






# Debasmita Lohar

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## Education

- 2017 – Ongoing  **Ph.D., MPI-SWS**, Saarbrücken, Germany  
Thesis: *Expanding the Horizons of Finite-Precision Analysis*  
Advisor: Dr. Eva Darulova
- 2014 – 2017  **M.S. by Research, (GPA: 9.47/10.0)**, IIT, Kharagpur, India  
Thesis: *Formal Methods for Probabilistic Failure Analysis of Behavioral Specifications*  
Advisor: Dr. Soumyajit Dey
- 2009 – 2013  **B.Tech., (GPA: 8.45/10.0)**, Heritage Institute of Technology, Kolkata, India

## Research Interests





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|-----------------------|---|
| Formal Methods        |  Program Analysis, Abstract Interpretation, Model Checking |
| Approximate Computing |  Floating-Point Analysis, Fixed-Point Analysis             |
| Software Testing      |  Fuzzing Techniques                                       |

## Publications

- Lohar, D.**, Jeangoudoux, C., Volkova, A., & Darulova, E. (Sound Mixed Fixed-Point Quantization of Neural Networks, to appear at the International Conference on Embedded Software (EMSOFT) and ACM Transactions on Embedded Computing Systems, 2023).
- Lohar, D.**, Jeangoudoux, C., Sobel, J., Darulova, E., & Christakis, M. (2021). A two-phase approach for conditional floating-point verification. In *International conference on tools and algorithms for the construction and analysis of systems (TACAS)*.
- Lohar, D.**, Prokop, M., & Darulova, E. (2019). Sound probabilistic numerical error analysis. In *International conference on integrated formal methods (IFM)*.
- Lohar, D.**, Darulova, E., Putot, S., & Goubault, E. (2018). Discrete choice in the presence of numerical uncertainties. *International Conference on Embedded Software (EMSOFT) and IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*.
- Ghosh, S. K., **Lohar, D.**, Das, D., & Dey, S. (2017). Verifying stability guarantees of control software implementations in the presence of sensor level faults: Work-in-progress. In *International conference on embedded software (EMSOFT) companion*.
- Lohar, D.**, Dunaboyina, A., Das, D., & Dey, S. (2016). Failure estimation of behavioral specifications. In *International symposium on dependable software engineering: Theories, tools, and applications (SETTA)*.
- Lohar, D.**, & Dey, S. (2015). Integrating formal methods with testing for reliability estimation of component based systems. In *International symposium on software reliability engineering (ISSRE) workshops*.

## Open Source Contributions

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- [Blossom](#)  A framework for fuzzing numerical programs
- [Amazon FreeRTOS](#)  IoT operating system for microcontroller
- [Daisy](#)  A framework for accuracy analysis and synthesis of numerical programs
- [PropFA](#)  Probabilistic Path-based Failure Analyzer

## Work Experience

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- July 2022 – Oct 2022  **Research Intern, Microsoft Research**, Bangalore, India  
Project: *Synthesizing Data Privacy Attacks on Neural Networks*  
Supervisors: Dr. Akash Lal, Dr. Satya Lokam, and Dr. Rahul Sharma
- May 2019 – Jul 2019  **SDE Intern, Amazon Web Services (AWS)**, Boston, USA  
Project: *Memory Safety verification of Communication Protocols* ([blog post](#))  
Supervisor: Dr. Mark R. Tuttle
- Jul 2016 – Sept 2016  **Visiting Scholar, MPI-SWS**, Saarbrücken, Germany  
Project: *Verification of Programs with Probabilistic Inputs*  
Advisor: Dr. Eva Darulova
- Feb 2016 – May 2016  **Research Consultant, IIT**, Kharagpur, India  
Project: *RTOS Validation and Development Support*  
Sponsor: Hindustan Aeronautics Limited  
Principal Investigator: Prof. Dr. Pallab Dasgupta
- Sept 2013 – Jan 2016  **Research Consultant, IIT**, Kharagpur, India  
Project: *Architectural and Algorithmic Optimizations for speech-based Communication Interfaces on Mobile Devices*  
Sponsor: Intel Semiconductor (US) Limited  
Principal Investigator: Dr. Soumyajit Dey

## Mentoring Experience

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- Jun 2021 – Jun 2022  **SIGPLAN Long-Term Mentor**, Saarbrücken, Germany  
Mentee: Mugdha Khedkar, Paderborn University
- May 2021 – Jul 2021  **MPI-SWS Internship (Co-advisor)**, Saarbrücken, Germany  
Project: *Probabilistic Analysis of Large Floating-Point Programs*  
Student: Jai Arora, IIT Delhi
- May 2020 – Jul 2020  **MPI-SWS Internship (Co-advisor)**, Saarbrücken, Germany  
Project: *Automatic Verification of Floating-point Rust programs*  
Student: Joshua Sobel, University of Rochester
- Jun. 2018 – Aug. 2018  **DAAD Rise (Advisor)**, Saarbrücken, Germany  
Project: *Verifying Floating-Point Computations in Embedded Systems*  
Student: Milos Prokop, University of Edinburgh
- 2016  **B.Tech Thesis (Co-advisor)**, Kharagpur, India  
Project: *Implementation of a Tool for Probabilistic Failure Analysis*  
Student: Anudeep Dunaboyina, IIT Kharagpur

## Teaching Assistance

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- **Advanced Program Analysis (Block-seminar)**, Saarland University, March 2019
- **Program Analysis (WS18/19)**, Saarland University
- **Fault Tolerant Systems** (Spring 2016, 2015, 2014), IIT Kharagpur
- **Theory of Computation** (Fall 2015), IIT Kharagpur
- **Computer Organization and Architecture Lab** (Fall 2014), IIT Kharagpur

## Talks and Posters

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### Talks

- 2022 ▪ **Expanding the Horizons of Finite-Precision Analysis**, Microsoft Research, India
- 2021 ▪ 1. **A Two-Phase Approach for Conditional Floating-Point Verification**, FPTalks (virtual)  
2. **A Two-Phase Approach for Conditional Floating-Point Verification**, TACAS, Luxembourg (virtual)
- 2019 ▪ 1. **Sound Probabilistic Numerical Error Analysis**, iFM, Norway  
2. **Probabilistic Analysis of Programs with Numerical Uncertainties**, iFM Doctoral Symposium, Norway
- 2018 ▪ **Discrete Choice in the Presence of Numerical Uncertainties**, EMSOFT, Italy
- 2015 ▪ **Integrating Formal Methods with Testing for Reliability Estimation**, ISREEW, USA

### Posters

- 2020, 2019, 2018 ▪ **Cornell, Maryland, Max Planck Pre-doctoral Research School**, Saarbrücken, Germany
  1. *Verification of Finite-Precision Programs*
  2. *Daisy – Framework for Analysis of Numerical Programs*
  3. *Verifying Floating Point Computations for Branching*
- 2018 ▪ **Google's 6th Compiler and Programming Language Summit**, Munich, Germany  
*Discrete Choice in the Presence of Numerical Uncertainties*

## Other Activities

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### Program Committee Member

- Artifact Evaluation ▪ CAV'23, TACAS'22, CAV'21, TACAS'21
- WIP ▪ EMSOFT'19
- Paper Evaluation ▪ VLSI-D'16

### Other Professional Activities


- 2021 ▪ **Student Election Committee Member** of MPI-SWS
- **Admissions Committee Member** of International Max Planck Research School on Trustworthy Computing (IMPRS-TRUST)
- Invited to **Dagstuhl Seminar** on Approximate Systems (21302)
- **Organizing Committee Member** of Girl's Day at MPI-SWS

## Other Activities (continued)

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2014     **Organizing Committee Member** of Formal Methods Update Meeting

### Member of Professional Bodies

IEEE     Student Member, Young Professionals, Women in Engineering


### Other Diversity Activities


- 2021     1. Participated in Grace Hopper Celebration EMEA (virtual)  
2. Participated in Google's Women's Day Celebration (virtual)
- 2015     Participated in Grace Hopper Celebration India


## Skills


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### Coding


Functional     Scala, OCaml

High Level     C, Java, C++


Hardware Description     Verilog, VHDL


Low Level     Assembly Language Programming


Database     SQL


Others     HTML, CSS, Shell Scripts

### Software Packages

Formal Methods Tools     Astrée, CBMC, Z3, KLEE, Frama-C, LattE









Hardware Design Suites     Vivado Design Suite, ISE Design Suite, Altera Design Suite

Others     MATLAB, Netbeans, LaTeX, PocketSphinx

Operating Systems     Ubuntu, Fedora, CentOS, Yocto, Puppy Linux, MacOS, Windows

## Achievements

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-  Selected to participate in the **Marktoberdorf Summer School**, 2023
-  Selected to participate in the 10th **Heidelberg Laureate Forum**, 2023
-  Invited to **(virtual) Grace Hopper Celebration EMEA**, 2021
-  Won the **Best Presentation Award** at iFM PhD Symposium, 2019
-  Invited to **Google's 6th Compiler and Programming Language Summit**, 2018
-  Recipient of the **Max Planck Fellowship** for a wholly funded 3 months Internship (Jul. - Sept. 2016) at MPI-SWS, Saarbrücken, Germany
-  Recipient of **Student Scholarship** in Grace Hopper Celebration, India, 2015
-  Qualified in Graduate Aptitude Test in Engineering (GATE) with 99.55 percentile, India, 2013