School of Computer Science
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moarbugs
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Rohan Padhye

Research Interests

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

Academic Appointments

2020–present **Carnegie Mellon University**, *Assistant Professor*, Pittsburgh, PA, USA.
Institute of Software Research (ISR), School of Computer Science (SCS)

Education

2015–2020 **University of California, Berkeley**, *Ph.D*, Computer Science.
2011–2013 **Indian Institute of Technology (IIT) Bombay**, *M.Tech*, Computer Science & Engineering.
2007–2011 **University of Mumbai**, *B.E*, Computer Engineering, Thadomal Shahani Engineering College (TSEC).

Industry Positions

Summer 2018 **Microsoft Research**, *Research Intern*, Redmond, WA, USA.
Summer 2017 **Samsung Research America**, *Security Engineering Intern*, Mountain View, CA, USA.
2013–2015 **IBM Research India**, *Software Engineer (Research)*, New Delhi, India.

Awards and Achievements

2020 Outstanding Graduate Student Instructor Award, UC Berkeley
2020 C.V. Ramamoorthy Distinguished Research Award, UC Berkeley
2019 ACM SIGOPS—SOSP 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]
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

Teaching

2020–present **Carnegie Mellon University**, *Assistant Professor*.
- *Program Analysis* (undergraduate + graduate), Spring 2021 (co-taught with Jonathan Aldrich)
- *Software Engineering Research* (PhD core course), Fall 2020 (co-taught with ISR faculty)

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

ASE'20 **BigFuzz: Efficient Fuzz Testing for Data Analytics using Framework Abstraction**
Qian Zhang, Jiyuan Wang, Muhammad Ali Gulzar, **Rohan Padhye**, Miryung Kim,
35th ACM/IEEE International Conference on Automated Software Engineering, ASE 2020.
Acceptance Rate: 22.5% (93/414)

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.
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.

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 Innovation Award **Rohan Padhye**, Debdoot Mukherjee, Vibha Singhal Sinha,
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

PhD **Abstractions and Algorithms for Specializing Dynamic Program Analysis and Random Fuzzing**
Rohan Padhye (advisor: Prof. Koushik Sen),
Ph.D. Dissertation, University of California, Berkeley.

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

Media and Adoption

2020 JQF is officially supported by Gitlab.
`https://docs.gitlab.com/ee/user/application_security/coverage_fuzzing/`

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 Massachesuetts 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.

Service

2022 **Program committee**, *ICSE 2022*.
2021 **Program committee**, *ISSTA 2021*.
2020 **Mentor**, *SPLASH 2020 Programming Languages Mentoring Workshop (PLMW)*.
2020 **External Review Committee**, *SPLASH/OOPSLA 2020*.
2020 **Reviewer**, *IEEE Transactions on Dependable and Secure Computing (TDSC)*.
2019–2020 **Reviewer**, *IEEE Transactions on Software Engineering (TSE)*.

2019–2020 **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*.

2016–2018 **Program committee**, ISEC'16, ISEC'17, ISEC'18.