

# Rohan Padhye

## Research Interests

Areas Software Engineering, Programming Languages, Systems, Security  
Topics Program Analysis, Fuzz Testing, Concurrency Testing

## Academic Appointments

2020–present **Carnegie Mellon University**, *Assistant Professor (tenure-track)*, Pittsburgh, PA, USA.  
Primary: Software and Societal Systems Department (S3D) in the School of Computer Science (SCS)  
Affiliate: 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

2025 ACM SIGPLAN Distinguished Reviewer Award (PLDI'25)  
2025 ACM SIGSOFT Distinguished Paper Award [[MSR'25](#)]  
2025 Amazon Research Award (Fall'24 cycle)  
2023 ACM SIGSOFT Distinguished Paper Award [[ISSTA'23](#)]  
2022 Amazon Research Award (Fall'21 cycle)  
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.**

- Spring 2025 17-712: *Fantastic Bugs and How to Find Them*  
Fall 2024 17-313: *Foundations of Software Engineering* (co-taught with Michael Hilton)  
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 2020–2024 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**

TOSEM'25 **The Havoc Paradox in Generator-Based Fuzzing**

Ao Li, Madonna Huang, Vasudev Vikram, Caroline Lemieux, **Rohan Padhye**,  
*ACM Transactions on Software Engineering and Methodology*, TOSEM.  
Accepted

MSR'25 **It's About Time: An Empirical Study of Date and Time Bugs in Open-Source Python Software**

**Distinguished Paper** Shrey Tiwari, Serena Chen, Alexander Joukov, Peter Vandervelde, Ao Li, **Rohan Padhye**,  
*22nd International Conference on Mining Software Repositories*, MSR 2025.

ICST'25 **SPIDER: Fuzzing for Stateful Performance Issues in the ONOS Software-Defined Network Controller**

Ao Li, **Rohan Padhye**, Vyas Sekar,  
*18th IEEE International Conference on Software Testing, Verification and Validation*, ICST 2025.

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**, Tevfik Bultan, Corina Păsăreanu, 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**  
**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)
- FUZZING'24 **The Havoc Paradox in Generator-Based Fuzzing (Registered Report)**  
 Ao Li, Madonna Huang, Caroline Lemieux, **Rohan Padhye**,  
*3rd ACM International Fuzzing Workshop, FUZZING 2024.*
- Onward'24 **Software Engineering Methods For AI-Driven Deductive Legal Reasoning**  
**Rohan Padhye**,  
*2024 ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software, Onward! at SPLASH 2024.*
- 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**  
**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**  
**Rohan Padhye**, Debdeep 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.*  
 Preprints
- arxiv'25 **Fray: An Efficient General-Purpose Concurrency Testing Platform for the JVM**  
 Ao Li, Byeongjee Kang, Vasudev Vikram, Isabella Laybourn, Samvid Dharanikota, Shrey Tiwari,  
**Rohan Padhye**,  
*Preprint, <https://arxiv.org/abs/2501.12618>.*

- 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'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.

## Media and Blogs

- 2025 Featured in **Elastic Search Labs Blog** by Benjamin Trent—"Concurrency bugs in Lucene: How to fix optimistic concurrency failures". Available online: <https://www.elastic.co/search-labs/blog/optimistic-concurrency-lucene-debugging>
- 2024 Article in **MIT Computational Law Report**—"AI-Driven Statutory Reasoning via Software Engineering Methods". Available online: <https://law.mit.edu/ai>
- 2023 Quoted in **Information Week** article by John Edwards—"Stress-Test Your Software to Prevent a Southwest-Type Calamity". Available online: <https://www.informationweek.com/cyber-resilience/stress-test-your-software-to-prevent-a-southwest-type-calamity>
- 2019 Featured in **Tech Republic** article by James Sanders—"How ChocoPy uses Python and RISC-V to teach compiler creation". Archived online: <https://web.archive.org/web/20190914011912/https://www.techrepublic.com/article/how-chocopy-uses-python-and-risc-v-to-teach-compiler-creation/>

## Professional Service

- 2025–present **Member**, *IFIP Working Group 2.4*, Software Implementation Technology, invited/pending ratification.
- 2026 **Co-Chair for Workshops**, *SPLASH/ISSTA 2026*, Oakland, CA, USA.
- 2025 **Co-Organizer**, *FUZZING Workshop 2025*, part of ISSTA 2025, Trondheim, Norway.
- 2024 **Co-Chair for Tool Demonstrations**, *ECOOP/ISSTA 2024*, Vienna, Austria.
- 2023 **Co-Organizer**, *Dagstuhl Seminar on "Software Bug Detection: Challenges and Synergies"*, Germany.
- 2021–present **Distinguished Reviewer**, *ACM Transactions on Software Engineering and Methodology (TOSEM)*.
- 2025–present **Reviewer**, *ACM Transactions on Computer Systems (TOCS)*.
- 2019–present **Reviewer**, *IEEE Transactions on Software Engineering (TSE)*.
- 2020 **Reviewer**, *IEEE Transactions on Dependable and Secure Computing (TDSC)*.
- 2026 **Review committee**, *OOPSLA 2026*.
- 2025 **Program committee**, *ASE 2025*.
- 2025 **Review committee**, *PLDI 2025*.
- 2024 **Program committee**, *FUZZING Workshop 2024*.
- 2024 **Program committee**, *ISSTA 2024*.

- 2023 **Program committee**, *FUZZING Workshop 2023*.
- 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 **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*.

## --- Department and University Service

- 2025 **Committee Chair**, *CyLab Presidential Fellowships*.
- 2020–2025 **Coordinator**, *Software Engineering PhD Seminar (SSSG)*.
- 2020–2025 **Committee Member**, *Software Engineering PhD Admissions*.
- 2021–2024 **Committee Member**, *CyLab Presidential Fellowship*.
- 2021–2023 **Committee Member**, *Department Community Building*.
- 2021 **Committee Member**, *REU in Software Engineering (REUSE) Admissions*.

## --- Funding Received as PI

- 2025 **National Science Foundation—Computer and Information Science and Engineering (CISE)**, *SHF: Small: Practical Controlled Concurrency Testing for Managed Code*, \$300,000, 3 years.
- 2025 **Amazon Research Award**, *Automating Synthesis and Evaluation of Property-Based Tests*, \$60,000, 1 year.
- 2025 **National Science Foundation—Computer and Information Science and Engineering (CISE)**, *SHF: Small: Strengthening Correctness of Date & Time Logic in Software Systems*, \$647,993, 3 years.
- 2025 **CyLab Seed Funding**, *Finding Date and Time Vulnerabilities with AI-Powered Differential Fuzzing*, \$50,000, 1 year.
- 2023 **CyLab Seed Funding**, *Fuzzing for Stateful Performance Issues*, \$45,000, 1 year.
- 2023 **CyLab Future Enterprise Security Initiative**, *Harnessing LLMs for Enabling Fuzzing of High-Level API Properties*, \$50,000, 1 year.
- 2022–2023 **CyLab Future Enterprise Security Initiative**, *Observatory for Software Dependencies*, \$125,000, 2 years.  
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 Funding**, *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.

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## 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
  - 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)*, Software and Societal Systems Department (S3D), Carnegie Mellon University.
- Alexander Joukov, Stony Brook University—Summer 2024
  - Serena Chen, UC San Diego—Summer 2024
  - Peter Vandervelde, UC Santa Barbara—Summer 2024
  - Nicole Nair, Swarthmore College—Summer 2022
  - Kelton OBrien, University of Minnesota—Summer 2022
  - Daniel Verdi do Amarante, University of Richmond (co-advised with Vincent Hellendoorn)—Summer 2022.
  - John Billos, Wake Forest University (co-advised with Vincent Hellendoorn)—Summer 2021; subsequently winner of Goldwater Fellowship
  - Carolyn Oluwatomi Oluwaseun-Apo, Penn State (co-advised with Vincent Hellendoorn)—Summer 2021
  - Hita Kambhamettu, CMU (co-advised with Vincent Hellendoorn)—Summer 2021; now PhD student at University of Pennsylvania.
  - Rafello Sanna, University of Rochester—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 **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
  - Manisha Mukherjee (advised by Vincent Hellendoorn)—thesis proposal in Spring 2025
  - Luke Dramko (advised by Claire Le Goues)—thesis proposal in Spring 2025
- 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)*.