

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.
Software and Societal Systems Department (S3D), School of Computer Science (SCS); also affiliated with the
CyLab Security and Privacy Institute

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

2022–2023 **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

2023 ACM SIGSOFT Distinguished Paper Award [ISSTA'23]
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*.
Fall 2023 17-313: *Foundations of Software Engineering* (co-taught with Andrew Begel)

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 S3D 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

Peer-Reviewed Research Papers

- ISSTA'23 **Guiding Greybox Fuzzing with Mutation Testing**
 Distinguished Paper Vasudev Vikram, Isabella Laybourn, Ao Li, Nicole Nair, Kelton OBrien, Raffaello Sanna, **Rohan Padhye**,
 32nd ACM SIGSOFT International Symposium on Software Testing and Analysis, ISSTA 2023.
- IEEE'23 **Fuzzing, Symbolic Execution, and Expert Guidance for Better Testing**
 Ismet Burak Kadron, Yannic Noller, **Rohan Padhye**, Tevfik Bultan, Corina Păsăreanu, Koushik Sen,
IEEE Software, (accepted; to appear).
- 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.
Artifacts 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.
Artifacts 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.
Artifacts 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 **Rohan Padhye**, Debodoot Mukherjee, Vibha Singhal Sinha,
Innovation Award *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.
- Preprints
- arxiv'22a **SPIDER: A Practical Fuzzing Framework to Uncover Stateful Performance Issues in SDN Controllers**
Ao Li, **Rohan Padhye**, Vyas Sekar,
Preprint, <https://arxiv.org/abs/2209.04026>.
- arxiv'22b **Distributed Execution Indexing**
Christopher S. Meiklejohn, **Rohan Padhye**, Heather Miller,
Preprint, <https://arxiv.org/abs/2209.08740>.
- 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

- 2024 **Co-chair for Tool Demonstrations, ISSTA 2024.**
- 2024 **Program committee, ISSTA 2024.**
- 2023 **Program committee, FUZZING Workshop 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*.

Student Advising and Mentoring

- 2020–present **Advisor**, *Ph.D. in Software Engineering*, Software and Societal Systems Department (S3D), Carnegie Mellon University.
 - Vasudev Vikram—since Fall 2021
 - Ao Li (co-advised with Vyas Sekar)—since Fall 2020
- 2022–present **Advisor**, *M.S. in Information Technology-Information Security*, Information Networking Institute (INI), Carnegie Mellon University.
 - Palash Oswal—since Fall 2022
- 2021–2022 **Advisor**, *Research Experience for Undergraduates in Software Engineering (REUSE)*, ISoftware and Societal Systems Department (S3D), Carnegie Mellon University.
 - Nicole Nair —Summer 2022
 - Kelton OBrien —Summer 2022
 - 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—since Spring 2021
- 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)*.

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.