Jibesh **Patra**

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Education

Ph.D. in Computer Science — *University of Stuttgart*

2015–2021 — *Stuttgart, Germany*

Thesis: Analyzing Code Corpora to Improve the Correctness and Reliability of Programs

Part of the work was done at TU Darmstadt, Germany.

Master's in Computer Science — *National Institute of Technology (NIT)*

2011–2013 — *Durgapur, India*

Bachelor's in Computer Science — *West Bengal University of Technology*

2005–2009 — *Bankura, India*

Positions and Experience

Indian Institute of Technology Kharagpur (IIT KGP) — *Kharagpur, India*

Assistant Professor — *May 2024 - Present*

Primary responsibilities include teaching graduate and undergraduate students. Research topics on the applications of Machine Learning in Software Engineering, Programming Languages.

Honda Research Institute — *Offenbach am Main, Germany*

Senior Scientist — *Feb. 2023 - May 2024*

Research topics on the applications of Machine Learning in Software Engineering. Improve the overall quality of code and integrate better Software Engineering practices.

SAP SE — *Walldorf, Germany*

Senior Developer — *May 2021 - Jan. 2023*

I worked on improving the code quality of a large JavaScript code base by statically analyzing and refactoring commonly misused patterns. My work has reduced the overall build time of a large build infrastructure by 45%.

University of Stuttgart — *Stuttgart, Germany*

Research Assistant — *Mar. 2019 - Apr. 2021*

Moved along with the Software Lab research group. I worked on testing and program analysis, with focus on checking the correctness of programs. The highlights of my work are:

- Found bugs in real-world Python code using Deep Learning. The first step was to instrument a corpus of Python files and to execute them. This dynamic analysis step resulted in the training data for the Deep Learning model.
- Introduced realistic bugs in JavaScript programs that boosts the performance of learning based bug-finding approaches.
- I worked on predicting type signatures of JavaScript functions using Deep Learning. This work leveraged the natural language information present in variable names to successfully predict the return types.

TU Darmstadt

Darmstadt, Germany

RESEARCH ASSISTANT

Mar. 2015 - Feb. 2019

As part of the Software Lab research group, I worked on testing and program analysis, with focus on JavaScript. The highlights of my work are:

- In many cases, JavaScript libraries included in web pages write to the same global accesspath which may lead to unexpected behaviors for users. I investigated a way to detect such cases and found that many popular JavaScript libraries actually conflict when included together.
- I generated large number of JavaScript programs to fuzz test JavaScript engines like V8 and SpiderMonkey and found bugs in them.

Microsoft Research

Cambridge, United Kingdom

RESEARCH INTERN

Jun. 2018–Sep. 2018

The highlights of my work are:

- I worked on the applications of Machine Learning methods with source code as input.
- I used Recurrent Neural Networks (RNNs) to summarize code.

Microsoft Research

Bangalore, India

RESEARCH INTERN

Jun. 2017–Sep. 2017

The highlights of my work are:

- I understood simple protocols for secure multi-party computation and the syntax of a new programming language that implements such protocols.
- I specified the semantics of the new language.

Max Planck Institute for Software Systems

Kaiserslautern, Germany

INTERN

Oct. 2013–Dec. 2013

I explored program slicing and topics like causation and counterfactuals, to reason about their applications in ranking of program slices for asynchronous programs.

Max Planck Institute for Heart and Lung Research

Bad Nauheim, Germany

INTERN

Jun. 2013–Sep. 2013

I worked on the next generation sequencing area of Bioinformatics.

- I performed quality control of DNA sequence files.
- I set up a web server for the analysis process.
- I implemented an interface between the web server and an external cluster where the jobs can be submitted, making the analysis process faster.

Google Summer of Code

Remote

INTERN

May. 2012–Aug. 2012

I contributed to OpenMRS, an open source medical record system and integrated a file upload/download feature in one of its modules.

High School

West Bengal, India

ASSISTANT TEACHER

Aug. 2010–Aug. 2011

Apr. 2014–Jan 2015

I introduced coding to high school students.

Wipro Technologies

Hyderabad, India

PROJECT ENGINEER

May. 2010–Aug. 2010

As part of the training program, I learned system programming in Linux and implemented a project involving it.

Research Papers

Nalin: Learning from Runtime Behavior to Find Name-Value Inconsistencies in Jupyter Notebooks

*International Conference on Software Engineering (**ICSE**) [Core Rank A^*]*

Jibesh Patra, Michael Pradel

2022

We use data obtained from dynamic program analysis to train a neural model that finds bugs in real world Python code.

Semantic Bug Seeding: A Learning-Based Approach for Creating Realistic Bugs

*Foundations of Software Engineering (**ESEC/FSE**) [Core Rank A^*]*

Jibesh Patra, Michael Pradel

2021

Distinguished Paper Award

We generate large bug datasets by imitating real world bugs. We find that the generated bugs are useful in training learning-based bug detectors.

A Survey of Compiler Testing

*ACM Computing Surveys (**CSUR**) [Impact Factor 10.2]*

Junjie Chen, Jibesh Patra, Michael Pradel, Yingfei Xiong, Hongyu Zhang, Dan Hao, Lu Zhang

2020

Our work provides a comprehensive survey of various techniques used to test compilers.

NL2Type: Inferring JavaScript Function Types from Natural Language Information

*International Conference on Software Engineering (**ICSE**) [Core Rank A^*]*

Rabee Sohail Malik, Jibesh Patra, Michael Pradel

2019

We train neural models that aid developers by suggesting types in not-yet annotated JavaScript code. This work has directly inspired an approach called 'TypeWriter' that has been deployed at Facebook.

ConflictJS: Finding and Understanding Conflicts Between JavaScript Libraries

*International Conference on Software Engineering (**ICSE**) [Core Rank A^*]*

Jibesh Patra, Pooja N. Dixit, Michael Pradel

2018

Using dynamic program analysis, our work finds that when included together, even popular JavaScript libraries can cause unexpected behavior for users.

Automatically Reducing Tree-Structured Test Inputs

*International Conference on Automated Software Engineering (**ASE**) [Core Rank A^*]*

Satia Herfert, Jibesh Patra, Michael Pradel

2017

Our work leverages large corpora of code to reduce test inputs.

Learning to Fuzz: Application-Independent Fuzz Testing with Probabilistic, Generative Models of Input Data

Technical Report, TU Darmstadt

Jibesh Patra, Michael Pradel

2016

Our work learns probabilistic models of code from a large corpus and generates data for fuzz testing.

Congestion Balancing Global Router

*VLSI Design and Test (**VDAT**)*

Shyamapada Mukherjee, Jibesh Patra, Suchismita Roy

2013

We propose a solution to global routing for VLSI circuits.

Skills

Statically Typed Languages	C, Java
Dynamically Typed Languages	JavaScript, Python
Others	PyTorch, NumPy, pandas, Node.js, LaTeX, HTML
Natural Languages	English (fluent), German (intermediate), Bangla (fluent), Odia (fluent)

Teaching, Mentoring and Service

Instructor/Co-Instructor — *IIT Kharagpur, India*

Software Engineering
Software Engineering Laboratory
Object-Oriented Systems
Programming & Data Structures Lab

2024-Present

Teaching Assistant — *TU Darmstadt, Germany*, *University of Stuttgart, Germany*

Program Testing and Analysis
Programming Paradigms
Analyzing Software using Deep Learning
Machine Learning for Programming

2015-2021

Program/Evaluation Committee

CAIN'25 - Industry Track - Program Committee
FSE'25 - Poster Track - Program Committee
ISSTA'17 - Artifact Evaluation Committee

Student Volunteer — *ECOOP* *2016*, *ESEC/FSE* *2017*

Served as a student volunteer for conferences such as European Conference on Object-Oriented Programming (ECOOP) and Foundations of Software Engineering (ESEC/FSE).

Assistant Teacher — *Govt. of West Bengal, India* *2010-2011*, *2014-2015*

Introduced coding to high school students.

Awards and Grants

Distinguished Paper Award — *ESEC/FSE* *2021*

Semantic Bug Seeding: A Learning-Based Approach for Creating Realistic Bugs

Received the award for my paper at the European Software Engineering Conference and Symposium on the Foundations of Software Engineering conference.

ACM Travel Grant — *ICSE* *2018*

ConflictJS: Finding and Understanding Conflicts Between JavaScript Libraries

Received a travel grant of 620$ to present my paper at the International Conference on Software Engineering, held in Gothenburg, Sweden.

Prize for Good Supervision — *TU Darmstadt* *2017*

Supervision for Program Testing and Analysis course

Received the award *Preis für gute Betreuung*, along with my fellow teaching assistants, based on feedback from the participating students.

Distinguished Poster Award — *ECOOP* *2016*

Language-Independent Fuzz Testing with Probabilistic, Generative Models

Received the award for my poster at the European Conference on Object-Oriented Programming.