Madhurima Chakraborty

Software+ML Engineer/Researcher **| Ph.D.** candidate in Computer Science, UC Riverside
LinkedIn | Google Scholar | GitHub | Email

Broadly interested in the applied and fundamental aspects of programming languages, applications of software engineering and intelligent decision making; particularly developing structured code analysis and automated software testing or debugging techniques. My current research focuses on the intersection of machine learning and program analysis. **Actively seeking Full time positions.**

ACHIEVEMENTS

- **ACM Student Research Competition** Grand Finals, 2022 - Third Place, Graduate Category.
- **SPLASH Student Research Competition**, 2021 - Winner, Graduate Category.
- **Dean's Distinguished Fellowship** from University of California, Riverside, 2019
- **Student Travel Award**: ICLR 2020

KEY SKILLS

Programming	Python, JavaScript, TypeScript, Java, C/C++, Bash		
ML Libraries	numpy, pandas, scikit-learn, pytorch, transformers, matplotlib, seaborn		
Tools	Git, Docker	**Operating System**	Linux, MacOS, Windows
Database	SQL	**Version Control**	Git

EDUCATION

Ph.D. in Computer Science, **University of California, Riverside** 09/2019-present
GPA - 3.87/4 *Riverside, CA, USA*

B.Tech. in Information Technology, **RCC Institute of Information Technology** 05/2011-05/2015
GPA - 8.6/10 *Kolkata, WB, India*

EXPERIENCE

Research Intern 06/2022 - 09/2022
Microsoft Research *Seattle, WA, USA*
Code Defect Detection using LLMs: Investigated the application of machine learning to detect source-sink vulnerabilities in code using static analysis techniques and large language models. Developed a neural modeling framework to identify sanitized and unsanitized data flows for various Common Weakness Enumeration (CWE) vulnerabilities.

Computing Scholar 06/2024 - 09/2024
Lawrence Livermore National Lab *Seattle, WA, USA*
Pre/Post Condition Summaries: Developed program analysis capabilities in the ROSE compiler to automatically summarize pre and post-conditions of functions for C++ and Ada code.

Graduate Researcher 09/2019 - Present
University of California, Riverside *Riverside, CA, USA*

Data-driven Call Graph Optimizer: Trained a neural model to identify specific call types generated by dynamic call-graphs that are otherwise difficult for static call graph generators to capture, subsequently enhancing the static call graph with these relations to improve recall rates.
Call Graph Performance Optimization: Developed and implemented a novel technique for improving static call graph analysis in JavaScript, addressing performance challenges for real-world programs. Achieved impressive speed-up results in experimental evaluations on large Node.js-based programs and medium-sized web and mobile benchmarks, with minimal impact on recall and precision.
Call Graph Evaluation: Developed an automated technique to assess the significance of root causes in call graph unsoundness for JavaScript applications. Evaluated the performance of state-of-the-art call graph construction methods on web applications, identifying areas for improvement and offering valuable insights for analysis design.

Product Specialist 01/2018 - 05/2019
Cognizant Technology Solutions *Kolkata, WB, India*
- Migrated legacy mainframe-based applications to Java APIs, leveraging Java and H-Base, resulting in enhanced system efficiency and performance.
- Demonstrated strong software engineering skills in handling large codebases and integrating old systems into modern environments.

Senior Systems Engineer 08/2015 - 12/2017
Infosys Limited *Bhubaneshwar, Odisha, India*
- Led the development and maintenance of high-performance Mainframe applications.
- Implemented new features and performance improvements using COBOL, JCL, and DB2.

SELECTED PUBLICATIONS

1. **Chakraborty, Madhurima**, Aakash Gnanakumar, Manu Sridharan, and Anders Møller. "Indirection-Bounded Call Graph Analysis." In 38th European Conference on Object-Oriented Programming (ECOOP 2024).
2. **Chakraborty, Madhurima**, Renzo Olivares, Manu Sridharan, and Behnaz Hassanshahi. "Automatic root cause quantification for missing edges in javascript call graphs." In 36th European Conference on Object-Oriented Programming (ECOOP 2022).
3. **Chakraborty, Madhurima.** "A study of call graph effectiveness for framework-based web applications." In Companion Proceedings of the 2021 ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity, pp. 13-15. 2021. [**SPLASH Student Research Competition : Winner, Graduate Category**]
4. **Chakraborty, Madhurima**. "SPLASH: G: A Study of Call Graph Effectiveness for Framework-Based Web Applications." [**ACM Student Research Competition Grand Finals: Third Place, Graduate Category**]

ACCOLADES/INVOLVEMENTS

Academic Achievements
2023: Attended **Twelfth Summer School on Formal Techniques** at SRI.
2021: Participated in the **Programming Language Implementation Summer School**.
2020: Recognized a bug during **DeepCode's Bug Bounty program** at DeepCode.ai.
2018: Awarded the **Google Nanodegree Scholarship** for Front End Web Developer by Google India & Udacity.
2018: Shortlisted for the **International Women's Hackathon** by Hackerearth.

Professional Recognitions
2018: Received the **1 Star Award** at Cognizant Technology Solutions for exceptional performance.
2017: Earned the **Insta Award** at Infosys Limited for the successful implementation of a high-visibility project.
2017: Recognized with the **Insta Award** at Infosys Limited for excellent analytical skills.
2016: Acknowledged as a **High Performer Trainee** at Infosys Limited, awarded to the top 10% of employees.

Extracurricular and Leadership
2017: Achieved the **Division-level Public Speaking Champion** title at Toastmasters International.
2017: Earned the **Triple Crown Award** at Toastmasters International.

Synergistic Activities
Program Committee: **SAS'22 (AEC)**, **PLDI'24 (AEC)**, **SPLASH'24 (SV Co-Chair)**
Reviewer: **ECML PKDD'22**, **MSR 2025, TechDebt 2025**
Mentor: **Open Source Day** Summer 21.
Student Volunteer: **PLDI'20**, **SPLASH'20, ESEC/FSE'23**.