



# Debasmita Lohar

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## Research Interests

Formal Methods	📌 Program Analysis, Abstract Interpretation, Model Checking
Approximate Computing	📌 Finite-Precision Analysis and Optimization
Software Testing	📌 Fuzzing Techniques

## Education

2017 – 2023 📌 **Ph.D., Saarland University, MPI-SWS, Saarbrücken, Germany**  
Thesis: *Expanding the Horizons of Finite-Precision Analysis*  
Advisor: Assoc. Prof. Dr. Eva Darulova

2014 – 2017 📌 **M.S. by Research (GPA: 9.47/10.0), Indian Institute of Technology 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**

## Work Experience

April 2024 – Ongoing 📌 **Postdoctoral Researcher, KASTEL, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany**  
Group: *Application-oriented Formal Verification* led by Prof. Dr. Bernhard Beckert

July 2022 – Oct 2022 📌 **Research Intern, Microsoft Research, Bangalore, India**  
Project: *Synthesizing Data Privacy Attacks on Neural Networks*  
Advisors: 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](#))  
Advisor: 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 Development Support* led by Prof. Dr. Pallab Dasgupta  
Sponsor: Hindustan Aeronautics Limited

Sept 2013 – Jan 2016 📌 **Research Consultant, IIT, Kharagpur, India**  
Project: *Architectural and Algorithmic Optimizations for speech-based Communication Interfaces on Mobile Devices* led by Dr. Soumyajit Dey  
Sponsor: Intel Semiconductor (US) Limited

## Publications

### Journal Articles

- 1 **Lohar, D.,** Jeangoudoux, C., Volkova, A., & Darulova, E. (2023). Sound mixed fixed-point quantization of neural networks. *ACM Transactions on Embedded Computing Systems (TECS)*.
- 2 **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)*.

## Conference/Workshop Proceedings

- 1 **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)*.
- 2 **Lohar, D.**, Prokop, M., & Darulova, E. (2019). Sound probabilistic numerical error analysis. In *International conference on integrated formal methods (IFM)*.
- 3 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*.
- 4 **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)*.
- 5 **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

<a href="#">Aster</a>	■ A mixed fixed-point quantizer for neural networks
<a href="#">Blossom</a>	■ A framework for fuzzing numerical programs
<a href="#">Amazon FreeRTOS</a>	■ IoT operating system for microcontroller
<a href="#">Daisy</a>	■ A framework for accuracy analysis and synthesis of numerical programs
<a href="#">PropFA</a>	■ Probabilistic Path-based Failure Analyzer

## Invited Talks

2024	■ <b>Aster: Sound Mixed Fixed-Point Quantizer for Neural Networks</b> , FPTalks (virtual) (up-coming)
2023	■ <b>Making Finite-Precision Analysis Practical</b> , HLF, Heidelberg, Germany
2022	■ <b>Expanding the Horizons of Finite-Precision Analysis</b> , Microsoft Research, Bangalore, India
2021	■ <b>A Two-Phase Approach for Conditional Floating-Point Verification</b> , FPTalks (virtual)

## Mentoring Experience

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

## Teaching Assistance

- **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

## Services

### Academic Activities

Program Committee	■	SETTA'24
Artifact Evaluation	■	CAV'23, TACAS'22, CAV'21, TACAS'21
WIP Committee	■	EMSOFT'19
Full Paper Subreview	■	FM'24, DATE'24, VLSI-D'16

### Miscellaneous

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|------|---|--|
| 2021 | ■ | <ol style="list-style-type: none"><li>1. Student Election Committee Member of MPI-SWS</li><li>2. Admissions Committee Member of International Max Planck Research School on Trustworthy Computing (IMPRS-TRUST)</li><li>3. Invited to Dagstuhl Seminar on Approximate Systems (21302)</li><li>4. Participated in Grace Hopper Celebration EMEA (virtual)</li><li>5. Participated in Google's Women's Day Celebration (virtual)</li><li>6. Organizing Committee Member of Girl's Day at MPI-SWS</li></ol> |
| 2015 | ■ | Participated in Grace Hopper Celebration India   |
| 2014 | ■ | Organizing Committee Member of Formal Methods Update Meeting, India  |

## Skills

Coding	■	Scala, C, Java, HTML, CSS, Shell Scripts
Software Packages	■	Astrée, CBMC, Z3, KLEE, Frama-C, LattE, Vivado Design Suite

## Achievements

- 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