

Keyur Parag Joshi

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Education

- **University of Illinois at Urbana-Champaign (UIUC), USA**
August 2017 – May 2023 (Expected)
Ph.D in Computer Science advised by Sasa Misailovic
- **Indian Institute of Technology, Hyderabad (IITH), India**
August 2013 – May 2017
Bachelor of Technology (Honours) in Computer Science and Engineering
Valedictorian

Research Interests

- Programming languages and software engineering
- Testing and analysis of approximate and/or unreliable programs and systems
- Effective application of approximations in emerging domains

Current Research

I am currently a Research Assistant at UIUC advised by Sasa Misailovic. My current projects include:

- **State uncertainty estimation for autonomous robots:** Modern autonomous robots use neural networks to perceive their state and make control decisions. We adapt techniques such as polynomial chaos to estimate the uncertainty in the robot state over time, for robots employing such complex systems. We use the uncertainty estimates to evaluate robot safety guarantees.
- **Static analysis of accuracy of programs with recovery mechanisms:** We extend Chisel, a static analysis of quantitative accuracy of programs, with analysis for programs with (possibly imperfect) error checks and recovery mechanisms. We also integrate the analysis of Approxylizer, a tool for systematic analysis of program error caused by bitflips, to extend the scope of Chisel.

Publications

- **Diamont: Dynamic Monitoring of Uncertainty for Distributed Asynchronous Programs**
Vimuth Fernando, **Keyur Joshi**, Jacob Laurel, Sasa Misailovic
International Conference on Runtime Verification (RV 2021)
- **ApproxTuner: A Compiler and Runtime System for Adaptive Approximations**
Hashim Sharif, Maria Kotsifakou, Yifan Zhao, Akash Kothari, Ben Schreiber, Elizabeth Wang, Yasmin Sarita, Nathan Zhao, **Keyur Joshi**, Vikram Adve, Sasa Misailovic, Sarita Adve
ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPOPP 2021)
- **Aloe: Verifying Reliability of Approximate Programs in the Presence of Recovery Mechanisms**
Keyur Joshi, Vimuth Fernando, Sasa Misailovic
IEEE/ACM International Symposium on Code Generation and Optimization (CGO 2020)
- **Statistical Algorithmic Profiling for Randomized Approximate Programs**
Keyur Joshi, Vimuth Fernando, Sasa Misailovic
41st ACM/IEEE International Conference on Software Engineering (ICSE 2019)

- **Verifying Safety and Accuracy of Approximate Parallel Programs via Canonical Sequentialization**
Vimuth Fernando, **Keyur Joshi**, Sasa Misailovic
34th ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA/SPLASH 2019)
- **ApproxHPVM: A Portable Compiler IR for Accuracy-Aware Optimizations**
Hashim Sharif, Prakalp Srivastava, Muhammad Huzaifa, Maria Kotsifakou, **Keyur Joshi**, Yasmin Sarita, Nathan Zhao, Vikram S. Adve, Sasa Misailovic, Sarita Adve
34th ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA/SPLASH 2019)
- **Identifying Optimal Parameters for Randomized Approximate Algorithms**
Vimuth Fernando, **Keyur Joshi**, Darko Marinov, Sasa Misailovic
Workshop on Approximate Computing Across the Stack (WAX 2019) (Co-located with PLDI 2019)

Professional Experiences

- Summer 2021 – Member of the OOPSLA 2021 Artifact Evaluation Committee
- Fall 2020 – Teaching assistant for the Software Engineering course at UIUC
- Spring 2018 – Co-organized the Brett Daniel Software Engineering Seminar at UIUC

Talks and Presentations

- **Conference Talk:** Aloe: Verifying Reliability of Approximate Programs in the Presence of Recovery Mechanisms *at CGO 2020*
- **Conference Talk:** Statistical Algorithmic Profiling for Randomized Approximate Programs *at ICSE 2019*
- **Seminar Talk:** Monitor-Based Statistical Model Checking for Weighted Metric Temporal Logic *at the Brett Daniel Software Engineering Seminar, UIUC*
- **Lightning Talk:** Implementation of a Cache Miss Calculator in LLVM/Polly *at the LLVM in HPC workshop, SC 2017*
- **Seminar Talk:** Triangular inequality for compiler-based strength reduction *at the Brett Daniel Software Engineering Seminar, UIUC*

Tools

- **AxProf:** Statistical Algorithmic Profiling for Randomized Approximate Programs: tool, examples, and tutorial available at axprof.org

Skills

- **Languages:** Extensive experience with Python, C++, C, `git`, and \LaTeX . Moderate experience with Java and LLVM.
- **OS:** Experience in programming for GNU/Linux and Windows environments.
- **Teamwork:** Experience working on research and engineering projects in teams of 2-5 individuals.