

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

2020 Outstanding Graduate Student Instructor Award, UC Berkeley
2020 C.V. Ramamoorthy Distinguished Research Award, UC Berkeley EECS Department
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

- 2020 **Bending Fuzzers to One's Own Will**, *University of Wisconsin–Madison*, Madison, WI, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *University of Illinois at Urbana-Champaign*, IL, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *Columbia University*, New York, NY, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *University of Massachusetts Amherst*, Amherst, MA, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *University of Michigan*, Ann-Arbor, MI, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *Carnegie Mellon University*, Pittsburgh, PA, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *University of Washington*, Seattle, WA, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *University of British Columbia*, Vancouver, BC, Canada.
- 2020 **Bending Fuzzers to One's Own Will**, *UC San Diego*, San Diego, CA, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *Cornell University*, Ithaca, NY, USA.
- 2020 **Bending Fuzzers to One's Own Will**, *Georgia Tech*, Atlanta, GA, USA.
- 2019 **Bending Fuzzers to One's Own Will**, *University of Chicago*, 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*, Mumbai, 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*, *ISSTA'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.