School of Computer Science
Carnegie Mellon University
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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 (tenure-track)*, Pittsburgh, PA, USA.
Institute of Software Research, School of Computer Science

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

2022–present **Amazon Web Services**, *Visiting Academic*, Remote.
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

2022 Amazon Research Award
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

Carnegie Mellon University, *Instructor of Record*.
Spring 2023 *17-712: Fantastic Bugs and How to Find Them*
Fall 2022 *17-313: Foundations of Software Engineering* (co-taught with Michael Hilton)
Spring 2022 *17-355/17-665/17-819: Program Analysis*

Fall 2021 *17-313: Foundations of Software Engineering* (co-taught with Michael Hilton)
Spring 2021 *17-355/17-665/17-819: Program Analysis* (co-taught with Jonathan Aldrich)
Fall 2020–21 *17-808: Software Engineering Research* (co-taught with ISR faculty)

Carnegie Mellon University, *Guest Lecturer*.
Fall 2021 *14-735: Secure Coding* (instructor of record: Hanan Hibshi)
Fall 2020 *14-735: Secure Coding* (instructor of record: Hanan Hibshi)

University of California, Berkeley, *Graduate Student Instructor*.
Fall 2019 *CS164: Programming Languages and Compilers* (instructor of record: Koushik Sen)
Fall 2018 *CS164: Programming Languages and Compilers* (instructor of record: Koushik Sen)

IIT Bombay, *Teaching Assistant*.
Spring 2012 *CS152: Abstractions and Paradigms of Programming* (instructor of record: Amitabha Sanyal)
Fall 2012 *CS699: Software Lab* (instructor of record: Supratim Biswas)
Summer 2012 *Workshop: Essential Abstractions in GCC* (instructor of record: Uday Khedker)
Spring 2013 *CS316: Implementation of Programming Languages* (instructor of record: Uday Khedker)

Publications

Preprint'22a **Guiding Greybox Fuzzing with Mutation Testing**
Isabella Laybourn, Vasudev Vikram, Rafaello Sanna, Ao Li, **Rohan Padhye**,
Revision in preparation, `https://rohan.padhye.org/files/mu2-draft.pdf`.

Preprint'22b **SPIDER: A Practical Fuzzing Framework to Uncover Stateful Performance Issues in SDN Controllers**
Ao Li, **Rohan Padhye**, Vyas Sekar,
Currently under peer review, `https://arxiv.org/abs/2209.04026`.

Preprint'22c **Distributed Execution Indexing**
Christopher S. Meiklejohn, **Rohan Padhye**, Heather Miller,
Revision in preparation, `https://arxiv.org/abs/2209.08740`.

Peer-Reviewed **Research** Papers

MSR'22 **On the Naturalness of Fuzzer-Generated Code**
Rajeswari Hita Kambhamettu, John Billos, Tomi Oluwaseun-Apo, Benjamin Gafford, **Rohan Padhye**, Vincent J Hellendoorn,
19th International Conference on Mining Software Repositories, MSR 2022.

SoCC'21 **Service-Level Fault Injection Testing**
Christopher S. Meiklejohn, Andrea Estrada, Yiwen Song, Heather Miller, **Rohan Padhye**,
12th ACM Symposium on Cloud Computing, SoCC 2021.

ICSE'21 **Growing a Test Corpus with Bonsai Fuzzing**
Vasudev Vikram, **Rohan Padhye**, Koushik Sen,
43rd ACM/IEEE International Conference on Software Engineering, ICSE 2021.

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.

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.

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.
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.
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.
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.

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.

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.

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.

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.

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.

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, Tool Demos, New Ideas)

ICSE-C'21 **Efficient Fuzz Testing for Apache Spark using Framework Abstraction**
Qian Zhang, Jiyuan Wang, Muhammad Ali Gulzar, **Rohan Padhye**, Miryung Kim,
43rd ACM/IEEE Int'l Conf. on Software Engineering, ICSE 2021, Companion Proceedings.

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.

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.

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.

Professional Service

2023 **Co-Chair for Student Volunteers**, *ESEC/FSE 2023*.

2023 **Co-organizer**, *Dagstuhl Seminar on "Software Bug Detection: Challenges and Synergies"*.

2021–present **Distinguished Reviewer**, *ACM Transactions on Software Engineering and Methodology (TOSEM)*.

2019–present **Reviewer**, *IEEE Transactions on Software Engineering (TSE)*.

2022 **Program committee**, *ICST 2023*.

2022 **Program committee**, *ESEC/FSE 2022*.

2022 **Program committee**, *ISSTA 2022*.

2021 **Program committee**, *ICSE 2022*.

2021 **Program committee**, *ISSTA 2021*.

2021 **Program committee**, *ISSTA 2021*, Tool demonstrations.

2020 **Reviewer**, *IEEE Transactions on Dependable and Secure Computing (TDSC)*.

2020 **Invited Reviewer**, *ASPLOS 2021*.

2020 **Invited Reviewer**, *OSDI 2020*.

2020 **External Review Committee**, *SPLASH/OOPSLA 2020*.

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.

Invited Talks

2022 **Bending Fuzzers to One's Own Will**, *Amazon Web Services*, virtual talk.
2021 **Bending Fuzzers to One's Own Will**, *VMWare Research*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *Synopsys*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *University of Wisconsin–Madison*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *University of Illinois at Urbana-Champaign*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *Columbia University*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *University of Massachesuetts Amherst*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *University of Michigan, Ann-Arbor*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *Carnegie Mellon University*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *University of Washington*, virtual talk.
2020 **Bending Fuzzers to One's Own Will**, *University of British Columbia*, virtual talk.
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.

Funding Received as PI

2022 **CyLab Future Enterprise Security Grant**, *Observatory for Software Dependencies*, $75,000, 1 year. Joint with Co-PI Yuvraj Agarwal

2022 **Amazon Research Award**, *Coverage-Guided Property-Based Testing of Concurrent Programs*, $40,000, 1 year.

2021 **CyLab Seed Grant**, *Secure Software Evolution*, $44,500, 1 year.

2021 **National Science Foundation—Computer and Information Science and Engineering (CISE)**, *SHF: Small: Future-Proof Test Corpus Synthesis for Evolving Software*, $546,091, 3 years.

Student Advising and Mentoring

2020–present **Advisor**, *Ph.D. in Software Engineering*, Institute for Software Research, Carnegie Mellon University.
- Vasudev Vikram—since Fall 2021
- Ben Gafford (co-advised with Eunsuk Kang)—since Fall 2020
- Ao Li (co-advised with Vyas Sekar)—since Fall 2020

2021 **Advisor**, *Research Experience for Undergraduates in Software Engineering (REUSE)*, Institute for Software Research (ISR), Carnegie Mellon University.
- John Billos (co-advised with Vincent Hellendoorn)—Summer 2021
- Carolyn Oluwatomi Oluwaseun-Apo (co-advised with Vincent Hellendoorn)—Summer 2021
- Hita Kambhamettu (co-advised with Vincent Hellendoorn)—Summer 2021
- Rafello Sanna—Summer 2021

2021–present **Advisor**, *Undergraduate Research*, School of Computer Science, Carnegie Mellon University.
- Isabella Laybourn—Spring 2021, Fall 2021, Spring 2022

2020–22 **Thesis Committee**, *Ph.D. in Software Engineering*, Institute for Software Research, Carnegie Mellon University.
- Miguel Velez (advised by Christian Kästner)
- Christopher Meiklejohn (advised by Heather Miller)

2021–22 **Reader**, *M.S. in Information Security*, Information Networking Institute (INI), Carnegie Mellon University.
- Sears Schulz (advised by Maverick Woo)

2022 **Mentor**, *ICSE 2022 Student Mentoring Workshop*.

2021 **Mentor**, *ICSE 2021 Speed Networking*.

2020 **Panelist**, *JOBS workshop at IEEE MICRO 2020*.

2020 **Mentor**, *SPLASH 2020 Programming Languages Mentoring Workshop (PLMW)*.

Department and University Service

2020–present SE PhD Admissions Committee

2020–present SE PhD Seminar (SSSG) Coordinator

2021–present ISR Community Building Committee

2021 ISR Diversity, Equity, Inclusion Committee

2021 CyLab Presidential Fellowship Committee

2021 REU in Software Engineering (REUSE) Admissions Committee

Patents

2015 **Smart Programming Playgrounds**. *Inventors*: Pankaj Dhoolia, **Rohan Padhye**, Senthil Mani and Vibha Singhal Sinha. *US Patent Number*: 9710361. *Assigned to*: IBM Corporation.

2014 **Preventing Sharing of Sensitive Information Through Code Repositories**. *Inventors*: Vibha Singhal Sinha, **Rohan Padhye**, Senthil Mani and Pankaj Dhoolia. *US Patent Number*: 9910837. *Assigned to*: IBM Corporation.

2014 **Controlling Generation of Change Notifications in a Collaborative Authoring Environment**. *Inventors*: **Rohan Padhye**, Senthil Mani and Vibha Singhal Sinha. *US Patent Number*: 9910837. *Assigned to*: IBM Corporation.