SREEJA S NAIR

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RESEARCH AREAS

Distributed Systems, Programming Languages, Formal Verification, Replication and Consistency, Distributed Data Structures, Distributed Computing, Program Analysis, Abstract Interpretation, Algorithm Development.

WORK EXPERIENCE

- **Senior Technologist** at ZettaScale, France from September 2021
  - Working on anti-entropy protocols for edge computing.
- **PhD student** DELYS team, Laboratoire d'Informatique de Paris 6 (LIP6), INRIA, CNRS, Sorbonne Université, Paris from April 2018 to July 2021, advised by Marc Shapiro
  - Worked on a model for optimizing concurrency control in distributed systems.
  - Designed a coordination-free and safe design of a replicated tree data Structures.
  - Designed and developed a proof rule for verifying distributed applications.
- **Research Engineer** at LIP6, REGAL team, Paris from April 2017 to March 2018
  - Evaluated and improved an existing tool for verifying distributed applications using operation based update propagation.
  - Conceived a complementary tool for distributed applications using state based update propagation mechanism.
- **Associate Scientist** at ABB Corporate Research, India from August 2014 to April 2017
  - Involved in the research efforts on improving productivity of industrial automation engineers using program analysis
    - Implemented static code analysis tool for IEC 61131 languages (used for programming PLCs) which detects potential run-time errors, semantic errors and helps in checking conformance to coding guidelines which was piloted with more than 30 real-time projects with corroborated results.
    - Designed and implemented code dependency solver which visualizes and detects dependencies between different programs in automation engineering projects which was tested and corroborated with more than 300 real-life issues.
    - Generalised the program analysis framework for enabling the analysis of industrial robotic applications and measurement field device programs.
  - Mentored two masters thesis on constraint based program analysis.
  - Worked on a platform to provide Machine learning as a service.
- **Research Intern** at ABB Corporate Research, India from August 2013 to May 2014

  - Implemented a hybrid data-flow analysis and abstract interpretation based framework to detect potential run-time errors.

- **Technology Analyst** at Infosys Limited, India from September 2008 to July 2012
  - Designed, developed and documented database for a portfolio of applications for British Telecom.
  - Integrated client's billing system with a Geographical Information System.
  - Developed and maintained tool for workforce optimization for the company of 100,000 employees.
  - Proposed and implemented a method for automated data validation.

EDUCATIONAL DETAILS

- PhD in Computer Science from Sorbonne Université in 2021.
- Master of Technology in Electrical & Electronics Engineering from National Institute of Technology Calicut, India with Gold medal (9.15/10) in 2014.
- Bachelor of Technology in Electrical & Electronics Engineering from NSS College of Engineering, India (affiliated to University of Calicut) with First Class (71.5%) in 2008.

AWARDS AND HONORS

- Laureate of the third edition of the Séphora Berrebi Scholarships for Women in Advanced Mathematics & Computer Science.
  This is awarded per year for one female French PhD student in computer science. The selection is done by a very prestigious jury. The award consists of a research grant of €2000 and opportunities to talk at scientific events aimed at motivating students into Computer Science.
- Nomination for EASST Award-systematic and rigorous engineering of software & systems for ETAPS 2020.
- Extra Miler award from ABB Corporate Research in 2015 for exceptional collaboration with stakeholders and showing high level of technical leadership.
- Gold Medal for outstanding scholastic performance from National Institute of Technology Calicut, India in 2014.

INVITED TALKS

- "Exploring the coordination lattice" at the FRIDA Workshop, colocated with DISC 2021, 8th October 2021.
- "Invariant safety for distributed applications" at the Verification Seminar organised by IRIF at Paris, 15th March 2019.
- "Proving the safety of highly-available distributed objects" at
  - European Symposium on Programming, ESOP, Online, 30th March 2021.

- Cambium/Prosecco seminar at Inria Paris, 14th April 2020. (Cancelled due to COVID-19)
- Verification of Distributed Systems (VDS) in Marrakesh, Morocco. June 03-05, 2020. (Cancelled due to COVID-19)

PROFESSIONAL ACTIVITIES

- Program Committee member for PaPoC 2022
- Artifact Evaluaiton Committee member for EuroSys 2022, JSys 2022 and SOSP 2021.
- Co-reviewer for EuroSys 2019 and 2020, Middleware 2019, PODC 2019.
- Participated in RainbowFS a French ANR research project and LightKone an EU H2020 project.
- Co-advisor of masters thesis on
  - Worst case execution time of a control code in automation systems, defended in 2018.
  - on Static analysis of field measurement devices, 2017.

PUBLICATIONS

- Sreeja Nair. "Designing safe and highly available distributed applications". PhD thesis, Sorbonne Université, 2021.
- Sreeja S. Nair, Filipe Meirim, Mário Pereira, Carla Ferreira, Marc Shapiro. "A coordination-free, convergent, and safe replicated tree", Inria Research Report, RR-9395, LIP6, Sorbonne Université, Inria de Paris; Universidade nova de Lisboa. 2021.
- Sreeja S. Nair, Gustavo Petri, Marc Shapiro. "Proving the safety of highly-available distributed objects", 29^{th} European Symposium on Programming (ESOP), Dublin, Ireland, 2020, Published in LNCS Programming Languages and Systems. *Nominated for EASST Award-systematic and rigorous engineering of software and systems.*
- Sreeja S. Nair, Gustavo Petri, Marc Shapiro. "Invariant Safety for Distributed Applications", Workshop on Principles and Practice of Consistency for Distributed Data (PaPoC), Dresden, Germany, 2019.
- Sreeja S. Nair, Marc Shapiro, "Improving the "Correct Eventual Consistency" Tool", Inria Research Report, RR-9191, 2018.
- Avijit Mandal, Devina Mohan, Raoul Jetley, Sreeja S. Nair, Meenakshi D'Souza, "A generic static analysis framework for domain specific languages", Proceedings of the 23^{rd} IEEE International Conference on Emerging Technologies and Factory Automation (ETFA), Italy, 2018.
- Surabhi Jha, Meenakshi D'Souza, Raoul Jetley and Sreeja Nair, "Worst Case Execution Time Estimation for Control Code of Automation Systems," 2018 International Conference on Advances in Computing and Communication Engineering (ICACCE), Paris, 2018.
- Sreeja S. Nair, "Evaluation of the CEC (Correct Eventual Consistency) Tool", Inria Research Report, RR-9111, 2017.

- Avijit Mandal, Sreeja S. Nair, Raoul Jetley and Meenakshi D'Souza, "A static analyzer for Industrial robotic applications", Proceedings of the 28^{th} International Symposium on Software Reliability Engineering (ISSRE), France, 2017.

- Sreeja S. Nair and Raoul Jetley,"Solving Circular Dependencies in Industrial Automation Programs", Proceedings of IEEE 14^{th} International Conference on Industrial Informatics(INDIN), France, 2016.

- Sreeja S. Nair, Raoul Jetley, Anil Nair and Stefan Hauck-Stattelmann,"A Static Code Analysis Tool for Control System Software", Proceedings of 2015 IEEE 22^{nd} International Conference on Software Analysis, Evolution, and Reengineering (SANER), Pages 459-463, Montreal, Canada, 2015.