School of Computer Science
Carnegie Mellon University
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Updated: May 19, 2025

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)
Affliate: *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 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

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)

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 (pending minor revisions)

MSR'25 — Distinguished Paper — **It's About Time: An Empirical Study of Date and Time Bugs in Open-Source Python Software**
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 — Distinguished Paper — **Guiding Greybox Fuzzing with Mutation Testing**
Vasudev Vikram, Isabella Laybourn, Ao Li, Nicole Nair, Kelton OBrien, Rafaello 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 Best Paper	**Efficient and Scalable Thread-Safety-Violation Detection** 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 Distinguished Artifact	**Semantic Fuzzing with Zest** **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 Distinguished Paper	**PerfFuzz: Automatically Generating Pathological Inputs** 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)

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**
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, Debdoot 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'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	**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.

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)*.