Abhik Roychoudhury
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Biography

Abhik Roychoudhury is an Associate Professor of Computer Science at National University of Singapore, where he has been employed since 2001. Abhik received his Ph.D. in Computer Science from the State University of New York at Stony Brook in 2000. His research interests are in software testing, program analysis, and trustworthy software, with specific focus on software for real-time embedded systems.

Abhik has published widely in premier conferences and journals in software engineering and embedded systems. He has authored a book on "Embedded Systems and Software Validation" published by Elsevier (Morgan Kaufmann) Systems-on-Silicon series in 2009, which has been adopted for teaching at different universities. Abhik's research has led to scalable and usable analysis tools which enhance software quality as well as programmer productivity. Meaningful examples of such endeavor include the Chronos static analysis tool for ensuring time-predictable software execution, and the JSlice dynamic analysis tool for software debugging.

Lately, his research has focused on the use of dependency analysis and symbolic reasoning for software debugging, as well as the use of formal analysis for software performance testing. His recent work on debugging using logical formula to represent program executions (DARWIN - FSE09) was the first in the domain, and has subsequently led to a steady stream of works by other researchers. His recent work on providing timing guarantees for multi-core platforms (RTSS 2009 and later works) have received attention in the real-time systems community, and his group has built the very first timing analyzer to predict timing of behavior of software running on multi-cores.

Abhik's research has been recognized by various awards and honors including ACM Distinguished Speaker (2013-16), ACM SIGSOFT Distinguished Paper Award (from SIGSOFT FSE 2009) and IBM Faculty Award (2008). His research has been funded by various agencies including Ministry of Education, A*STAR and Defense Research and Technology Office DRTech. He has served in program committees and organizing committees of at least fifty conferences and workshops.

Research Interests

- Software Testing and Analysis.
- Design and Verification of Real-time Embedded Systems.

Education

- Ph.D. Computer Science (2000), State Univ. of New York (SUNY) at Stony Brook (USA).
  Dissertation: Program Transformations for Verifying Parameterized Systems.
- M.S. Computer Science (1997), State Univ. of New York (SUNY) at Stony Brook (USA)
  Grade Point Average: 3.96/4.
- B.E. Computer Engineering (1995), Jadavpur University (India),
  Grade Point Average: 5.00/5.

Employment

- Since July 2007: Associate Professor (with Tenure), School of Computing, National University of Singapore. *Awarded tenure from July 2007.*
- 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.
- 1997: Course Instructor, Department of Computer Science, SUNY at Stony Brook.

Externally Funded Research Projects

- As Principal Investigator (PI)

  Currently, I have $ 2.1 million as PI in research funding, with no co-PIs involved.

  - *Energy aware programming*, PI, Funded by Ministry of Education (MoE), 2014-17 (3 years), $373, 089.
  - *CODETEST: Comprehension Detection and Testing via Symbolic Execution*, PI, Funded by DSO Labs, 2013 - 15 (2 years), $ 390,000.
  - *Scalable Timing Analysis Methods for Embedded Software*, PI, Funded by A*STAR Public Sector Funding (PSF), 2012 - 2015 (3 years), $ 590,000.
  - *Analysis and Test Generation for Evolving Software*, PI, Funded by Ministry of Education (MoE), 2011 - 2014 (3 years), $ 831,000.
  - *Symbolic Taint Analysis*, PI, Funded by Defense Research and Technology Office (DRTech) under Defence Innovative Research Program (DIRP), 2009-2012 (3 years), $ 397,290.
  - *Tools and techniques for Model based Software Debugging*, PI, Funded by Agency of Science Technology and Research (A*STAR), September 2004 - 2007 (3 years), $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.

- 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, $1.35 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), $429,000.

– *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), $ 29,000.

Major Honors and Awards

- *ACM Distinguished Speaker*, since 2013.
- 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.
- 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 regions including USA, China, Europe, New Zealand, South Korea and India. The book has been highlighted in EE Times as *Editor's Top Picks* in 2012. A Chinese translation of the book has been done at the behest of Tsinghua University Press, and the Chinese version has subsequently been adopted for teaching at various Chinese universities.
- Two of my PhD students have received the *Best PhD Thesis* award from NUS School of Computing
  - Dr. Dawei Qi, Best PhD Thesis 2013, Semantic Analyses to detect and localize software regression errors
  - Dr. Tao Wang, Best PhD Thesis 2008, Post-mortem Dynamic Analysis for Software Debugging
- Two of my PhD students have received the Microsoft Research Asia Fellowship so far. They are
  - Vivy Suhendra
  - Tao Wang
- Taught following courses at NUS in both undergraduate and graduate levels.

- CS 6880 *Advanced Topics in Software Engineering*
  Proposed and designed this graduate advanced course with comprehensive coverage of requirements, modeling and implementation of software. The course involves paper presentation, a project on one of the cutting edge topics on Software Engineering (SaaS, Out-sourcing etc) and an examination.
- 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.

- 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 (current)*
  - Dr. Jooyong Lee (Yi), Ph.D. Aarhus University, Denmark, Member of my research group 2011- now.
  - Dr. Clement Ballabriga, Ph.D. University of Toulouse, France, Member of my research group 2012- now.
- *Post-doctoral Fellows (past)*
  - Dr. Bruno C.d.S. Oliveira, Ph.D Oxford University, UK, Member of my research group 2012 - 2013. Joined Hong Kong University (HKU) as Assistant Professor from September 2013.
  - 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, joined Indian Statistical Institute as Assistant Professor

- Dr. Adrian Curic, Ph.D. VERIMAG France (06). Member of my group in 2007.
- Dr. Sun Meng, Ph.D. Beijing University China (05). Member of my research group in 2005-06. Joined Peking University, currently Associate Professor.

- *PhD student Supervision (Current)*
  - Marcel Böhme, Ph.D. student, *Testing of Evolving programs*, Graduation expected in 2014.
  - Abhijeet Banerjee, Ph.D. student, *Static Analysis driven Performance and Energy Testing.*
  - P. V.Thuan , Ph.D. student, *Testing and analysis of Device Drivers.*
  - Shin Hwei Tan, Ph.D. student, *Programming Environments to enable Software Repair.*
  - Sergey Mechtaev, Ph.D. student, *Scalable Symbolic Execution methods for Software Validation.*

- *Graduated PhD students*
  - Dawei Qi, (2013), *Debugging of Evolving Programs*, Recipient of NUS Presidential Graduate Fellowship, **Best PhD thesis** award 2013, moved to Worldquant Singapore.
  - Sudipta Chattopadhyay, (2013), *Timing analysis of embedded software running on multicores*, Recipient of NUS Presidential Graduate Fellowship, moved to Linkoping University, Sweden.
  - Sandeep Kumar, (2012) (Co-supervised with Siau Cheng Khoo), *Dynamic analysis based Multi-view Specification Mining*, moved to AdNovum Singapore.
  - Lei Ju, Ph.D.(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 as Researcher.
  - 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.
  - 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*, moved to industry first, and currently pursuing PhD in NTU Singapore.
  - 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, Kathy Nguyen Dang.
  - Thesis committee member of several M.Sc. students from NUS — Suraj Pathak, 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*, 2009.

- Samuel Risandy, *Hierarchical Dynamic Slicing using JSlice*, graduated 2011.
- S. Subhasree, *Interplay of Program debugging and repair*, 2012-13
- Lei Dong, *Using regression debugging tools for teaching programming*, 2012-13.

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 number 20100299654, application pending.

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 300 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 150 research groups in at least 20 different countries. It has also been used for teaching at universities e.g. University of British Columbia.

Invited Talks/ Tutorials

- "Symbolic techniques for software debugging and repair", Tutorial at ACM SIGSOFT Symposium on Foundations of Software Engineering (FSE) 2013, St Petersburg, Russia, jointly with Satish Chandra.
- "How Symbolic Reasoning can help Program Debugging and Repair", ISSTA workshop on Future of Debugging, Lugano, Switzerland, July 2013.
- "SEMFIX: Automated repair via Semantic Analysis", at Dagstuhl Seminar on Fault Prediction, Localization and Repair - Dagstuhl, Germany, February 2013.
- "Formal techniques for debugging software regressions", Invited talk at International Seminar on Program Verification, Automated Debugging and Symbolic Computation (PAS) 2012, Beijing, China.
- "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 Colloqium 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

- "Debugging of Software Regressions", Presentation at Indian Institute of Science (IISc), September 2012.

- "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 Comprehension of 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.

Summary of Citation Data

- *Total number of citations* $\sim$ 1939 All citation data has been collected from Google Scholar on September 20, 2013.
- h-index = 26. h-index is the maximum value of h such that there are h papers co-authored by me with h or more citations.

Summary of Post-PhD Publication Data

The full publication list from NUS Staff research publication system appears in the research section of this dossier, and hence is not repeated here. University/school also maintains a ranking of journals and conferences into tiers, and the data in the following contains a summary of my publications with respect to this ranking. In total, I have published *46 papers in tier-1 conferences and journals*, after my PhD. All of these papers were co-authored during my employment at NUS, first as Assistant Professor, and then as Associate Professor.

Break-up into areas My two main areas of research are Software Engineering and Real-time Systems. In both of these areas I have published regularly in the top venues. As an evidence of this, I can mention

- at least 20 papers co-authored *after my PhD* in premier (tier 1) conferences and journals in Real-time/Embedded Systems, and
- at least another 26 papers co-authored *after my PhD* in premier (tier 1) conferences and journals in Software Engineering/Programming Languages.

Conference vs. Journal As is well known, tier-1 conferences in Computer Science are extremely prestigious, competitive and peer-reviewed. I have co-authored 31 publications in tier-1 conferences in my areas of research, after my PhD. Over and above the conference publications, I have co-authored 15 journal papers in premier (tier-1) journals, after my PhD.

Service to the University

- Vice Dean (Postgraduate Studies) at NUS School of Computing, 2013 - 2016.
  Enhanced transparency in PhD admissions process, Placed greater focus on placement of PhD students by organizing events to help them make aware of job search tips.
- Assistant Dean (Postgraduate Studies) at NUS School of Computing, 2011 - 2013.
  Started an annual workshop series for greater engagement with students and professors from Indian universities in graduate eduction and research.
- Chair of the *Publications Committee*, CS Department, NUS, 2010 - 2013.
  I headed and 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.
- Area representative of Security research area in Computer Science Department Executive Committee (CS ExCo) since 2013.
- Representative of Associate Professors in the NUS School of Computing Executive Committee 2010.
- Member of *Graduate Studies Committee*, NUS School of Computing since 2003.
  Conducted many outreach trips to Indian universities since 2003, and to universities in Vietnam (2007).

  Duties include:

  - Co-ordinator of PhD Qualifier Examination (2005-08).
  - Evaluation of PhD applications from Indian subcontinent (since 2003).
  - Recruitment trips to Indian Universities *many times* since 2002.
  - Recruitment trip to Ho Chi Minh City, Vietnam in 2007.
- Member of *Outreach committee*, NUS School of Computing, 2009-11.
  Conducted outreach to high schools in Vietnam (2010). 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), 2009-12.
- 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).
- *Assistant Professor Representative* in Executive Committee of School of Computing (2002-03).

Service to the International Community (Recent ones only)

- Co-Chair, New Ideas and Emerging Results (NIER), International Conference on Software Engineering (ICSE) 2015.
- Doctoral Symposium co-chair, ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE) 2014. This is a role reserved for senior and accomplished researchers in the area to mentor PhD students into becoming mature researchers.
- Mentoring co-chair, International Conference on Software Engineering (ICSE) 2014. This role by convention is assigned only to senior prominent researchers who can mentor newcomers into the software engineering research community.
- Invited International Member of ArtistDesign, the European Network of Excellence in Embedded Systems, 2009-12.
- Chair of Design and Verification Track in IEEE Real time Systems Symposium (RTSS) 2012.
- Program Chair of 9th International Colloquium on Theoretical Aspects of Computing (ICTAC) 2012, Proceedings available as Springer LNCS 7521.
- Co-chair of "Workshop on Future of Software Debugging", organized under Mysore Park Workshop Series, Infosys, Feb - March 2012.
- Guest Editor of Software Tools for Technology Transfer (STTT) journal, 14(6), Special issue on model transformations and validation.
- Recent Program Committee Memberships include:
  - RTSS - IEEE Real-time Systems Symposium - 2010, 2011, 2013.
  - RTAS - IEEE Real-time Applications Symposium - 2014
  - DATE - Design Automation and Test in Europe - 2012, 2014.
  - FSE - ACM SIGSOFT Foundations of Software Engineering - 2012
  - ISSTA - International Symposium on Software Testing and Analysis - 2013
  - ASE - Automated Software Engineering - 2013.
  - ATVA - Automated Technology for Verification and Analysis - 2012, 2013.

- LCTES - ACM SIGPLAN Symposium on Languages Compilers and Tools for Embedded Systems - 2012.
- ICST - International Conference on Software Testing - 2013, 2014.
- ICSE - International Conference on Software Engineering - 2014(NIER), 2009(Tools).
- Panelist in ISSTA 2013 Doctoral Symposium.

Service to Local Community

- Invited speaker at Cognizant Quality Engineering and Assurance Summit, organized by Cognizant Singapore, March 6 2013.
- 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 Informatics" (IOI).