

Abhik Roychoudhury

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Brief Biography

Abhik Roychoudhury is an Associate Professor of Computer Science at the National University of Singapore. Abhik received his Ph.D. in Computer Science from the State University of New York at Stony Brook. His research interests are in software and system validation with specific focus on embedded systems. Abhik has published widely in premier conferences and journals in software engineering and embedded systems, with over 70 peer-reviewed publications. His research has led to scalable and usable analysis tools for embedded software which enhance software quality as well as programmer productivity. Two meaningful examples of such endeavor are the Chronos static analysis tool for ensuring time-predictable software execution, and the JSlice dynamic analysis tool for software functionality debugging. Such tools have a substantial user-base spread across many different countries and have usage in teaching / development apart from research. Abhik has been the Principal Investigator of many medium and large scale funded projects in Software Engineering and Embedded Systems, including projects from companies like Microsoft. His research has been recognized by various awards including ACM SIGSOFT Distinguished Paper Award (from SIGSOFT FSE 2009) and IBM Faculty Award (2008).

Research Interests

- *Research Areas:* Software Engineering, Embedded Systems.
- *Research Topics:* Software Testing, Software Debugging and Analysis, Embedded Software Analysis and Optimizations.

Education

- Ph.D. Computer Science (2000), State Univ. of New York (SUNY) at Stony Brook (USA).
 - *Dissertation:* Program Transformations for Verifying Parameterized Systems.
 - *Advisors:* I.V. Ramakrishnan and C.R. Ramakrishnan.
- M.S. Computer Science (1997), State Univ. of New York (SUNY) at Stony Brook (USA), GPA: 3.96/4.
- B.E. Computer Engineering (1995), Jadavpur University (India), GPA: 5.00/5.
 - 1st rank in Engineering Faculty in freshman/sophomore years (1991-1993).
 - 2nd rank in Engineering Faculty in junior/senior years (1993-1995).

Employment

- Since July 2007: Associate Professor (with Tenure), School of Computing, National University of Singapore.

- 2001 - 2007: Assistant Professor (Tenure-track), School of Computing, National University of Singapore.
- 1995 - 2000: Research and Teaching Assistant, Department of Computer Science, State University of New York (SUNY) at Stony Brook.

Visiting Appointments

- 2008: Visiting Researcher, Microsoft Research (5 months - sabbatical leave from NUS).
- 2007: Visiting Faculty, Department of Computer Science and Automation, Indian Institute of Science, Bangalore (2 months).
- 1998: Member of Technical Staff, Bell Laboratories, Lucent Technologies, New Jersey (3 months).
- 1997: Course Instructor, Department of Computer Science, SUNY at Stony Brook (2 months).

Funded Research Projects

- As Principal Investigator (PI)
 - *Scalable Timing Analysis Methods for Embedded Software*, PI, Funded by A*STAR Public Sector Funding (PSF), 2012 - 2015 (3 years), S\$ 590,000.
 - *Analysis and Test Generation for Evolving Software*, PI, Funded by Ministry of Education (MoE), 2011 - 2014 (3 years), S\$ 830,000.
 - *Symbolic Taint Analysis*, PI, Funded by Defense Research and Technology Office (DRTech), 2009-2012 (3 years), S\$ 397,290.
 - *Multi-tenant Software Engineering for Cloud Computing*, PI, Funded by Academic Research Fund 2010-12 (2 years), S\$82,600.
 - *Validation and Comprehension Methods for Large-scale Systems with Complex Interactions*, PI, Funded by Academic Research Fund 2009-12 (3 years), S\$66,268.
 - *Timing Analysis of Behavioral System Models*, PI, Funded by NUS University Research Council (URC), October 2007 - 2010 (3 years), S\$ 250,000.
 - *Tools and techniques for Model based Software Debugging*, PI, Funded by Agency of Science Technology and Research (A*STAR), September 2004 - 2007 (3 years), S\$362,000.
 - *Correctness and Performance Issues in the CLI memory model*, PI, a small grant funded by Microsoft for one year (2005-2006), US\$15,000.
 - *Efficient Design Space Exploration of Embedded Systems*, PI, Funded by InfoComm and InfoTech Initiative (ICITI) at NUS, July 2003 - 2006 (3 years), S\$75,000.
 - *Protocols for System-on-chip Designs*, PI, Funded by Faculty Research Council (internal grant), Oct 2001 -2004 (3 years), S\$38,800.
 - *Formally Verifying Safety Properties of Distributed Systems*, PI, Funded by Faculty Research Council (internal grant), April 2001 -04 (3 years), S\$29,500.
- As Co-Principal Investigator (Co-PI)
 - *EASEL: Engineering Architectures and Software for the Embedded Landscape*, Co-PI, Funded by Agency of Science Technology and Research (A*STAR), March 2006-09, S\$1.4 million.

- *Formal Design Techniques for Reactive Embedded Systems*, Co-PI, Funded by Agency of Science Technology and Research (A*STAR), March 2003 - 2006 (3 years), S\$429,000.
- *Techniques to Support Timing and Power Guarantees for Embedded Code*, Co-PI, Funded by University Research Council (URC) of NUS, July 2003 - 2006 (3 years), S\$231,000.
- *Model-based Approach to Integrated Timing Analysis of Embedded Systems*, Co-PI, Funded by Faculty Research Council (internal grant), March 2007-08 (1 year), S\$ 41,000.
- *Reactive Embedded Systems: High-level Design Methods*, Co-PI, Pilot project funded by Agency of Science Technology and Research (A*STAR), Nov 2001 - 02 (1 year), S\$ 29,000.

Honors and Awards

- ACM SIGSOFT Distinguished Paper Award (from SIGSOFT FSE 2009).
- IBM Faculty Award, 2008.
- Tan Kah Kee Young Inventor's Award, Silver Award in Open Section, for building the Java program debugging and comprehension tool JSlice, 2008.
- Best paper award nomination from
 - IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) 2011.
 - ACM Design Automation Conference (DAC) 2009.
 - ACM Intl. Conf. on Hardware Software Codesign and System Synthesis (CODES-ISSS) 2008.
 - 19th Euromicro Conference on Real-time Systems (ECRTS) 2007.
- Award from ACM SIGPLAN Professional Activities Fund, 1999.
- Top score in the Ph.D. Qualifier Examination, Department of Computer Science, State University of New York at Stony Brook, 1996.
- Award and Medal for 1st rank in Engineering Faculty, Jadavpur University (India) in freshman and sophomore years (1991-1993), and 2nd rank in Engineering Faculty, Jadavpur University (India) in junior and senior years (1993-1995).
- National Scholarship and Award for ranking 8th among all candidates in Higher Secondary Education (equivalent of A levels) in the state of West Bengal, India, 1991.
- Ranked 2nd among all candidates in the West Bengal Joint Entrance Examination for admission to Engineering colleges/institutes in the state of West Bengal, India, 1991.

Teaching Experience

- Written a textbook for senior undergraduate courses, entitled "*Embedded Systems and Software Validation*". The book has been published by Elsevier (formerly Morgan Kaufmann) Systems-on-Silicon series in 2009. It has been adopted in courses at different universities spread over various countries (Czech Republic, New Zealand, South Korea and USA).
- Taught various courses at NUS in both undergraduate and graduate levels.
 - CS 5219/6214 *Automated Software Validation*
Proposed and designed this graduate course in software validation which studies model checking, theorem proving and their combinations.

- CS 4271 *Critical Systems and their Verification*
Designed this undergraduate course on system modeling and verification, focusing on model checking
- CS 4272 *Hardware Software Codesign*
Covers Modeling, Hardware-Software Partitioning, Software Analysis, Compilation and Hardware Platforms. I made substantial changes in the course contents.
- CS 3211 *Parallel and Concurrent Programming*
I re-designed the course with equal emphasis on concurrency concepts, multi-threaded programming in Java, and parallel programming in MPI.
- CS 2104 *Programming Language Concepts*
This is a first course on principles of programming languages that I taught twice — in 2001-02 and 2002-03.
- CS 1102 *Data Structures and Algorithms*
This is a first course in data structures and programming that I taught in 2000-01.
- Taught a graduate course on Software Validation while visiting Indian Institute of Science (IISc) in May - July 2007.
- Actively involved in designing and formulating the *written Ph.D. Qualifier Examination* at NUS School of Computing, 2004-05.
- Contributed article on education/pedagogy based on experience in teaching courses on formal verification.
 - “Introducing Model Checking to Undergraduates” by Abhik Roychoudhury, In Formal Methods Education Workshop 2006 (co-located with Formal Methods Symposium (FM) 2006). The paper is available from
<http://www.comp.nus.edu.sg/~abhik/pdf/fm-ed06.pdf>

Graduate Student Supervision and Mentoring

- *Post-doctoral Fellows*
 - Dr. Jooyong Lee, Ph.D. Aarhus University Denmark (08), Member of my research group 2011-...
 - Dr. Cristal Ngo, Ph.D. Nanyang Technological University Singapore (08). Member of my research group in 2010-11.
 - Dr. Ansuman Banerjee, Ph.D. IIT Kharagpur India (07). Member of my research group in 2010.
 - Dr. Adrian Curic, Ph.D. VERIMAG France (06). Member of my research group in 2007.
 - Dr. Sun Meng, Ph.D. Beijing University China (05). Member of my research group in 2005-06.
- *PhD student Supervision (Current)*
 - Dawei Qi, Ph.D. student (since August 2008), *Testing and Debugging of Evolving Programs*, Recipient of NUS Presidential Graduate Fellowship.
 - Sudipta Chattopadhyay, Ph.D. student (since January 2009), *Timing analysis of embedded software running on multi-cores*, Recipient of NUS Presidential Graduate Fellowship.

- Sandeep Kumar, Ph.D. student (Co-supervised with Siau Cheng Khoo), *Dynamic analysis based Multi-view Specification Mining*.
- Sun Tao, Ph.D. student.
- *Graduated PhD students*
 - Lei Ju, Submitted Ph.D. thesis (2010), *Model-driven timing analysis of embedded software*, Moved to Shandong University (China) as Associate Professor.
 - Ankit Goel, Ph.D., Sole supervision, *Parameterized Validation of MSC-based System Models*, Moved to: INRIA, (and then subsequently to his own business).
 - Vivy Suhendra, Ph.D. (graduated 2009), Co-supervised with Tulika Mitra, *Memory Optimizations for Developing Predictable Embedded Software*, Awarded *Microsoft Research Asia Fellowship* for her work in 2006-07. Moved to: Institute of Infocomm Research (I2R) Singapore.
 - Tao Wang, Ph.D. (graduated Feb 2008), Sole Supervision, *Bytecode level Dynamic Analysis for Software Debugging*, Adjudged **Best PhD thesis** from School of Computing in 2008, Awarded *Microsoft Research Asia Fellowship* in 2004-05, also awarded *Presidential Graduate Fellowship* by NUS. Moved to: Morgan Stanley (currently Manager)
 - Xianfeng Li, Ph.D. (graduated Dec 2005), Co-supervised with Tulika Mitra, *Micro-architectural modeling for Timing Analysis of Embedded Software*, Awarded *Dell Fellowship*, *Dean's Graduate Award* during his PhD study at NUS. Moved to: Peking University (currently Associate Professor).
- *Graduated M.Sc. Students*
 - Bach Khoa Huynh, (Graduated 2010), *Timing analysis of data intensive programs*.
 - Shanshan Liu, (Graduated 2009), Sole supervision, *Model checking of Parameterized Systems*, First employment: DBS, Singapore.
 - Liang Guo, (Graduated 2008), Sole supervision, *Debugging Statechart Models via Model-code Traceability*, First Employment: CreditSuisse, Singapore.
 - Tuan-Anh Tran, M.Sc. (Graduated 2005), Co-supervised with P.S. Thiagarajan, *Protocol Converters from Scenario-based Specifications*, First Employment: Friar Tuck Pte Ltd (Singapore).
 - Qinghua Shen, M.Sc. (Graduated 2004), Co-supervised with Tulika Mitra, *Multi-threaded Java from Multi-processor Perspective*, First Employment: Creative Technology Ltd (Singapore).
 - Hemendra Singh Negi, M.Sc. (Graduated 2004), Co-supervised with Tulika Mitra, *Two Concrete Problems in Worst-Case Execution Time Analysis*, First Employment: Mentor Graphics, New Delhi (India).
 - Lei Xie, M.Sc. (Graduated 2003), Sole supervision, *Performance Impact of Multi-threaded Java Semantics on Multiprocessor Memory Models*.
- *PhD/M.Sc. Thesis Committees:*
 - PhD thesis evaluator of several PhD students from NUS — Andrew Edward Sentosa, Corneliu Popeea, Sun Jun, Hamid Abdul Basit, Chen Chunqing, Edward Sim Joon.
 - Thesis committee member of several M.Sc. students from NUS — Xu Na and Kamrul Hasan Talukder.
 - External Assessor of the following PhD thesis – “A formal framework for a service oriented multi-agent society” by Manas Ranjan Patra (University of Hyderabad, India).

Undergraduate Student Supervision

- S.R. Karri, *Verification of AMBA bus protocol*, graduated 2002. This work led to a publication in Design Automation and Test in Europe Conference (DATE) 2003.
- S.C. Choudhary, *Symbolic simulation of Live Sequence Charts*, Co-supervised with Roland Yap, graduated 2003. This work led to a publication in the Intl. Conf. on Practical Applications of Declarative Languages (PADL) 2004.
- Jia Zhan, *Multi-threaded Java from Multi-processor perspective*, Co-supervised with Tulika Mitra, graduated 2003.
- K.K. Subramanian, *Extending algorithmic searches for Design Space Exploration of Embedded Systems*, graduated 2004.
- Lei Ju, *Tracing methods to help multi-threaded program debugging*, graduated 2005.
- Xue Luo, *A Play-in front-end to a Live Sequence Chart symbolic simulator*, graduated 2005.
- Mustafa Yucefabdali, *Search optimizations for model checking of C# programs*, graduated 2006.
- Chong Tat Chua, *Improved instrumentation methods for software fault localization*, graduated 2006.
- Shek Chian Low, *Verification of Interacting Process Classes using PVS prover*, graduated 2007.
- Kelly Tan, *Verification of Live Sequence Charts using PVS prover*, graduated 2007.
- Wei Chern Choo, *Explanation of counter-examples in SPIN for education purposes*, graduated 2009.
- Samuel Risandy, *Hierarchical Dynamic Slicing using JSlice*, supervising in 2010.

Patent

- “Methods and apparatus for generating a verified algorithm for transforming a program from a first form to a second form”, United States Patent 6,343,372, Awarded: January 29, 2002. Co-Inventors: Amy P. Felty and Douglas J. Howe , Assignee: Lucent Technologies Inc. (USA).
- “An approach for root-causing regression bugs”, Abhik Roychoudhury and Kapil Vaswani, US Patent application pending (filed May 2009).

Software Tools released

- *Jslice, a dynamic slicing tool for debugging Java programs.*
Dynamic slicing is a popular and well-known software analysis technique. It is useful for program debugging as well as comprehension of program functionality/performance. It can also be integrated as a module in many software validation tools (such as software model checkers). Slicing can explain the reasons for unexpected variable values in a program execution, by analyzing control and data dependencies. To the best of our knowledge, prior to our work no dynamic slicing tool was available for Java programs. The Jslice tool resulted from the following research paper.

- Using Compressed Bytecode Traces for Slicing Java Programs, by Tao Wang and Abhik Roychoudhury, Intl. Conf. on Software Engineering (ICSE) 2004.

The JSlice tool can be downloaded from <http://jslice.sourceforge.net/>
Its current user base includes over 150 different research/industrial groups spread over 30 different countries.

- *Chronos, a Worst-case Execution Time (WCET) analysis tool for C programs.*
 Estimating the maximum execution time of a program is a generic problem. To obtain such estimates tightly, one needs to analyze the program flow as well as the the timing effects of the underlying processor micro-architecture. Such execution time estimates are directly useful for scheduling of hard real-time systems as well as in other applications (like guiding program optimizations). Our execution time analysis tool resulted from several research papers, including the core modeling which was reported in the following.

- Modeling Out-of-order Processors for WCET Analysis, by Xianfeng Li, Abhik Roychoudhury and Tulika Mitra, Real-Time Systems Journal 2006, Preliminary version published in IEEE Real-time Systems Symposium (RTSS) 2004.

The tool is available from <http://www.comp.nus.edu.sg/~rpembed/chronos>
Its current user base includes over 85 different research groups in 16 different countries.

Invited Talks/ Tutorials

- “Symbolic Techniques for Software Debugging”, Technical Briefing at *34th International Conference on Software Engineering (ICSE) 2012*, Jointly with Satish Chandra, June 2012, Venue: Zurich, Switzerland.
- “Debugging as a Science, that too, for Evolving Programs”, Keynote given at *3rd International Workshop on Harnessing Theories for Tool Support in Software (TTSS) 2009*, a workshop held along with the *International Colloquium on Theoretical Aspects of Computing (ICTAC) 2009*, August 2009, Venue: Kuala Lumpur, Malaysia.
- “Synthesis of Scenario-based System Models”, Invited Presentation at the Track on Highly Reliable Software at the *International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA)*, November 2006, Venue: Paphos, Cyprus.
- “Interacting Process Classes”, Talk given at the Workshop on Predictable Software Component Assembly, Organized by *University of Manchester*, Manchester (UK), September 2005, and at the Workshop on Formal Methods for Design and Analysis of Software, Organized by *Microsoft Research*, Bangalore (India), October 2005.
- “Scenario based methods for system design” Invited tutorial (jointly with P.S. Thiagarajan) at *International Conference on Application and Theory of Petri Nets and Other Models of Concurrency (ICATPN)*, June 2005, Miami (USA).
- “Automated Generation of Protocol Converters from Scenario-based Specifications”, *Workshop on Predictable Software Component Assembly*, Sponsored by CoLogNet (the European Network for Excellence in Computational Logic), May 2004, Venue: Manchester, UK.
- “Program Transformations for Automated Verification” Invited tutorial (jointly with I.V. Ramakrishnan) at *International Conference on Logic Programming (ICLP)*, August 1 2002, Copenhagen (Denmark).

- “Induction Proofs for Verification of Parameterized Systems”, Post-conference workshop on Infinite State Systems for Intl. Conf. on Foundations of Software Technology and Theoretical Computer Science (FST&TCS) 2001, Chennai (India), December 2001.

Other Presentations

- “Testing and Debugging of Evolving Programs”, Presentation at Stanford Research Institute (USA), July 2010.
- “Timing analysis of Embedded Software”, Presentation at University of Saarland (Germany), June 2010.
- “DARWIN: an approach for Debugging Evolving Programs”, Presentation at Fraunhofer Center for Software Engineering, University of Maryland College Park (USA), December 2009.
- “Timing analysis of Embedded Software”, Presentation at TU Dortmund (Germany), August 2009.
- “Performance Debugging of Complex Embedded Systems”, Tutorial at the *IEEE Intl. Conf on VLSI Design (VLSI)*, Bangalore (India), January 2007 (Jointly with Samarjit Chakraborty).
- “Software Timing Analysis”, Tutorial at the *Intl. Conf. on Formal Engineering Methods (ICFEM)*, November 2005, Manchester (UK).
- “Dynamic Slicing for Debugging Java programs”, Talk given at King’s College London (July 2007).
- “Memory model sensitive bytecode verification”, Visit to *Microsoft Research*, Bangalore(India), January 2007.
- “Interacting Process Classes”, Talk given at *IEEE chapter — IIT Kharagpur* (India) January 2006, and at *United Nations University - International Institute of Software Technology (UNU-IIST)*, Macau (China), June 2006.
- “Worst-case Execution Time Analysis”, Talk given at *University of Florida Gainesville* (June 2005) and *Indian Institute of Science Bangalore* (October 2005).
- “Induction Proofs for Verification of Parameterized Systems”, Talk given at *INRIA Nancy* (France) April 1998, and at *Bell Laboratories* (USA), February 1998.
- “Unfold/fold Transformations of Logic Programs for Verification”, *New England Seminar on Programming Languages and Systems (NEPLS)*, December 7 2000, Venue: Brown University, Rhode Island, USA.

Research Citations as of 2011

- *Total number of citations* \sim 1300 All citation data has been collected from Google Scholar.
- *h-index* = 21. *h-index* is the maximum value of h such that there are h papers co-authored by me with h or more citations.

Book

- “Embedded Systems and Software Validation”, Abhik Roychoudhury, *Morgan Kaufmann (Elsevier)*, 2009.

The book is 272 pages, and the ISBN is 978-0123742308. It was published in 2009, and has since been adopted in several universities (in US, New Zealand, South Korea, Czech Republic) as senior undergraduate or graduate level text.

Full Publication List (Journals, Conferences)

(*Post-Ph.D. publications are grouped into two related areas. Acceptance rates of conference papers are marked wherever this data is known. All papers are full-length papers unless indicated otherwise.*)

- **Software Modeling and Validation**

- [ICSE’12] “Inferring Class-level Specifications for Distributed Systems”, Sandeep Kumar, Siau Cheng Khoo, Abhik Roychoudhury, David Lo, *ACM/IEEE International Conference on Software Engineering (ICSE) 2012*.
- [TOSEM-Journal’12] “DARWIN: An approach for Debugging Evolving Programs”, Dawei Qi, Abhik Roychoudhury, Zhenkai Liang and Kapil Vaswani, *ACM Transactions on Software Engineering and Methodology (TOSEM)*, *To appear*.
- [TOSEM-Journal’12] “Symbolic Message Sequence Charts”, Abhik Roychoudhury, Ankit Goel, Bikram Sengupta *ACM Transactions on Software Engineering and Methodology (TOSEM)*, 21(2), 2012.
- [ESEC-FSE’11] “Path Exploration based on Symbolic Output”, Dawei Qi, Hoang D.T. Nguyen and Abhik Roychoudhury, *ACM SIGSOFT FSE 2011*.
- [PASTE’11] “Locating Failure Inducing Environment Changes”, Dawei Qi, Minh Ngoc Ngo, Tao Sun and Abhik Roychoudhury, *10th Workshop on Program Analysis for Software Tools and Engineering (PASTE) 2011*.
- [PESOS’11] “Engineering Multi-tenant Software-as-a-Service Systems” Bikram Sengupta, Abhik Roychoudhury *International Workshop on Principles of Engineering Service Oriented Systems (PESOS) 2011, co-located with ICSE 2011*.
- [ICSE’11] “Mining Message Sequence Graphs”, Sandeep Kumar, Siau-Cheng Khoo, Abhik Roychoudhury, David Lo, *ACM/IEEE International Conference on Software Engineering (ICSE) 2011, Acceptance rate = 14%*.
- [FSE’10] “Golden Implementation Driven Software Debugging”, Ansuman Banerjee, Abhik Roychoudhury, Johannes A. Harlie, Zhenkai Liang *ACM SIGSOFT Symposium on Foundations of Software Engineering (FSE) 2010, Acceptance rate = 20 %*.
- [ASE’10] “Test Generation to Expose Changes in Evolving Programs”, Dawei Qi, Abhik Roychoudhury, Zhenkai Liang *25th IEEE/ACM International Conference on Automated Software Engineering (ASE) 2010, Acceptance rate = 18%*.
- [ESEC-FSE’09] “DARWIN: An Approach for Debugging Evolving Programs”, Dawei Qi, Abhik Roychoudhury, Zhenkai Liang, Kapil Vaswani *Joint meeting of ESEC and ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE), ESEC-FSE 2009, ACM SIGSOFT Distinguished Paper Award, Acceptance rate = 14%*.
- [FM’09] “Fair Model Checking with Process Counter Abstraction”, Jun Sun, Yang Liu, Abhik Roychoudhury, Shanshan Liu and Jin Song Dong *International Symposium on Formal Methods (FM) 2009*.

- [ICSE '09] “Footprinter: Roundtrip Engineering via Scenario and State based Models”, Ankit Goel, Bikram Sengupta and Abhik Roychoudhury, *ACM International Conference on Software Engineering (ICSE) 2009, Short paper*.
- [TOSEM-Journal '09] “Interacting Process Classes”, Ankit Goel, Abhik Roychoudhury and P.S. Thiagarajan, *ACM Transactions on Software Engineering and Methodology (TOSEM)*, 18(4), 2009.
- [PASTE'08] “Java Memory Model aware Software Validation”, Arnab De, Abhik Roychoudhury and Deepak D'Souza, *Program Analysis for Software Tools and Engineering (PASTE) 2008*.
- [ISoLA'08] “Debugging Statecharts via Model-Code Traceability”, Guo Liang and Abhik Roychoudhury, *IEEE International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA)*, 2008.
- [TOPLAS-Journal'08] “Dynamic Slicing on Java bytecode traces”, Tao Wang and Abhik Roychoudhury, *ACM Transactions on Programming Languages and Systems (TOPLAS)*, 30(2), 2008.
- [FMSD-Journal'07] “Memory Model Sensitive Bytecode Verification”, Thuan Quang Huynh and Abhik Roychoudhury, *Formal Methods in System Design Journal*, 31(3), 2007.
- [ISSTA'07] “Hierarchical Dynamic Slicing”, Tao Wang and Abhik Roychoudhury, *ACM International Symposium on Software Testing and Analysis (ISSTA) 2007*. Acceptance rate = $22/101 = 21\%$.
- [ESEC-FSE'07] “Symbolic Message Sequence Charts”, Abhik Roychoudhury, Ankit Goel and Bikram Sengupta, *15th ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE), Jointly with ESEC, 2007*. Acceptance rate = $43/251 = 17\%$
- [ICSE'06] “Interacting Process Classes”, Ankit Goel, Sun Meng, Abhik Roychoudhury and P.S. Thiagarajan, *ACM/IEEE International Conference on Software Engineering (ICSE) 2006*. Acceptance rate $36/395 = 9\%$
- [ISoLA'06] “Synthesis and Traceability of Scenario-based Executable Models”, Ankit Goel and Abhik Roychoudhury, *International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA)*, 2006, IEEE Press.
- [FM'06] “A Memory Model Sensitive Checker for C#”, Thuan Quang Huynh and Abhik Roychoudhury, *International Symposium on Formal Methods (FM) 2006*. Acceptance rate $36/145 = 24.8\%$
- [CC'06] “Accurately Choosing Execution Runs for Software Fault Localization”, Liang Guo, Abhik Roychoudhury and Tao Wang, *Compiler Construction (CC) 2006*. Acceptance rate $17/72 = 23.6\%$
- [ASE'05] “Automated Path Generation for Software Fault Localization”, Tao Wang and Abhik Roychoudhury, *ACM/IEEE International Conference on Automated Software Engineering (ASE)*, 2005, Short Paper.
- [ICSE'04] “Using Compressed Bytecode Traces for Slicing Java Programs”, Tao Wang and Abhik Roychoudhury, *ACM/IEEE International Conference on Software Engineering (ICSE) 2004*. Acceptance rate $58/436 = 13\%$
- [PACT'04] “Impact of Java Memory Model on Out-of-Order Multiprocessors”, Tulika Mitra, Abhik Roychoudhury and Qinghua Shen, *IEEE/ACM International Conference on Parallel Architecture and Compilation Techniques (PACT) 2004*.

- [PADL’04] “Symbolic Execution of Behavioral Requirements”, Tao Wang, Abhik Roychoudhury, Roland H.C. Yap and S.C. Choudhary, *International Symposium on Practical Applications of Declarative Languages (PADL) 2004*, Springer Verlag, LNCS 3057.
- [ACSD’03] “Communicating Transaction Processes”, Abhik Roychoudhury and P. S. Thiagarajan, *IEEE International Conference on Applications of Concurrency in System Design (ACSD) 2003*.
- [PPoPP’03] “Compactly Representing Parallel Program Executions”, Ankit Goel, Abhik Roychoudhury and Tulika Mitra, *ACM Symposium on Principles and Practice of Parallel Programming (PPoPP) 2003*.
- [ASE’03] “Depiction and Layout of Multi-threaded Program Executions”, Abhik Roychoudhury, *IEEE International Conference on Automated Software Engineering (ASE) 2003, Short paper*.
- [UNU’02] “An Executable Specification Language based on Message Sequence Charts”, Abhik Roychoudhury and P.S. Thiagarajan, *10th Anniversary Colloquium of UNU/IIST*, Springer Verlag, LNCS 2757, 2002.
- [ICFEM’02] “Formal Reasoning about Hardware and Software Memory Models”, Abhik Roychoudhury, *Intl. Conf. on Formal Engineering Methods (ICFEM) 2002*, Springer Verlag, LNCS 2495.
- [ICSE’02] “Specifying Multithreaded Java Semantics for Program Verification”, Abhik Roychoudhury and Tulika Mitra, *ACM/IEEE International Conference on Software Engineering (ICSE) 2002*. Acceptance rate $45/303 = 15\%$

- **Design Tools for Embedded Systems (mostly Timing Analysis)**

- [RTAS’12] “A Unified WCET Analysis Framework for Multi-core Platforms”, Sudipta Chattopadhyay, Chong Lee Kee, Abhik Roychoudhury, Timon Kelter, Peter Marwedel and Heiko Falk *18th IEEE Real-time and Embedded Technology and Applications Symposium (RTAS) 2012*.
- [RTSS’11] “Scalable and Precise Refinement of Cache Timing Analysis via Model Checking”, Sudipta Chattopadhyay, and Abhik Roychoudhury, *IEEE Real-time Systems Symposium (RTSS) 2011*.
- [RTSS’11] “Timing Analysis of a Protected Operating System Kernel”, Bernard Blackham, Yao Shi, Sudipta Chattopadhyay, Abhik Roychoudhury and Gernot Heiser, *IEEE Real-time Systems Symposium (RTSS) 2011*.
- [RTAS’11] “Scope aware Data Cache Analysis for WCET Estimation”, Bach Khoa Huynh, Lei Ju and Abhik Roychoudhury, *IEEE Real-time and Embedded Technology and Applications Symposium (RTAS) 2011*.
- [LCTES’11] “Static Bus Schedule aware Scratchpad Allocation in Multiprocessors”, Sudipta Chattopadhyay and Abhik Roychoudhury *ACM SIGPLAN/SIGBED Conference on Languages, Compilers and Tools for Embedded Systems (LCTES) 2011*.
- [DAC’10] “Timing Analysis of Esterel Programs on General-purpose Multiprocessors”, Lei Ju, Bach Khoa Huynh, Abhik Roychoudhury and Samarjit Chakraborty, *ACM Design Automation Conference (DAC), 2010*.
- [TOPLAS-Journal’10] “Scratchpad Allocation for Concurrent Embedded Software”, Vivy Suhendra, Abhik Roychoudhury and Tulika Mitra, *ACM Transactions on Programming Languages and Systems (TOPLAS), 32(4), 2010*.

- [DAES-journal’10] “Cache-aware Optimization of BAN Applications”, Yun Liang, Lei Ju, Samarjit Chakraborty, Tulika Mitra and Abhik Roychoudhury *Design Automation for Embedded Systems, Springer, Special issue for selected papers from CODES-ISSS 2008, To appear.*
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- [ASE-Journal’04] “Inductively Verifying Invariant Properties of Parameterized Systems”, Abhik Roychoudhury and I.V. Ramakrishnan, *Automated Software Engineering Journal, Kluwer Academic Publishers, 11(2), 2004*.
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- [FST&TCS’95] “Efficient algorithms for vertex arboricity of planar graphs”, Abhik Roychoudhury and Susmita Sur Kolay, *Intl. Conf. on Foundations of Software Technology and Theoretical Computer Science (FST & TCS) 1995, Springer Verlag, LNCS 1026*.

Service to the University and Local Community

- Assistant Dean (Graduate Studies), 2011 - 2013.
- Chair of the *Publications Committee*, CS Department, NUS, since 2010. Co-ordinated an elaborate year-long exercise to develop research evaluation metrics which balance the importance given to research activity vis-a-vis long-term research impact.
- Representative of Associate Professors in the NUS School of Computing Executive Committee 2010.
- Member of *Graduate Studies Committee*, NUS School of Computing since 2003. Duties include:
 - Co-ordinator of PhD Qualifier Examination (2005-08).
 - Evaluation of PhD applications from Indian subcontinent (since 2003).

- Recruitment trips to Indian Universities, including IIT Bombay (2002) and IIT Guwahati, Jadavpur University, Bengal Engineering & Science University (2005).
- Recruitment trip to Ho Chi Minh City, Vietnam in 2007.
- Member of *Outreach committee*, NUS School of Computing since 2009. Duties include:
 - Organization of workshop for Junior College Mathematics teachers (July 2009).
 - Outreach trip to Vietnam High Schools (September 2010).
 - Facilitator in NUS Computing Camp 2010 (Dec 2010), jointly organized by NUS School of Computing and NUS Extension for high school students from India/Indonesia.
 - Science Mentorship Programme (SMP) for High School Students (2010).
 - Attracting IOI participants and medalists into NUS undergraduate programme (2010).
- Member of Selection Panel for Computing Alumni Assistance Award (CAAA) and Computing Student Development Fund (CSD), 2009.
- Member of Departmental Evaluation Committee (DEC) of certain academic staff for promotion (on ad-hoc basis - 2009).
- Teaching Peer-review evaluator of certain academic staff (on ad-hoc basis - 2005, 2007, 2009).
- *Assistant Professor Representative* in Executive Committee of School of Computing (2002-03).
- Research Project Evaluator for *Singapore Israel Industrial Development Foundation (SIIRD)*, Feb 2009.
- Co-organizer of Breakout Session on Computer Systems at the launch of *Advanced Digital Sciences Center (ADSC)* by University of Illinois and A*STAR at Singapore on Feb 2009.
- Member of Scientific Committee for *National Informatics Olympiad (NOI)*, Singapore (2002-2004). NOI is a creative problem solving and programming competition for High School / JC Students. Selected candidates from NOI represent Singapore in the International Olympiad in Informatics⁷ (IOI).

Service to the International Community

- International Member of ArtistDesign, the European Network of Excellence for Design of Embedded Systems (member from January 1, 2009).
- Program Chair of 9th International Colloquium on Theoretical Aspects of Computing (ICTAC) 2012.
- Chair of Design and Verification Track in IEEE Real time Systems Symposium (RTSS) 2012.
- Recent Program Committee Memberships include:
 - ACM SIGSOFT Foundations of Software Engineering (FSE) 2012.
 - International Conference on Languages, Compilers, Tools and Theory for Embedded Systems (LCTES) 2012.
 - Design Automation and Test in Europe (DATE) 2012.
 - IEEE Real-time Systems Symposium (RTSS) 2010, 2011.
 - International Conference on the Principles and Practice of Programming in Java (PPPJ) 2010, 2011.

- International Symposium on Automated Technology for Verification and Analysis (ATVA) 2009, 2011.
- International Symposium On Leveraging Applications of Formal Methods, Verification and Validation (ISoLA) 2010 - Track chair.
- International Conference on Software Engineering (ICSE) 2009 (Tools Track).
- Co-organized International Workshop on Software Verification and Validation (SVV) 2003—06, a new workshop on software validation.
- Guest Editor of two special issues of Electronic Notes in Theoretical Computer Science (ENTCS), where proceedings of SVV 2003, 05 were published by Elsevier.

Personal Data

- Married, One son.