

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, IIT, Kharagpur, India**
Thesis: *Formal Methods for Probabilistic Failure Analysis of Behavioral Specifications*
Advisor: Dr. Soumyajit Dey
GPA: 9.47/10.0
- 2009 – 2013 📖 **B.Tech., Heritage Institute of Technology, Kolkata, India**
GPA: 8.45/10.0

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

Journal Articles

- 1 **Lohar, D., Darulova, E., Putot, S., & Goubault, E.** (2018). Discrete choice in the presence of numerical uncertainties. *IEEE Trans. Comput. Aided Des. Integr. Circuits Syst.*, 37(11), 2381–2392.
🔗 doi:10.1109/TCAD.2018.2857320

Conference Proceedings

- 1 **Lohar, D., Jeangoudoux, C., Sobel, J., Darulova, E., & Christakis, M.** (2021). A two-phase approach for conditional floating-point verification. In *Tools and algorithms for the construction and analysis of systems - 27th international conference, TACAS 2021* (Vol. 12652, pp. 43–63). 🔗 doi:10.1007/978-3-030-72013-1_3
- 2 **Lohar, D., Prokop, M., & Darulova, E.** (2019). Sound probabilistic numerical error analysis. In *Integrated formal methods - 15th international conference, IFM 2019* (Vol. 11918, pp. 322–340).
🔗 doi:10.1007/978-3-030-34968-4_18
- 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 *Proceedings of the thirteenth ACM international conference on embedded software 2017 companion, EMSOFT 2017 companion* (2:1–2:2). 🔗 doi:10.1145/3125503.3125569
- 4 **Lohar, D.**, Dunaboyina, A., Das, D., & Dey, S. (2016). Failure estimation of behavioral specifications. In *Dependable software engineering: Theories, tools, and applications - second international symposium, SETTA 2016* (Vol. 9984, pp. 315–322). 🔗 doi:10.1007/978-3-319-47677-3_20

- 5 **Lohar, D., & Dey, S.** (2015). Integrating formal methods with testing for reliability estimation of component based systems. In *2015 IEEE international symposium on software reliability engineering workshops, ISSRE workshops* (pp. 33–36).  doi:10.1109/ISSREW.2015.7392033

Open Source Contributions

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

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

Mentoring Experience

Jun 2021 – Jun 2022	■ SIGPLAN Long-Term Mentor , Saarbrücken, Germany Mentee: Mugdha Khedkar
May 2021 – Jul 2021	■ MPI-SWS Internship (Co-advisor) , Saarbrücken, Germany Project: <i>Probabilistic Analysis of Large Floating-Point Programs</i> Student: Jai Arora
May 2020 – Jul 2020	■ MPI-SWS Internship (Co-advisor) , Saarbrücken, Germany Project: <i>Automatic Verification of Floating-point Rust programs</i> Student: Joshua Sobel

Mentoring Experience (continued)






- Jun. 2018 – Aug. 2018  **DAAD Rise (Advisor)**, Saarbrücken, Germany
Project: *Verifying Floating-Point Computations in Embedded Systems*
Student: Milos Prokop
- 2016  **B.Tech Thesis (Co-advisor)**, Kharagpur, India
Project: *Implementation of a Tool for Probabilistic Failure Analysis*
Student: Anudeep Dunaboyina

Teaching Assistance



-  **Advanced Program Analysis (Block-seminar)**, Saarland University, Mar 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

Talks

- 2022  **Expanding the Horizons of Finite-Precision Analysis**, Microsoft Research, Bangalore, India
- 2021  1. **A Two-Phase Approach for Conditional Floating-Point Verification**, FPTalks, Online
2. **A Two-Phase Approach for Conditional Floating-Point Verification**, TACAS, Luxembourg (virtual)
- 2019  1. **Sound Probabilistic Numerical Error Analysis**, iFM, Bergen, Norway
2. **Probabilistic Analysis of Programs with Numerical Uncertainties**, iFM Doctoral Symposium, Bergen, Norway
3. **Memory Safety Verification of FreeRTOS protocols**, Amazon Web Services, Boston, USA
- 2018  **Discrete Choice in the Presence of Numerical Uncertainties**, EMSOFT, Turin, Italy
- 2015  **Integrating Formal Methods with Testing for Reliability Estimation**, ISREE, Maryland, 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

Program Committee Member

Artifact Evaluation	■	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
2014	■	Organizing Committee Member of Formal Methods Update Meeting

Member of Professional Bodies

IEEE	■	Student Member, Young Professionals, Women in Engineering
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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

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

- 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

Achievements (continued)

- 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

References

Available on Request