

Rohan Padhye

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Research Interests

Areas Software Engineering, Programming Languages, Systems, Security
Topics Dynamic Program Analysis, Automatic Test Generation, Fuzz Testing

Education

- 2020 **Ph.D.**, *Computer Science*, University of California, Berkeley.
(expected) Thesis Advisor: Koushik Sen.
- 2013 **M.Tech.**, *Computer Science & Engineering*, Indian Institute of Technology (IIT) Bombay.
- 2011 **B.E.**, *Computer Engineering*, University of Mumbai—Thadomal Shahani Engineering College (TSEC).

Awards and Achievements

- 2019 **ACM SIGOPS—SOSP 2019 Best Paper Award** [SOSP'19]
- 2019 **ACM SIGSOFT Tool Demonstration Award** [ISSTA'19b]
- 2019 **ACM SIGSOFT Distinguished Artifact Award** [ISSTA'19a]
- 2018 **ACM SIGSOFT Distinguished Paper Award** [ISSTA'18]
- 2018 Amazon AWS Cloud Credits for Research Award (\$10,000)
- 2015 Mining Software Repositories Hall of Fame (Honorable Mention) [MSR'14]
- 2014 ICSE-NIER Award for Innovation and Potential Impact [ICSE-C'14]
- 2013 Institute Silver Medal, IIT Bombay
- 2013 Shri K.M. Doshi Charitable Trust Prize, IIT Bombay.
- 2011 TSEC Ambassador, Thadomal Shahani Engineering College, Mumbai
- 2011 TSEC Leader, Thadomal Shahani Engineering College, Mumbai

Research Experience

- 2015–present **University of California, Berkeley**, *Graduate Student Researcher*, Berkeley, CA, USA.
Dynamic program analysis and fuzz testing [ICSE'17, ISSTA'18, ICSE-C'19, ISSTA'19a, ISSTA'19b, JPF'19, OOPSLA'19, VMIL'19, ICSE'20].
- May–Aug. 2018 **Microsoft Research**, *Research Intern*, Redmond, WA, USA.
Industry-scale dynamic analysis of asynchronous C# programs [SOSP'19].
- May–Aug. 2017 **Samsung Research America**, *Security Engineering Intern*, Mountain View, CA, USA.
Fuzz testing of Trusted Execution Environments (TEE) [USENIX Sec'20].
- 2013–2015 **IBM Research India**, *Blue Scholar*, New Delhi, India.
Mining software repositories [MSR'14, ICSE-C'14, ASE'14, MSR'15a, MSR'15b, ICSE-C'15, ISEC'16].
- 2011–2013 **IIT Bombay**, *Graduate Student*, Mumbai, India.
Static, interprocedural data-flow analysis for heap data [SOAP'13, MTP].

Teaching Experience

- 2018–2019 **University of California, Berkeley**, *Graduate Student Instructor*.
Designed the **ChocoPy** programming language [SPLASH-E'19]
<https://chocopy.org>
◦ *Programming Languages and Compilers* (undergraduate), Fall 2019
◦ *Programming Languages and Compilers* (undergraduate), Fall 2018
- 2012–2013 **IIT Bombay**, *Teaching Assistant*.
◦ *Abstractions and Paradigms of Programming* (undergraduate), Spring 2012
◦ *Software Lab* (graduate), Fall 2012
◦ *Essential Abstractions in GCC* (graduate + industry), Summer 2012
◦ *Implementation of Programming Languages* (undergraduate), Spring 2013

Publications

Peer-Reviewed Research Papers

- ICSE'20 **Quickly Generating Diverse Valid Test Inputs with Reinforcement Learning**
Sameer Reddy, Caroline Lemieux, **Rohan Padhye**, Koushik Sen,
42nd ACM/IEEE International Conference on Software Engineering, ICSE 2020 (to appear).
Acceptance Rate: 20.9% (129/617)
- USENIX Sec'20 **PARTEMU: Enabling Dynamic Analysis of Real-World TrustZone Software Using Emulation**
Lee Harrison, Hayawardh Vijayakumar, **Rohan Padhye**, Koushik Sen, Michael Grace,
29th USENIX Security Symposium, USENIX Security'20 (to appear).
- SOSP'19 **Efficient and Scalable Thread-Safety-Violation Detection**
Best Paper Guangpu Li, Shan Lu, Suman Nath, Madan Musuvathi, **Rohan Padhye**,
27th ACM Symposium on Operating Systems Principles, SOSP 2019.
Acceptance Rate: 13.77% (38/276). Aritifacts Evaluated: *Functional* + *Available*.
- OOPSLA'19 **FuzzFactory: Domain-Specific Fuzzing with Waypoints**
Rohan Padhye, Caroline Lemieux, Koushik Sen, Laurent Simon, Hayawardh Vijayakumar,
Proceedings of the ACM on Programming Languages, Volume 3 Issue OOPSLA.
Acceptance Rate: 35.8% (72/201). Aritifacts Evaluated: *Functional* + *Available*.
- ISSTA'19a **Semantic Fuzzing with Zest**
Distinguished Artifact **Rohan Padhye**, Caroline Lemieux, Koushik Sen, Mike Papadakis, Yves Le Traon,
28th ACM SIGSOFT International Symposium on Software Testing and Analysis, ISSTA 2019.
Acceptance Rate: 23.8% (32/134). Aritifacts Evaluated: *Functional* + *Reusable* + *Available*.
- ISSTA'18 **PerfFuzz: Automatically Generating Pathological Inputs**
Distinguished Paper Caroline Lemieux, **Rohan Padhye**, Koushik Sen, Dawn Song,
27th ACM SIGSOFT International Symposium on Software Testing and Analysis, ISSTA 2018.
Acceptance Rate: 27.6% (31/112)
- ICSE'17 **Travioli: A Dynamic Analysis for Detecting Data-Structure Traversals**
Rohan Padhye, Koushik Sen,
39th ACM/IEEE International Conference on Software Engineering, ICSE 2017.
Acceptance Rate: 16.4% (68/415)
- ISEC'16 **Mining API Expertise Profiles using Partial Program Analysis**
Senthil Mani, **Rohan Padhye**, Vibha Singhal Sinha,
9th ACM ISOFT India Software Engineering Conference, ISEC 2016.
Acceptance Rate: 15.7% (16/102)
- ASE'14 **NeedFeed: Taming Change Notifications by Modeling Code Relevance**
Rohan Padhye, Senthil Mani, Vibha Singhal Sinha,
29th ACM/IEEE International Conference on Automated Software Engineering, ASE 2014.
Acceptance Rate: 19.9% (55/276)

Peer-Reviewed Education Papers

- SPLASH-E'19 **ChocoPy: A Programming Language for Compilers Courses**
Rohan Padhye, Koushik Sen, Paul N. Hilfinger,
2019 ACM SIGPLAN SPLASH-E Symposium.

Other Peer-Reviewed Publications (Workshops and Short Papers)

- VMIL'19 **Efficient Fail-Fast Dynamic Subtype Checking**
Rohan Padhye, Koushik Sen,
11th ACM SIGPLAN Workshop on Virtual Machines and Managed Runtimes, VMIL 2019.
- JPF'19 **SAFFRON: Adaptive Grammar-based Fuzzing for Worst-Case Analysis**
Xuan Bach D. Le, Corina Pasareanu, **Rohan Padhye**, David Lo, Willem Visser, Koushik Sen,
Java Path Finder Workshop 2019.
- ISSTA'19b **JQF: Coverage-Guided Property-Based Testing in Java**
Best Tool Demo **Rohan Padhye**, Caroline Lemieux, Koushik Sen,
28th International Symposium on Software Testing and Analysis, ISSTA 2019, Tool Demo.
- ICSE-C'19 **Validity Fuzzing and Parametric Generators for Effective Random Testing**
Rohan Padhye, Caroline Lemieux, Koushik Sen, Mike Papadakis, Yves Le Traon,
41st ACM/IEEE Int'l Conf. on Software Engineering, ICSE 2019, Companion Proceedings.
- ICSE-C'15 **Smart Programming Playgrounds**
Rohan Padhye, Pankaj Dhoolia, Senthil Mani, Vibha Singhal Sinha,
37th ACM/IEEE Int'l Conf. on Software Engineering, ICSE 2015, Companion Proceedings.
- MSR'15a **Detecting and Mitigating Secret-Key Leaks in Source Code Repositories**
Vibha Singhal Sinha, Diptikalyan Saha, Pankaj Dhoolia, **Rohan Padhye**, Senthil Mani,
12th Working Conference on Mining Software Repositories, MSR 2015.
- MSR'15b **The Synergy Between Voting and Acceptance of Answers on StackOverflow, or the Lack Thereof**
Neelamadhav Gantayat, Pankaj Dhoolia, **Rohan Padhye**, Senthil Mani, Vibha Singhal Sinha,
12th Working Conference on Mining Software Repositories, MSR 2015.
- ICSE-C'14 **API as a Social Glue**
NIER **Rohan Padhye**, Debodoot Mukherjee, Vibha Singhal Sinha,
Innovation Award *36th ACM/IEEE Int'l Conf. on Software Engineering, ICSE 2014, Companion Proceedings.*
- MSR'14 **A Study of External Community Contribution to Open-source Projects on GitHub**
Hall of Fame **Rohan Padhye**, Senthil Mani, Vibha Singhal Sinha,
11th Working Conference on Mining Software Repositories, MSR 2014.
- SOAP'13 **Interprocedural Data Flow Analysis in Soot using Value Contexts**
Rohan Padhye, Uday P. Khedker,
2nd ACM SIGPLAN Int'l Workshop on State-Of-the-Art in Java Program Analysis, SOAP 2013.

Dissertations

- MTP **Interprocedural Heap Analysis Using Access Graphs and Value Contexts**
Rohan Padhye (supervised by Prof. Uday Khedker),
Master's Thesis Project, IIT Bombay.

Media and Adoption

- 2019 TechRepublic article on *How ChocoPy uses Python and RISC-V to teach compiler creation.*
<https://www.techrepublic.com/article/how-chocopy-uses-python-and-risc-v-to-teach-compiler-creation>
- 2019 JQF+Zest is provided as a service by *FuzzIt*, a continuous fuzzing startup.
<https://fuzzit.dev>
- 2019 Multiple talks by Pentagrid IT Security on *Fuzzing Java with the Help of JQF.*
https://www.pentagrid.ch/en/blog/fuzzing_java_with_jqf/

Conference Talks

13 talks across 7 venues

- 2019 **OOPSLA'19, VMIL'19, SPLASH-E'19** at Athens, Greece
- 2019 **ISSTA'19a, ISSTA'19b** at Beijing, China
- 2017 **ICSE'17** at Buenos Aires, Argentina
- 2015 **ICSE-C'15** (New Ideas Track), **MSR'15a, MSR'15b** at Florence, Italy
- 2014 **ASE'14** at Västerås, Sweden
- 2014 **ICSE-C'14** (New Ideas Track), **MSR'14** at Hyderabad, India
- 2013 **SOAP'13** at Seattle, WA, USA

Invited / Other Talks

- 2019 **Bending Fuzzers to One's Own Will**, *University of Chicago, IL, USA.*
- 2019 **Bending Fuzzers to One's Own Will**, *Apple, Cupertino, CA, USA.*
- 2019 **Bending Fuzzers to One's Own Will**, *CISPA, Saarland, Germany.*
- 2019 **Fuzzing for Performance Bottlenecks and Semantic Bugs**, *University of Toronto, Canada.*
- 2018 **Lightweight Happens-Before Analysis**, *Microsoft Research, Redmond, WA, USA.*
- 2018 **Dynamic Analysis of Data-Structure Traversals**, *IIT Bombay, India.*
- 2017 **Optimistic Fuzz Testing**, *Samsung Research America, Mountain View, CA, USA.*

Grant Writing Contributions

- 2019 **NSF: Automatic Exploration and Analysis of Software Performance Responses.**
- 2019 **NSF: Human-Guided Software Testing and Analysis for Scalable Bug Detection and Repair.**
- 2019 **NSF: Machine Learning for Effective Fuzz Testing.**
- 2018 **Facebook: Making Greybox Fuzz Testing Incremental.**
- 2018 **Samsung: Making Greybox Fuzz Testing Smarter.**

(All of the above have been granted with Prof. Koushik Sen as PI or co-PI)

Service

- 2020 **Reviewer**, *IEEE Transactions on Dependable and Secure Computing (TDSC).*
- 2019 **Reviewer**, *IEEE Transactions on Software Engineering (TSE).*
- 2019 **Reviewer**, *Journal of Information and Software Technology (IST).*
- 2018–2019 **Artifact evaluation committee**, *PLDI 2018, PLDI 2019.*
- 2015–2020 **Subreviewer**, *ASPLOS'16, ISSTA'16, PLDI'17, ASPLOS'18, PLDI'18, CAV'18, ICST'20.*
- 2019 **Panelist—Undergraduate Research Mixer**, *UC Berkeley IEEE Student Branch.*
- 2019 **Panelist—Qual Exam Orientation**, *UC Berkeley EECS Department.*
- 2019 **Organizer—Graduate Student Panel for New PhD Admits**, *UC Berkeley EECS Department.*
- 2019 **Faculty Hiring—Student Core Committee**, *UC Berkeley EECS Department.*
- 2018 **PhD Admissions—Student Review Committee**, *UC Berkeley EECS Department.*
- 2016–2018 **Program committee**, *ISEC'16, ISEC'17, ISEC'18.*
- 2012 **Webmaster**, *CSE Department, IIT Bombay.*
- 2010 **Treasurer**, *IEEE Student Branch, Thadomal Shahani Engg College.*
- 2009 **Webmaster**, *IEEE Student Branch, Thadomal Shahani Engg College.*