

# Jibesh Patra

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## Education

### Ph.D. in Computer Science

2015–2021

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

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

University of Stuttgart

Stuttgart, Germany

### Master's in Computer Science

2011–2013

National Institute of Technology

(NIT)

Durgapur, India

### Bachelor's in Computer Science

2005–2009

West Bengal University of

Technology

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.

**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

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

JIBESH PATRA, MICHAEL PRADEL

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

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

2022

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

JIBESH PATRA, MICHAEL PRADEL

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.

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

2021

## A Survey of Compiler Testing

JUNJIE CHEN, JIBESH PATRA, MICHAEL PRADEL, YINGFEI XIONG, HONGYU ZHANG, DAN HAO, LU ZHANG

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

ACM Computing Surveys (CSUR)  
[Impact Factor 10.2]

2020

## NL2Type: Inferring JavaScript Function Types from Natural Language Information

RABEE SOHAIL MALIK, JIBESH PATRA, MICHAEL PRADEL

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.

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

2019

## ConflictJS: Finding and Understanding Conflicts Between JavaScript Libraries

JIBESH PATRA, POOJA N. DIXIT, MICHAEL PRADEL

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

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

2018

## Automatically Reducing Tree-Structured Test Inputs

SATIA HERFERT, JIBESH PATRA, MICHAEL PRADEL

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

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

2017

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

JIBESH PATRA, MICHAEL PRADEL

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

Technical Report, TU Darmstadt

2016

## Congestion Balancing Global Router

SHYAMAPADA MUKHERJEE, JIBESH PATRA, SUCHISMITA ROY

We propose a solution to global routing for VLSI circuits.

VLSI Design and Test (VDAT)

2013

## Skills

<b>Statically Typed Languages</b>	C
<b>Dynamically Typed Languages</b>	JavaScript, Python
<b>Others</b>	PyTorch, NumPy, pandas, Node.js, $\LaTeX$ , HTML
<b>Natural Languages</b>	English (fluent), German (intermediate), Bangla (fluent), Odia (fluent)

## Teaching Assistant

TU Darmstadt, Germany  
University of Stuttgart, Germany

PROGRAM TESTING AND ANALYSIS

PROGRAMMING PARADIGMS

ANALYZING SOFTWARE USING DEEP LEARNING

MACHINE LEARNING FOR PROGRAMMING

Worked as teaching assistant for the above courses.

2015-2021

## Master's Thesis Adviser

TU Darmstadt, Germany

RABEE SOHAIL MALIK

2018

I served as an adviser for the work on inferring JavaScript function types from natural language information which led to a publication at ICSE 2018.

## Artifact Evaluation Committee

ISSTA

2017

Evaluated artifact submissions for International Symposium on Software Testing and Analysis (ISSTA).

## Student Volunteer

ECOOP

ESEC/FSE

2016

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

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## Distinguished Paper Award

ESEC/FSE

SEMANTIC BUG SEEDING: A LEARNING-BASED APPROACH FOR CREATING REALISTIC BUGS 

2021

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

CONFLICTJS: FINDING AND UNDERSTANDING CONFLICTS BETWEEN JAVASCRIPT LIBRARIES

2018

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

SUPERVISION FOR PROGRAM TESTING AND ANALYSIS COURSE 

2017

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

## Distinguished Poster Award

ECOOP

LANGUAGE-INDEPENDENT FUZZ TESTING WITH PROBABILISTIC, GENERATIVE MODELS 

2016

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