Abhik ROYCHOUDHURY

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Professor
Department of Computer Science
School of Computing
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Research Interests

- Software Testing and Analysis, Software Security, Trustworthy Systems.

Education

- Ph.D. in Computer Science, State University of New York at Stony Brook, 2000.

Employment National University of Singapore, School of Computing, since 2001.

- Professor, Computer Science Department (2014 - now), Provost's Chair Prof (2020 – now).
- Vice Dean of Graduate Studies, NUS School of Computing (2013-16).
- Associate Professor, Computer Science Department (2007-2014).
- Assistant Professor, Computer Science Department (2001-2007).

Current Projects and Initiatives

- Automated Program Repair, Lead PI, 2022-27, Ministry of Education Tier 3 grant, SGD ~7.5M.
- Descartes: Intelligent Modeling for Decision-Making in Critical Urban Systems, 2021-26. CREATE program with CNRS, Co-director, funded by NRF, SGD 25M.
- Software Recovery using Semantic Program Repair, Lead PI, DSO Labs, 2020-22, SGD 1.8 M.
- National Satellite of Excellence on Trustworthy Software Systems, Lead PI, 2019-23, SGD 12M.
- Trustworthy Systems from Un-trusted Component Amalgamations, Lead PI, funded by National Research Foundation Singapore, 2015 – 2020, SGD 6.1M.
- Self-Healing Software, Funded by Office of Naval Research, USA, PI, 2018-20, USD 120K.
- Singapore Cyber-security Consortium, Lead PI, 2016-22, SGD 4.8M, ~20 member companies.

Selected Publications

- SemFix: Program Repair via Semantic Analysis, by HDT Nguyen, D Qi, A Roychoudhury, S Chandra, ICSE 2013.
- Angelix: Scalable Multi-line Program Patch Synthesis via Symbolic Analysis, by S Mechtaev, J Yi and A Roychoudhury, ICSE 2016.
- Coverage-based Greybox Fuzzing as Markov Chain, by M Böhme, VT Pham, A Roychoudhury, CCS 2016.
- Fuzzing: Challenges and Reflections, M Böhme, C Cadar, A Roychoudhury, IEEE Software 21.
- Automated Program Repair, *Review article* by C Le Goues, M Pradel and A Roychoudhury, Communications of the ACM, December 2019.

Significant PhD Student Placement

- Sergey Mechtaev, PhD NUS moved to University College London, UK as Lecturer in 2019, winner of ACM SIGSOFT Outstanding Doctoral Dissertation Award.
- Marcel Böhme, PhD NUS, Faculty, Max-Planck Institute for Security and Privacy, Germany.
- Van Thuan Pham, PhD NUS, Lecturer (Asst Prof), University of Melbourne, Australia.
- Xianfeng Li, PhD NUS, Associate Professor, Peking University, China.

Awards, Honors, Lectures

- IEEE New Directions Award 2022 (awarded Jointly with Cristian Cadar).
- Distinguished paper award FSE09, Distinguished reviewer award ASE 2018.
- ACM Distinguished Member 2020, ACM Distinguished Speaker 2013-19.
- IBM Faculty Award 2009, Tan Kah Kee Young Inventor's Award from Singapore 2008
- Distinguished lectures at Max Planck Institute of Software Systems (July 2019), Peking University (Dec 2017), and University of Luxembourg (Jan 2017).
- Conference Keynote at 25th Australasian Software Engineering Conference (ASWEC) 2018, 4th IEEE/ACM Intl. Conference on Mobile Software Engineering and Systems (MobileSoft) 2017, 21st Intl. Symposium on Real-time Computing (ISORC) 2018, KLEE Workshop on Symbolic Execution 2018, Imperial College London.

Translational Impact

- AFLFast and AFLGo as extended grey-box fuzzing tools, built on top of AFL, for detecting program vulnerabilities. AFLFast has been integrated to the regular AFL distribution after significant discussion within the AFL user group. AFL is a popular security testing tool.
- Angelix tool for automated repair of C programs using symbolic execution, has been used for intelligent tutoring systems to teach programming to large cross-sections of students in India, in collaboration with Indian Institute of Technology (IIT) Kanpur.
- Corebench, a benchmark suite of realistic regression errors has been widely used by the software engineering community for studying real-life complex regression errors.

Recent Professional Service

- Chair of Foundational Research Capability in Security and Privacy study from NRF 2021-22.
- Program Chair, International Conference on Software Engineering (ICSE) 2024.
- General Chair ACM SIGSOFT Foundations of Software Engineering (FSE) 2022.
- Program Chair Intl Symposium on Software Testing and Analysis (ISSTA) 2016.
- Co-chair Dagstuhl Seminar on Program Repair 2017.
- Co-chair, Shonan Meeting on Fuzzing and Symbolic Execution, 2019.
- Associate Editor, IEEE Transactions on Software Engineering, 2014-18.
- Associate Editor, IEEE Transactions on Dependable and Secure Computing, current.
- Associate Editor, ACM Transactions on Software Engineering and Methodology, current.
- Co-chair, Communications of ACM Special Section on East Asia and Oceania, April 2020.

Teaching Introduced several courses at NUS, authored a textbook on software validation.

- Foundations of Software Engineering: Teaching of foundations and project on intelligent tutoring system with the goal of deploying for teaching programming.
- Software Testing: Compare test-driven development with requirements driven development via hands-on projects
- Software Security: Introduce fuzzing, hardening and related topics.
- Art of Computer Science Research: Course to introduce PhD students to planning of PhD studies, how to choose a topic, how to evaluate contributions of papers
- Automated Software Validation: Testing, Verification, Requirements check, Self-Healing.
- Authored a textbook "Embedded Systems and Software Validation" under Elsevier in 2009. Translated by Tsinghua University Press in 2011-12.

Other Data: Singaporean National, Married, One son.