Manish Motwani

School of Electrical Engineering & Computer Science
Oregon State University
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Research Interests

My broad research interests lie in improving software engineers' productivity by automating software engineering practices. I design novel automation techniques for tasks such as requirements elicitation, software testing, and program repair, targeting diverse application domains including artificial intelligence (AI), high-performance computing (HPC), network protocols, and REST API-based web applications.

Education

University of Massachusetts Amherst ..... Amherst, MA, USA
Sept 2022 **Doctor of Philosophy in Computer Science**
Dissertation: High–Quality Automatic Program Repair
Advisor: Prof. Yuriy Brun
May 2018 **Master of Science in Computer Science**

International Institute of Information Technology, Hyderabad ..... Hyderabad, TS, India
May 2011 **Bachelor of Technology (Honors) in Computer Science and Engineering**

Work Experience

School of Electrical Engineering and Computer Science, Oregon State University ..... Corvallis, OR, USA
Sept 2023 – Present Assistant Professor (tenure-track)

College of Computing – School of Computer Science, Georgia Institute of Technology ...Atlanta, GA, USA
Aug 2022 – Aug 2023 Postdoctoral Fellow

Manning College of Information and Computer Sciences, University of Massachusetts . Amherst, MA, USA
Sept 2015 – July 2022 Research Assistant

Security tools group, One Engineering Systems, Microsoft ..... Redmond, WA, USA
Aug 2021 – Oct 2021 Research Intern
May 2020 – Aug 2020 Research Intern

Tata Research Development and Design Centre ..... Pune, MH, India
July 2011 – July 2015 Researcher

Cisco Systems India Pvt. Ltd. ..... Bangalore, KA, India
May 2010 – July 2010 Software Developer Intern

Teaching Experience

School of Electrical Engineering and Computer Science, Oregon State University ..... Corvallis, OR, USA
Winter 2025 Instructor (*CS 563: Software Evolution and Maintenance*)
Winter 2025 Instructor (*CS 362: Software Engineering II*)
Spring 2024 Instructor (*CS 563: Software Evolution and Maintenance*)
Winter 2024 Instructor (*CS 569: Selected Topics in Software Engineering: Program Analysis and Evaluation*)

Manning College of Information and Computer Sciences, University of Massachusetts . Amherst, MA, USA

Fall 2021	Guest lecturer (*CS 520: Theory and Practice of Software Engineering*)
Spring 2020	Guest lecturer (*CS 520: Theory and Practice of Software Engineering*)
Fall 2018	Teaching Assistant (*CS 520: Theory and Practice of Software Engineering*)

Tata Research Development and Design Centre ..... Pune, MH, India

May 2013	Guest lecturer (*Modelling business processes using the Web Ontology Language (OWL)*)

International Institute of Information Technology, Hyderabad ..... Hyderabad, TS, India

Spring 2011	Teaching Assistant (*CEG421: Building Energy Simulation*)
Fall 2010	Teaching Assistant (*CS3155: Compilers*)
Fall 2009	Teaching Assistant (*MA3200: Discrete Maths*)

Technical Skills

- **Research & Planning**: Identifying Problems, Gathering Information, Developing Evaluations, Calculating Results
- **Programming languages**: Working knowledge of Java, C, C++, C#, Python, Shell, R, Ruby, and PHP
- **Machine learning frameworks**: PyTorch, Keras/Tensorflow
- **Databases**: MySQL, Oracle, Kusto
- **IDEs and tools**: Eclipse, NetBeans, MS Visual Studio, Vim, Git, Mercurial
- **Cloud platforms**: Amazon Web Services, SLURM clusters

Publications

Referred Journal/Conference Publications

- **Manish Motwani**, Aakash Kulkarni, Yunhan Qiao, Matthew Davis, and Ziyan Chen, LLM-Guided Differential Fuzzing for Detecting Platform-Specific Bugs in Scientific Applications, in *proceedings of the IEEE International Conference on AI x Software Engineering (AIxSE)*, pages 59–66, Laguna Hills, CA, USA, October 2025. DOI: 10.1109/AIxSE64906.2025.00015
- Ruikai Huang, **Manish Motwani**, Idel Martinez, and Alessandro Orso, Generating REST API Specifications through Static Analysis. In *proceedings of the research track at the 46th International Conference on Software Engineering (ICSE)*, Lisbon, Portugal, April 2024. ACM artifact badges awarded: Artifact Available, Artifact Reusable. DOI: https://doi.org/10.1145/3597503.3639137
- **Manish Motwani** and Yuriy Brun, Better Automatic Program Repair by Using Bug Reports and Tests Together. In *proceedings of the technical track at the 45^{th} International Conference on Software Engineering (ICSE)*, pages 1225–1237, Melbourne, Australia, May 2023. ACM artifact badges awarded: Artifact Available, Artifact Reusable. DOI: 10.1109/ICSE48619.2023.00109
- **Manish Motwani** and Yuriy Brun, Understanding Why and Predicting When Developers Adhere to Code-Quality Standards. In *proceedings of the Software Engineering in Practice track at the 45^{th} International Conference on Software Engineering (ICSE-SEIP)*, pages 432–444, Melbourne, Australia, May 2023. DOI: 10.1109/ICSE-SEIP58684.2023.00045
- **Manish Motwani**, Mauricio Soto, Yuriy Brun, René Just, and Claire Le Goues, Quality of Automated Program Repair on Real-World Defects, *IEEE Transactions on Software Engineering (TSE)*, 2020. DOI: 10.1109/TSE.2020.2998785
- **Manish Motwani** and Yuriy Brun, Automatically Generating Precise Oracles from Structured Natural Language Specifications. In *proceedings of the technical track at the 41^{st} International Conference on Software Engineering (ICSE)*, pages 188–199, Montreal, QC, Canada, May 2019. ACM artifact badges awarded: Artifact Available, Artifact Reusable. DOI: 10.1109/ICSE.2019.00035
- Afsoon Afzal, **Manish Motwani**, Kathryn T. Stolee, Yuriy Brun, and Claire Le Goues, SOSRepair: Expressive

Semantic Search for Real-World Program Repair, *IEEE Transactions on Software Engineering (TSE)*, 2019. DOI: 10.1109/TSE.2019.2944914

- **Manish Motwani**, Sandhya Sankaranarayanan, René Just, and Yuriy Brun, Do Automated Program Repair Techniques Repair Hard and Important Bugs?, In *proceedings of the Journal First track at the 40^{th} International Conference on Software Engineering (ICSE)*, pages 25, Gothenburg, Sweden, May 2018.
- **Manish Motwani**, Sandhya Sankaranarayanan, René Just, and Yuriy Brun, Do Automated Program Repair Techniques Repair Hard and Important Bugs?, *Empirical Software Engineering (EMSE)*, 2018. DOI: 10.1007/s10664-017-9550-0

Referred Short Conference Publications

- **Manish Motwani**, High-Quality Automated Program Repair. In *companion proceedings of the IEEE/ACM 43^{rd} International Conference on Software Engineering: (ICSE-Companion)*, pages 309–314, Virtual (originally in Madrid, Spain), May 2021. DOI: 10.1109/ICSE-Companion52605.2021.00134.
- Smita Ghaisas, **Manish Motwani**, Balaji Balasubramaniam, Anjali Gajendragadkar, Rahul Kelkar, and Harrick Vin. Towards automating the security compliance value chain. In *proceedings of the Industrial Track at the 10^{th} Joint Meeting on Foundations of Software Engineering (FSE)*, pages 1014–1017, Bergamo, Italy, August 2015. DOI: 10.1145/2786805.2804435
- Smita Ghaisas, **Manish Motwani**, and Preethu Rose. Detecting System Use Cases and Validations from Documents. In *proceedings of the New Ideas and Emerging Results Track at the 28^{th} IEEE/ACM International Conference on Automated Software Engineering (ASE)*, pages 568–573, Palo Alto, CA, USA, November 2013. DOI: 10.1109/ASE.2013.6693114

Dissertation

- **Manish Motwani**. High-Quality Automatic Program Repair 2022. Doctoral Dissertations. 2696. University of Massachusetts, Amherst MA USA. DOI: 10.7275/30288519

Referred Workshop Publications

- Yashwanthi Anand, Rahil P. Mehta, **Manish Motwani**, and Sandhya Saisubramanian, Uncovering Systemic and Environment Errors in Autonomous Systems Using Differential Testing, in *proceedings of the AAAI Fall Symposium Series on AI Trustworthiness and Risk Assessment for Challenged Contexts (AAAI 2025 FS - ATRACC)*, Arlington, VA, USA, Nov 2025.
- Preethu R. Anish, SK. Sharma, **Manish Motwani**, and Smita Ghaisas. Knowledge-assisted Product Requirements Configurator. In *proceedings of the 4^{th} International workshop on Product Line Approaches in Software Engineering (PLEASE)*, pages 29–32, San Francisco, CA, USA, May 2013. DOI: 10.1109/PLEASE.2013.6608660

Patents

- Smita Ghaisas, **Manish Motwani**, Preethu R. Anish, Balaji Balasubramaniam, and Aarthy Krishnamurthy. Systems and Methods for an Automated Interpretation of Legal Regulations. United States Patent # US9972016B2, May 2018.
- Smita Ghaisas, **Manish Motwani**, Preethu Rose Anish, and Shashi Kant Sharma. Automated Classification of Business Rules from Text. United States Patent # US10146762B2, Dec 2018.

arXiv Preprints

- Matthew Davis, Aakash Kulkarni, Ziyan Chen, Yunhan Qiao, Christopher Terrazas, and **Manish Motwani**, Automatically Detecting Heterogeneous Bugs in High-Performance Computing Scientific Software, arXiv preprint arXiv:2501.09872, 2025

- Rahil P Mehta, Yashwanthi Anand, **Manish Motwani**, and Sandhya Saisubramanian, Uncovering Systemic and Environment Errors in Autonomous Systems Using Differential Testing, arXiv preprint arXiv:2507.03870, 2025
- **Manish Motwani** and Yuriy Brun, Automatically repairing programs using both tests and bug reports, arXiv preprint arXiv:2011.08340, 2020

Open–Source Software and Software Artifacts

- **HeteroBugDetect**: Automatically detecting heterogeneous bugs in high-performance computing applications. `https://doi.org/10.7910/DVN/VHO9RH`
- **AIProbe**: Black-box testing framework to identify and attribute execution anomalies in autonomous AI agents. `https://github.com/ANSWER-OSU/AIProbe`
- **Respector**: Automatically generate REST API specifications in the OpenAPI format using static program analysis. `https://github.com/nntzuekai/Respector`
- **Blues**: Information retrieval-based statement-level fault localization for automated program repair. `https://github.com/LASER-UMASS/Blues`
- **RAFL**: Combine fault localization results of multiple techniques using unsupervised rank aggregation algorithms. `https://github.com/LASER-UMASS/RAFL`
- **SBIR replication package**: Replication package for evaluating SBIR (SBFL and Blues combined using RAFL) and the repair performance of three APR techniques using SBIR on the Defects4J benchmark. `https://github.com/LASER-UMASS/SBIR-ReplicationPackage`
- **JaRFly**: Java repair framework. `http://JaRFly.cs.umass.edu/`
- **JaRFly replication package**: Replication package of evaluating JaRFly on the Defects4J benchmark. `https://github.com/LASER-UMASS/JavaRepair-replication-package`
- **Swami**: Automated test generation from natural language software specifications. `https://Swami.cs.umass.edu`
- **SOSRepair**: Expressive semantic search for real-world program repair. `https://github.com/squaresLab/SOSRepair/`
- **SOSRepair replication package**: Replication package for evaluating SOSRepair on the ManyBugs benchmark. `https://github.com/squaresLab/SOSRepair-Replication-Package`
- **Repair Applicability**: Data, scripts, and methodology for evaluating the applicability of automated program repair. `https://github.com/LASER-UMASS/AutomatedRepairApplicabilityData/`

Invited Talks and Panels

- **Invited Talk**, *AI Seminar*, **AI for Software Engineering (AI4SE): Opportunities and Challenges**, Oregon State University, January 2024.
- **Panelist**, *Birds of a Feather (BoF) Session on Software Testing for Scientific Computing in HPC*, Supercomputing Conference (SC), Denver, USA, November 2023.
- **Panelist**, *Key Challenges and Promising Research Directions for Program Repair*, 4th International Workshop on Automated Program Repair (APR), Melbourne, Australia, May 2023.

Formal Presentations

- **LLM-Guided Differential Fuzzing for Detecting Platform-Specific Bugs in Scientific Applications.** The *Regular Paper Track of the IEEE International Conference on AI x Software Engineering (AIxSE)*, Laguna Hills, CA, USA, Oct 2025.

- **Better Automatic Program Repair by Using Bug Reports and Tests Together.** The *Technical Track of the 45^{th} International Conference on Software Engineering(ICSE)*, Melbourne, Australia, May 2023.
- **Understanding Why and Predicting When Developers Adhere to the Code Quality Standards.** The *Software Engineering in Practice (SEIP) Track of the 45^{th} International Conference on Software Engineering(ICSE)*, Melbourne, Australia, May 2023.
- **High Quality Automated Program Repair.** The *Doctoral Symposium Track of the 43^{rd} International Conference on Software Engineering(ICSE)*, Virtual (originally Madrid, Spain), May 2021.
- **Automatically Generating Precise Oracles from Structured Natural Language Specifications.** The *Technical Track of the 41^{st} International Conference on Software Engineering(ICSE)*, Montreal, QC, Canada, May 2019.
- **Do Automated Program Repair Techniques Repair Hard and Important Bugs?** The *Journal First Track of the 40^{th} International Conference on Software Engineering(ICSE)*, Gothenburg, Sweden, May 2018.
- **Detecting System Use Cases and Validations from Documents.** The *New Ideas and Emerging Results Track of the 28^{th} IEEE/ACM International Conference on Automated Software Engineering (ASE)*, Palo Alto, CA, USA, Nov 2013.

Research Mentoring

- Kausar Moshood (1^{st} year PhD in CS, Oregon State)
  Automated testing and debugging of REST APIs, Sept 2025 – Present.
- Ninad Anklesaria (1^{st} year PhD in CS, Oregon State)
  Energy-Aware Testing of High-Performance Computing Scientific Software, Sept 2025 – Present.
- Akshith Gunasekaran (PhD Candidate, Oregon State)
  Automated Testing for Certificate Authority Software, April 2024 – Present.
- Rahil Mehta (2^{nd} year MS in CS, Oregon State)
  Automated Testing for AI agents, Jan 2024 – Present.
- Oscar Ludwig (4^{th} year Undergrad in CS, Oregon State)
  Automated Testing for High-Performance Computing Scientific Software, April 2025 – Present.
- Farzaan Wadiwalla (3^{rd} year Undergrad in CS, Oregon State)
  LLM-Guided Verification to Solve the Patch Overfitting Problem, June 2025 – Present.
- Aakash Kulkarni (graduated with MEng, Oregon State)
  Automated Testing for High-Performance Computing Scientific Software, April 2024 – June 2025.
- Matthew Davis (2^{nd} year PhD in CS, Georgia Tech)
  Heterogenous Memory Bug Detection in High-Performance Computing Applications, Jan 2024 – June 2025.
- Ruikai Huang (3^{rd} year PhD in CS, Georgia Tech)
  Generating REST API Specifications through Static Analysis, Sept 2022 – Aug 2023.
- Jerry Chen (1^{st} year MS in CS, Georgia Tech)
  Heterogenous Memory Bug Detection in High-Performance Computing Applications, Jan 2023 – Aug 2023.
- Declan Gray-Mullen (1^{st} year MS in CS, UMass Amherst)
  Detecting and Fixing Flaky Tests using the Source Code Coverage, Sept 2021 – Dec 2021.
- Priya Wagh, Madhuri Jadhav, and Nidhi Zanwar (1^{st} year BS students in CS, MIT Pune)
  Purpose-Centric Search for Enterprise Knowledge Reuse, Aug 2012 – April 2013.

Service

Professional Service

	2025
PC member	Research track, 34^{th} ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)
PC member	Industry Government and Communities track, 19^{th} ACM/IEEE Empirical Software Engineering and Measurement (ESEM) conference
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Reviewer	ACM Transactions on Software Engineering and Methodology (TOSEM) journal
Undergraduate Research Committee	Academic Year 2024-25, Oregon State University
	2024
PC member	Research track, 32^{nd} ACM International Conference on the Foundations of Software Engineering (FSE)
PC member	Industry Government and Communities track, 18^{th} ACM/IEEE Empirical Software Engineering and Measurement (ESEM) conference
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Reviewer	ACM Transactions on Software Engineering and Methodology (TOSEM) journal
Faculty search committee member	Computer Science, Academic Year 2023-24, Oregon State University
	2023
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Sub–reviewer	32^{nd} ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)
	2022
PC member	Challenge track at the 13^{th} Symposium on Search-Based Software Engineering (SSBSE)
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Reviewer	ACM Transactions on Software Engineering and Methodology (TOSEM) journal
Sub–reviewer	43^{rd} ACM/IEEE International Conference on Software Engineering (ICSE)
	2021
PC member	Challenge track at the 13^{th} Symposium on Search-Based Software Engineering (SSBSE)
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Reviewer	ACM Transactions on Software Engineering and Methodology (TOSEM) journal
	2020
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Sub–reviewer	42^{nd} ACM/IEEE International Conference on Software Engineering (ICSE)
Sub–reviewer	35^{th} IEEE/ACM International Conference on Automated Software Engineering (ASE)
	2019
Reviewer	IEEE Transactions on Software Engineering (TSE) journal
Sub–reviewer	41^{st} ACM/IEEE International Conference on Software Engineering (ICSE)
Sub–reviewer	27^{th} ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE)
	2018
Sub–reviewer	40^{th} ACM/IEEE International Conference on Software Engineering(ICSE)
Sub–reviewer	26^{th} ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE)
	2015
Sub–reviewer	23^{rd} IEEE International Requirements Engineering (RE) conference

Other Service

2018	
PhD student representative	Manning College of Information and Computer Sciences, UMass Amherst
2017	
Event–coordinator	Indian Students Association (ISA) committee, UMass Amherst
2014	
Event–coordinator	Recreational Activities Organization committee, TRDDC, Pune
2010	
Organization committee member	Felicity, annual cultural and technical fest of IIIT Hyderabad

Professional Associations

Member	Association for Computing Machinery (ACM)	2012 – present
Member	Institute of Electrical and Electronics Engineers (IEEE)	2019 – present