–320, Springer-Verlag, 1996.
- [2] T.A. Henzinger, B. Horowitz, and R. Majumdar. Rectangular hybrid games. In *CONCUR 99: Concurrency Theory*, Lecture Notes in Computer Science, vol 1664, pages 320–335, Springer-Verlag, 1999.
- [3] T.A. Henzinger, B. Horowitz, R. Majumdar, and H. Wong-Toi. Beyond HyTech: Hybrid Systems Analysis using interval numerical methods. In *HSCC 00: Hybrid Systems: Computation and Control*, Lecture Notes in Computer Science, vol 1790, pages 130–144, Springer-Verlag, 2000. (Preliminary results appeared in *Hybrid Systems and AI: Modeling Analysis and Control of Discrete + Continuous Systems*, *AAAI 99 Spring Symposium Series*, 1999).
- [4] T.A. Henzinger and R. Majumdar. Symbolic model checking for rectangular hybrid systems. In *TACAS 00: Tools and Algorithms for the Construction and Analysis of Systems*, Lecture Notes in Computer Science, vol 1785, pages 142–156, Springer-Verlag, 2000.
- [5] T.A. Henzinger, R. Majumdar, F. Y.-C. Mang, and J.-F. Raskin. Abstract interpretation of game properties. In *SAS 00: Static Analysis Symposium*, Lecture Notes in Computer Science, vol 1824, pages 220–239, Springer-Verlag, 2000.
- [6] R. Alur, L. de Alfaro, R. Grosu, T.A. Henzinger, M. Kang, R. Majumdar, F. Mang, C. Meyer-Kirsch, and B.Y. Wang. jMocha: a model-checking tool that exploits design structure. *Proceedings of the 23rd Annual IEEE/ACM International Conference on Software Engineering (ICSE 01)*, ACM Press, pages 64–72, 2001.
- [7] L. de Alfaro and R. Majumdar. Quantitative solution of concurrent games. In *Proceedings on 33rd Annual ACM Symposium on Theory of Computing (STOC '01)*, ACM Press, pages 675–683, 2001.
- [8] R. Majumdar and J.L. Wong. Watermarking of SAT using combinatorial isolation lemmas. In *Proceedings of the 38th Design Automation Conference (DAC 2001)*, ACM Press, pages 480–485, 2001.

- [9] T. Ball, R. Majumdar, T. Millstein, and S.K. Rajamani. Automatic predicate abstraction of C programs. In *Proceedings of the 2001 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI '01)*, ACM Press, page 203–213, 2001.
- [10] L. de Alfaro, T.A. Henzinger, and R. Majumdar. From verification and control: dynamic programs for omega-regular properties. In *Proceedings of the 16th Annual Symposium on Logic in Computer Science (LICS 01)*, IEEE Computer Society Press, pages 279–290, 2001.
- [11] L. de Alfaro, T.A. Henzinger, and R. Majumdar. Symbolic algorithms for infinite-state games. In *Proceedings of the 12th International Conference on Concurrency Theory (CONCUR 01)*, Lecture Notes in Computer Science 2154, Springer-Verlag, pages 536–550, 2001. Best paper award.
- [12] T.A. Henzinger, R. Jhala, R. Majumdar, and G. Sutre. Lazy abstraction. In *Proceedings of the 29th Annual Symposium on Principles of Programming Languages (POPL 02)*, ACM Press, pages 58–70, 2002.
- [13] T.A. Henzinger, R. Jhala, R. Majumdar, G.C. Necula, G. Sutre, and W. Weimer. Temporal-safety proofs for systems code. In *Proceedings of the Computer-Aided Verification (CAV 02)*, Lecture Notes in Computer Science 2404, Springer-Verlag, pages 526–538, 2002.
- [14] T.A. Henzinger, C. Kirsch, R. Majumdar, and S. Matic. Time safety checking for embedded programs. In *Proceedings of the 2nd Conference on Embedded Software (EMSOFT 02)*, Lecture Notes in Computer Science, Springer-Verlag, pages 76–92, 2002.
- [15] T.A. Henzinger, R. Jhala, R. Majumdar, and G. Sutre. Software verification with Blast (Tool Paper). In *SPIN 03: SPIN Model Checking and Software verification*, Lecture Notes in Computer Science 2648. Springer-Verlag, pages 235–239, 2003.
- [16] T.A. Henzinger, O. Kupferman, and R. Majumdar. On the universal and existential fragments of the μ -calculus. In *TACAS 03: Tools and Algorithms for the Construction and Analysis of Systems*, Lecture Notes in Computer Science 2619. Springer-Verlag, pages 49–64, 2003.
- [17] L. de Alfaro, T.A. Henzinger, and R. Majumdar. Discounting the future in systems theory. In *ICALP 03: International Colloquium on Automata, Languages, and Programming*, Lecture Notes in Computer Science 2719. Springer-Verlag, pages 1022–1037, 2003.
- [18] T.A. Henzinger, R. Jhala, and R. Majumdar. Counterexample guided control. In *ICALP 03: International Colloquium on Automata, Languages, and Programming*, Lecture Notes in Computer Science 2719. Springer-Verlag, pages 886–902, 2003.
- [19] K. Chatterjee, D. Ma, R. Majumdar, T. Zhao, T.A. Henzinger, and J. Palsberg. Stack size analysis for interrupt driven programs. In *SAS 03: Static Analysis Symposium*, Lecture Notes in Computer Science 2694, Springer-Verlag, pages 109–126, 2003.

- [20] L. de Alfaro, M. Faella, T.A. Henzinger, R. Majumdar, and M. Stoelinga. The element of surprise in timed games. In *CONCUR 03: Concurrency Theory*, Lecture Notes in Computer Science 2761. Springer-Verlag, pages 142–156, 2003.
- [21] T.A. Henzinger, R. Jhala, R. Majumdar, and S. Qadeer. Thread modular abstraction refinement. In *CAV 03: Computer-Aided Verification*, Lecture Notes in Computer Science 2725. Springer-Verlag, pages 262–274, 2003.
- [22] T.A. Henzinger, R. Jhala, R. Majumdar, and K.L. McMillan. Abstractions from proofs. In *POPL 04: Principles of Programming Languages*, ACM press. To appear, 2004.
- [23] L. de Alfaro, M. Faella, T.A. Henzinger, R. Majumdar, and M. Stoelinga. Model checking discounted temporal properties. In *TACAS 04: Tools and Algorithms for the Construction and Analysis of Systems*, Lecture Notes in Computer Science. Springer-Verlag, 2004.
- [24] D. Beyer, A.J. Chlipala, T.A. Henzinger, R. Jhala, and R. Majumdar. Generating tests from counterexamples. In *ICSE 04: International Conference on Software Engineering*, ACM press. To appear, 2004.
- [25] T.A. Henzinger, R. Jhala, and R. Majumdar. Race checking by context inference. In *PLDI 04: Programming Languages Design and Implementation*, ACM press. To appear, 2004.
- [26] D. Beyer, T.A. Henzinger, R. Jhala, and R. Majumdar. An Eclipse plug-in for model checking. In *IWPC 04: International Workshop on Program Comprehension*, ACM press. 2004.
- [27] K. Chatterjee, R. Majumdar, and M. Jurdzinski. On Nash equilibria in stochastic games. In *CSL 04: Computer Science Logic*, Lecture Notes in Computer Science 3210, pages 26–40. Springer, 2004.
- [28] R. Jhala and R. Majumdar. Path slicing. In *PLDI 05: Programming Languages Design and Implementation*, pages 38–47. ACM, 2005.
- [29] J. Fischer, R. Jhala, and R. Majumdar. Joining dataflow with predicates. In *FSE 05: Foundations of Software Engineering*, ACM Press, 2005.
- [30] T.A. Henzinger, R. Jhala, and R. Majumdar. Permissive interfaces. In *FSE 05: Foundations of Software Engineering*, ACM Press, 2005.
- [31] A. Chakrabarti, K. Chatterjee, T.A. Henzinger, O. Kupferman, and R. Majumdar. Verifying quantitative properties using bound functions. In *CHARME 2005*, Springer. 2005.
- [32] K. Chatterjee, T.A. Henzinger, R. Jhala, and R. Majumdar. Counterexample-guided planning. In *UAI 2005*.
- [33] L. de Alfaro, M. Faella, R. Majumdar, and V. Raman. Code aware resource management. In *EMSOFT 05: Embedded Software*, ACM, 2005.

- [34] T.A. Henzinger, R. Majumdar, and V. Prabhu. Quantifying Similarities Between Timed Systems. In *FORMATS 2005*, Springer.
- [35] M.J. Emmi and R. Majumdar. Decision problems for model checking real-time software. In *HSCC 06: Hybrid Systems: Computation and Control*, Springer, 2006.
- [36] K. Chatterjee, R. Majumdar, and T.A. Henzinger. Markov decision processes with multiple objectives. In *STACS 06: Symposium on Theoretical Aspects of Computer Science*, Springer, 2006.
- [37] R. Jhala, R. Majumdar, and R. Xu. Structural invariants. In *SAS 06: Static Analysis Symposium*, Springer, 2006.
- [38] K. Chatterjee, L. de Alfaro, M. Faella, T.A. Henzinger, R. Majumdar, and M. Stoelinga. Compositional quantitative reasoning. In *QEST 06*, ACM, 2006.
- [39] R. Jhala and R. Majumdar. Bit level types for high level reasoning. In *FSE 06: Foundations of Software Engineering*, ACM, 2006.
- [40] D. Kapur, R. Majumdar, and C.G. Zarba. Interpolation for data structures. In *FSE 06: Foundations of Software Engineering*, ACM, 2006.
- [41] R. Jhala and R. Majumdar. The analysis of asynchronous programs. In *POPL 07: Principles of Programming Languages*, ACM, 2007.
- [42] M. Emmi, J. Fischer, R. Jhala, and R. Majumdar. Lock allocation. In *POPL 07: Principles of Programming Languages*, ACM, 2007.
- [43] M. Emmi and R. Majumdar. Verifying compensating transactions. In *VMCAI 07: Verification, Model Checking, and Abstract Interpretation*, Lecture Notes in Computer Science, Springer-Verlag, 2007.
- [44] D. Beyer, T.A. Henzinger, R. Majumdar, and A. Rybalchenko. Invariant Generation for Combined Theories. In *VMCAI 07: Verification, Model Checking, and Abstract Interpretation*, Lecture Notes in Computer Science, Springer-Verlag, 2007.
- [45] R. Jhala, R. Majumdar, and R.-G. Xu. State of the union: Type inference using Craig interpolation. In *TACAS 07: Tools and Algorithms for the Construction and Analysis of Systems*, Lecture Notes in Computer Science, Springer-Verlag, 2007.
- [46] L. de Alfaro, R. Majumdar, V. Raman, and M. Stoelinga. Game relations and metrics. In *LICS 07: Logic in Computer Science*, IEEE, 2007.
- [47] J. Fischer, R. Majumdar, and T. Millstein. Tasks: Language support for event-driven programming. In *PEPM 07: Partial Evaluation and Program Manipulation*, ACM, 2007.
- [48] R. Majumdar and K. Sen. Hybrid concolic testing. In *ICSE 07: International Conference on Software Engineering*, ACM and IEEE, 2007.

- [49] D. Beyer, T.A. Henzinger, R. Majumdar, and A. Rybalchenko. Path Invariants. In *PLDI 07: Programming Languages Design and Implementation*, ACM, 2007.
- [50] M. Emmi, R. Majumdar, and K. Sen. Dynamic test input generation for database applications. In *ISSTA 07: International Symposium on Software Testing and Analysis*, ACM, 2007.
- [51] Y. Hu, V. Shih, R. Majumdar, and L. He. Efficient SAT-Based Boolean Matching for Heterogeneous FPGA Technology Mapping. In *ICCAD 07: International Conference on Computer-Aided Design*, ACM, 2007.
- [52] J. Fischer and R. Majumdar. Ensuring consistency in long-running transactions. In *ASE 07: Automated Software Engineering*, ACM, 2007.
- [53] R. Majumdar and R. Xu. Directed test generation using symbolic grammars. In *ASE 07: Automated Software Engineering*, ACM, 2007. (A preliminary version appeared in *ESEC/FSE 07: Foundations of Software Engineering*.)
- [54] A. Gupta, T. Henzinger, R. Majumdar, A. Rybalchenko, R. Xu. Proving non-termination. In *POPL 08: Principles of Programming Languages*, ACM, 2008.
- [55] K. Chatterjee, R. Majumdar, and T. Henzinger. Controller synthesis with budget constraints. In *HSCC 08: Hybrid Systems Computation and Control*, Springer, 2008.
- [56] G. Ercal, R. Izhak-Ratzin, R. Majumdar, and A. Meyerson. Frugal routing in random geometric graphs. In *SAGT 08: Symposium on Algorithmic Game Theory*, Springer, 2008.
- [57] J. Fischer, R. Majumdar, and F. Sorrentino. The Consistency of Web Conversations. In *ASE 08: Automated Software Engineering*, IEEE, 2008.
- [58] R.-G. Xu, P. Godefroid, and R. Majumdar. Testing for Buffer Overflows using Length Abstraction. In *ISSTA 08: International Symposium on Software Testing and Analysis*, ACM, 2008.
- [59] D. Beyer, D. Zufferey, and R. Majumdar. CSIsat: Interpolation for LA+EUF. In *CAV 08: Computer-Aided Verification*, Springer, 2008.
- [60] Y. Hu, V. Shih, L. He, and R. Majumdar. FPGA area reduction by multi-output function based sequential resynthesis. In *DAC 08: Design Automation Conference*, ACM, 2008.
- [61] K. Chatterjee, L. de Alfaro, and R. Majumdar. The complexity of coverage. In *APLAS 08: Asian Symposium on Programming Languages and Systems*, Springer, 2008.
- [62] Y. Hu, Z. Feng, L. He, and R. Majumdar. Robust FPGA resynthesis based on fault tolerant Boolean matching. In *ICCAD 08: International Conference on Computer-Aided Design*, ACM, 2008. **Best paper nomination.**
- [63] J. Fischer and R. Majumdar. A theory of role composition. In *ICWS 08: International Conference on Web Services*, IEEE, 2008.

- [64] K. Chatterjee, L. de Alfaro, R. Majumdar, and V. Raman. Algorithms for game relations. In *FSTTCS 08: Foundations of Software Technology and Theoretical Computer Science*, Springer. To appear, 2008.
- [65] P. Ganty, R. Majumdar, and A. Rybalchenko. Liveness for asynchronous programs. In *POPL 09: Principles of Programming Languages*, ACM. 2009.
- [66] . Lee, Y. Hu, R. Majumdar, and L. He. Simultaneous Test Pattern Compaction, Ordering and X-Filling for Testing Power Reduction. In *ISQED 09: International Symposium on Quality Electronic Design*. IEEE, 2009.
- [67] A. Gupta, R. Majumdar, and A. Rybalchenko. From tests to proofs. In *TACAS 09: Tools and Algorithms for the Construction and Analysis of Systems*. Springer, 2009. **Best paper award.**
- [68] M.Emmi, R. Jhala, E. Kohler, and R. Majumdar. Verifying reference counted objects. In *TACAS 09: Tools and Algorithms for the Construction and Analysis of Systems*. Springer, 2009.
- [69] R. Majumdar and R. Xu. Reducing test inputs using information partitions. In *CAV 09: Computer-Aided Verification*. Springer 2009.
- [70] R. Izhak-Ratzin, N. Liogkas, and R. Majumdar. Team incentives in BitTorrent programs. In *ICCCN 09: International Conference on Computer Communications and Networks*, IEEE 2009.
- [71] P. Ganty and R. Majumdar. Analyzing real-time event-driven programs. In *FORMATS 09: Formal Modeling and Analysis of Timed Systems*. Springer 2009.
- [72] Z. Feng, Y. Hu, L. He, and R. Majumdar. IPR: In-place reconfiguration for FPGA fault tolerance. In *ICCAD 09: International Conference on Computer-Aided Design*. ACM, 2009. **Best paper nomination.**
- [73] R. Majumdar and I. Saha. Symbolic robustness analysis. In *RTSS 09: Real-Time Systems Symposium*. IEEE, 2009.
- [74] J.-Y. Lee, Y. Hu, R. Majumdar, L. He, and M. Li. Fault-tolerant resynthesis with dual output LUTs. In *ASPDAC 10: Asia South Pacific Design Automation Conference*. ACM, 2010.
- [75] Pierre Ganty, Rupak Majumdar, Benjamin Monmege: Bounded Underapproximations. CAV 2010: 600-614
- [76] Manu Jose, Yu Hu, Rupak Majumdar, Lei He: Rewiring for robustness. DAC 2010: 469-474
- [77] Samuel B. Luckenbill, Ju-Yueh Lee, Yu Hu, Rupak Majumdar, Lei He: RALF: Reliability Analysis for Logic Faults - An exact algorithm and its applications. DATE 2010: 783-788

- [78] Adolfo Anta Martinez, Rupak Majumdar, Indranil Saha, and Paulo Tabuada. Automatic verification of control system implementations. EMSOFT 2010: 9-18. ACM, 2010.
- [79] Manu Jose, Yu Hu, and Rupak Majumdar. On power and fault-tolerance optimization in FPGA physical synthesis. ICCAD 2010: 224-229. ACM, 2010.
- [80] Michael Emmi, Rupak Majumdar, and Roman Manevich. Parameterized verification of transactional memories. PLDI 2010: 134-145. ACM, 2010.
- [81] Mark Marron, Rupak Majumdar, Darko Stefanovic, and Deepak Kapur. Shape Analysis with Reference Set Relations. VMCAI 2010: 247-262. Springer, 2010.
- [82] Krishnendu Chatterjee and Rupak Majumdar. Discounting in Games across Time Scales. GANDALF 2010: 22-29. 2010.
- [83] Ranjit Jhala, Rupak Majumdar, Andrey Rybalchenko: HMC: Verifying Functional Programs Using Abstract Interpreters. CAV 2011: 470-485
- [84] Manu Jose, Rupak Majumdar: Bug-Assist: Assisting Fault Localization in ANSI-C Programs. CAV 2011: 504-509
- [85] Majid Zamani, Rupak Majumdar: A Lyapunov approach in incremental stability. CDC-ECE 2011: 302-307
- [86] Rupak Majumdar, Indranil Saha, Majid Zamani: Performance-aware scheduler synthesis for control systems. EMSOFT 2011: 299-308
- [87] Krishnendu Chatterjee, Rupak Majumdar: Minimum Attention Controller Synthesis for Omega-Regular Objectives. FORMATS 2011: 145-159
- [88] Rupak Majumdar, Elaine Render, Paulo Tabuada: Robust discrete synthesis against unspecified disturbances. HSCC 2011: 211-220
- [89] Pritam Roy, Paulo Tabuada, Rupak Majumdar: Pessoa 2.0: a controller synthesis tool for cyber-physical systems. HSCC 2011: 315-316
- [90] Manu Jose, Rupak Majumdar: Cause clue clauses: error localization using maximum satisfiability. PLDI 2011: 437-446
- [91] Krishnendu Chatterjee, Martin Chmelik, Rupak Majumdar: Equivalence of Games with Probabilistic Uncertainty and Partial-Observation Games. ATVA 2012: 385-399
- [92] Rupak Majumdar, Majid Zamani: Approximately Bisimilar Symbolic Models for Digital Control Systems. CAV 2012: 362-377
- [93] Indranil Saha, Rupak Majumdar: Trigger memoization in self-triggered control. EMSOFT 2012: 103-112
- [94] Rupak Majumdar, Indranil Saha, Majid Zamani: Synthesis of minimal-error control software. EMSOFT 2012: 123-132

- [95] Paulo Tabuada, Ayca Balkan, Sina Y. Caliskan, Yasser Shoukry, Rupak Majumdar: Input-output robustness for discrete systems. EMSOFT 2012: 217-226
- [96] Joo Carlos Menezes Carreira, Rodrigo Rodrigues, George Candea, Rupak Majumdar: Scalable testing of file system checkers. EuroSys 2012: 239-252
- [97] Zhenyue Long, Georgel Calin, Rupak Majumdar, Roland Meyer: Language-Theoretic Abstraction Refinement. FASE 2012: 362-376
- [98] Javier Esparza, Pierre Ganty, Rupak Majumdar: A Perfect Model for Bounded Verification. LICS 2012: 285-294
- [99] Rupak Majumdar, Indranil Saha, K. C. Shashidhar, Zilong Wang: CLSE: Closed-Loop Symbolic Execution. NASA Formal Methods 2012: 356-370
- [100] Jeffrey Fischer, Rupak Majumdar, Shahram Esmaeilsabzali: Engage: a deployment management system. PLDI 2012: 263-274
- [101] Milos Gligoric and Rupak Majumdar. Model Checking Database Applications. TACAS 2013: 549-564. Springer, 2013.
- [102] Javier Esparza, Pierre Ganty, and Rupak Majumdar. Parameterized Verification of Asynchronous Shared-Memory Systems. CAV 2013: 124-140.
- [103] Johannes Kloos, Rupak Majumdar, Filip Niksic, and Ruzica Piskac. Incremental, Inductive Coverability. CAV 2013: 158-173.
- [104] Rupak Majumdar and Zilong Wang. Expand, Enlarge, and Check for Branching Vector Addition Systems. CONCUR 2013: 152-166.
- [105] Reiner Hüchting, Rupak Majumdar, and Roland Meyer. A Theory of Name Boundedness. CONCUR 2013: 182-196.
- [106] Johannes Kloos and Rupak Majumdar. Supervisor synthesis for controller upgrades. DATE 2013: 1105-1110.
- [107] Rupak Majumdar, Roland Meyer, and Zilong Wang. Static Provenance Verification for Message Passing Programs. SAS 2013: 366-387.
- [108] Dmitry V. Chistikov and Rupak Majumdar. A Uniformization Theorem for Nested Word to Word Transductions. CIAA 2013: 97-108.
- [109] Rupak Majumdar, Indranil Saha, Koichi Ueda, Hakan Yazarel. Compositional equivalence checking for models and code of control systems. CDC 2013: 1564-1571.
- [110] Majid Zamani, Peyman Mohajerin Esfahani, Rupak Majumdar, Alessandro Abate, John Lygeros. Bisimilar finite abstractions of stochastic control systems. CDC 2013: 3926-3931.
- [111] Eva Darulova, Viktor Kuncak, Rupak Majumdar, Indranil Saha. Synthesis of fixed-point programs. EMSOFT 2013: 22:1-22:10.

- [112] Georgel Calin, Egor Derevenetc, Rupak Majumdar, Roland Meyer. A Theory of Partitioned Global Address Spaces. FSTTCS 2013: 127-139.
- [113] Sai Deep Tetali, Mohsen Lesani, Rupak Majumdar, Todd D. Millstein. MrCrypt: static analysis for secure cloud computations. OOPSLA 2013: 271-286
- [114] Chris Alvin, Sumit Gulwani, Rupak Majumdar, Supratik Mukhopadhyay: Synthesis of Geometry Proof Problems. AAAI 2014: 245-252
- [115] Milos Gligoric, Rupak Majumdar, Rohan Sharma, Lamyaa Eloussi, Darko Marinov. Regression Test Selection for Distributed Software Histories. CAV 2014: 293-309.
- [116] Javier Esparza, Rusln Ledesma-Garza, Rupak Majumdar, Philipp Meyer, Filip Niksic. An SMT-Based Approach to Coverability Analysis. CAV 2014: 603-619
- [117] Reiner Hüchting, Rupak Majumdar, Roland Meyer. Bounds on Mobility. CONCUR 2014: 357-371.
- [118] Rayna Dimitrova, Rupak Majumdar. Deductive control synthesis for alternating-time logics. EMSOFT 2014: 14:1-14:10.
- [119] Shahram Esmailsabzali, Rupak Majumdar, Thomas Wies, Damien Zufferey. Dynamic Package Interfaces. FASE 2014: 261-275.
- [120] Rupak Majumdar, Sai Deep Tetali, Zilong Wang. Kuai: A model checker for software-defined networks. FMCAD 2014: 163-170
- [121] Krishnendu Chatterjee, Rasmus Ibsen-Jensen, Rupak Majumdar. Edit distance for timed automata. HSCC 2014: 303-312.
- [122] Dmitry Chistikov, Rupak Majumdar. Unary Pushdown Automata and Straight-Line Programs. ICALP (2) 2014: 146-157
- [123] Pallavi Maiya, Aditya Kanade, Rupak Majumdar: Race detection for Android applications. PLDI 2014: 34
- [124] Antoine Durand-Gasselín, Javier Esparza, Pierre Ganty, Rupak Majumdar. Model Checking Parameterized Asynchronous Shared-Memory Systems. CAV (1) 2015: 67-84.
- [125] Jyotirmoy V. Deshmukh, Rupak Majumdar, Vinayak S. Prabhu: Quantifying Conformance Using the Skorokhod Metric. CAV (2) 2015: 234-250
- [126] Rupak Majumdar, Zilong Wang: Bbs: A Phase-Bounded Model Checker for Asynchronous Programs. CAV (1) 2015: 496-503
- [127] Sadegh Esmail Zadeh Soudjani, Alessandro Abate, and Rupak Majumdar. Dynamic Bayesian Networks as Formal Abstractions of Structured Stochastic Processes. CONCUR 2015: 169-183
- [128] Javier Esparza, Pierre Ganty, Jrme Leroux, Rupak Majumdar: Verification of Population Protocols. CONCUR 2015: 470-482

- [129] Ivan Gavran, Filip Niksic, Aditya Kanade, Rupak Majumdar, Viktor Vafeiadis. Rely/Guarantee Reasoning for Asynchronous Programs. *CONCUR 2015*: 483-496
- [130] Johannes Kloos, Rupak Majumdar, Viktor Vafeiadis: Asynchronous Liquid Separation Types. *ECOOP 2015*: 396-420
- [131] Michael Emmi, Pierre Ganty, Rupak Majumdar, Fernando Rosa-Velardo: Analysis of Asynchronous Programs with Event-Based Synchronization. *ESOP 2015*: 535-559
- [132] Indranil Saha, Sanjoy Baruah, Rupak Majumdar: Dynamic scheduling for networked control systems. *HSCC 2015*: 98-107
- [133] Rupak Majumdar, Vinayak S. Prabhu: Computing the Skorokhod distance between polygonal traces. *HSCC 2015*: 199-208.
- [134] Dmitry Chistikov, Rayna Dimitrova, Rupak Majumdar: Approximate Counting in SMT and Value Estimation for Probabilistic Programs. *TACAS 2015*: 320-334.

Invited Papers

- [1] T.A. Henzinger and R. Majumdar. A classification of symbolic transition systems. In *STACS 00: Theoretical Aspects of Computer Science*, Lecture Notes in Computer Science, vol 1770, pages 13–34, Springer-Verlag, 2000.
- [2] T.A. Henzinger, R. Jhala, R. Majumdar, and M.A.A. Sanvido. Extreme model checking. In *Proceedings of the International Symposium on Verification (Theory and Practice): Celebrating Zohar Manna's 64-th Birthday*, Lecture Notes in Computer Science 2722, pages 332–358, 2003.
- [3] D. Beyer, A. Chlipala, T.A. Henzinger, R. Jhala, and R. Majumdar. The Blast query language for software verification. In *SAS 04: Static Analysis Symposium*, Lecture Notes in Computer Science. Springer, 2004.
- [4] D. Beyer, T.A. Henzinger, R. Jhala, and R. Majumdar. Checking memory safety with Blast. In *FASE 05: Fundamental Approaches to Software Engineering*, 2005.
- [5] T.A. Henzinger, R. Jhala, and R. Majumdar. Software verification with BLAST. In *SPIN 05: Software Model Checking*, Springer. 2005.
- [6] Rupak Majumdar, Indranil Saha, and Zilong Wang. Systematic testing for control applications. *MEMOCODE 2010*: 1-10. IEEE, 2010.
- [7] Rupak Majumdar: End-to-End Guarantees in Embedded Control Systems - (Abstract). Ershov Memorial Conference 2011: 40
- [8] Jonathan K. Lee, Jens Palsberg, Rupak Majumdar, and Hong Hong. Efficient May Happen in Parallel Analysis for Async-Finish Parallelism. *SAS 2012*: 5-23. Springer, 2012.

- [9] Rupak Majumdar: The Marriage of Exploration and Deduction. VSTTE 2012: 162. Springer, 2012.
- [10] Rupak Majumdar, Roland Meyer, and Zilong Wang. Provenance Verification. RP 2013: 21-22.

Patents

US Patent 7058925: System and method for generating a predicate abstraction of a program.

Professional Activities

- GDV 2005: Games in Design and Verification (Program co-Chair).
- SPIN 2008: Software Model Checking (Program co-Chair).
- HSCC 2009: Hybrid Systems Computation and Control (Program co-Chair).
- TACAS 2010: Tools and Algorithms for the Construction and Analysis of Systems (Program co-Chair).
- RTSS 2010: Cyber-Physical Systems Track, Program Chair.
- DATE 2011: Modeling of Embedded Systems Track, Program Co-Chair.
- RV 2015: Program Co-Chair.
- Verification Mentoring Workshop, 2015: Workshop Co-Chair.
- POPL 2016: Program Chair.
- CAV 2017: Program Chair.

Students and Post-doctoral Associates

Post-doctoral associates: Rayna Dimitrova, Dmitry Chistikov, Anne-Kathrin Schmuck, Vinayak Prabhu.

Former Post-doctoral associates: Pierre Ganty, Roman Manevich, K.C. Shashidhar, Pritam Roy, Elaine Render, Shahram Esmaeilsabzali.

Graduate Students: Zilong Wang, Johannes Kloos, Filip Niksic, Susanne van den Elsen.

Graduated: Manav Mital (MS), Viktor Shih (MS), Jeffrey Fischer (PhD), Ru-Gang Xu (PhD), Michael Emmi (PhD), Rafit-Izhak-Ratzin (PhD), Majid Zamani (PhD), Tushar Agarwal (MS), Indranil Saha (PhD), Majid Zamani (PhD).

References

Available upon request.