

# 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

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## 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 2020–2023 17-808: *Software Engineering Research* (co-taught with S3D faculty)

**Carnegie Mellon University, Guest Lecturer.**

- Fall 2020–2023 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)

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## Publications

Peer-Reviewed **Research Papers**

- NSDI'24 **ExChain: Exception Dependency Analysis for Root Cause Diagnosis**  
Ao Li, Shan Lu, Suman Nath, **Rohan Padhye**, Vyas Sekar ,  
*21st USENIX Symposium on Networked Systems Design and Implementation*, NSDI 2024.
- 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**, Tefvik Bultan, Corina Pășăreanu, Koushik Sen,  
*IEEE Software*, Volume 41, Issue 1, pp. 98–104.
- 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'23 **Can Large Language Models Write Good Property-Based Tests?**  
Vasudev Vikram, Caroline Lemieux, **Rohan Padhye**,  
*Preprint, <https://arxiv.org/abs/2307.04346>.*
- 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.

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## Professional Service

- 2024 **Co-chair for Tool Demonstrations, ECOOP/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.
  - Shrey Tiwari—since Fall 2023
  - Lirong Yuan (co-advised with Christian Kästner)—since Fall 2023
  - Vasudev Vikram—since Fall 2021
  - Ao Li (co-advised with Vyas Sekar)—since Fall 2020
- 2022–2023 **Advisor**, *M.S. in Information Technology-Information Security*, Information Networking Institute (INI), Carnegie Mellon University.
  - Palash Oswal—graduated Spring 2023.
- 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; now PhD student at University of Pennsylvania.
  - Rafello Sanna—Summer 2021; now PhD student at Harvard University.
- 2021–2023 **Advisor**, *Undergraduate Research*, School of Computer Science, Carnegie Mellon University.
  - Isabella Laybourn—five semesters from Spring 2021 to Spring 2023; now at Apple.
- 2024–present **Thesis Committee**, *Ph.D. in Computer Science*, Khoury College of Computer Sciences, Northeastern University.
  - Katharine Hough (advised by Jonathan Bell)
- 2020–24 **Thesis Committee**, *Ph.D. in Software Engineering*, Software and Societal Systems Department, Carnegie Mellon University.
  - Miguel Velez (advised by Christian Kästner)—graduated Fall 2021
  - Christopher Meiklejohn (advised by Heather Miller)—graduated Spring 2024

- 2021–22 **Reader**, *M.S. in Information Security*, Information Networking Institute (INI), Carnegie Mellon University.  
◦ Sears Schulz (advised by Maverick Woo)—graduated Spring 2022
- 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)*.

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## 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.