Keyur Parag Joshi

Room 3107, Thomas M. Siebel Center for Computer Science
University of Illinois at Urbana-Champaign, USA
Email: kpjoshi2@illinois.edu Phone: 217-904-6096 Website: kpjoshi.com

Education

- **University of Illinois at Urbana-Champaign (UIUC), USA**
  August 2017 – May 2022 (Expected)
  Ph.D Student 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

Current Research

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

- **Dynamic Tracking of Reliability, Accuracy, and Fairness for Approximate Parallel Programs:** We bring existing analyses that are only available for sequential programs to parallel programs by generating an equivalent sequential program from the parallel program.
- **Accuracy of Programs with Recovery Mechanisms:** We quantify the increase in accuracy of inaccurate programs that attempt to fix errors, for example, by re-executing computations. Existing analyses have limited support for statically reasoning about such recovery mechanisms.
- **Tuning Approximate Sparse Graph Algorithms:** Approximate algorithm accuracy bounds are often based on conservative over-approximations. We experiment with increasing approximation beyond recommended settings while still maintaining accuracy, with a focus on sparse graph algorithms.

Honors and Awards

- Awarded a travel grant by the LLVM Foundation to attend SC 2017
- Awarded the President of India's Gold Medal for achieving the highest GPA across all undergraduate programs at IIT Hyderabad (graduated 2013)

Previous Research Experience

- Spring 2018 – Co-organized the Brett Daniel Software Engineering Seminar at UIUC
- Summer 2016 – Internship at ENS/INRIA Paris under Albert Cohen

Publications

- **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)

Talks and Poster Presentations

- **Poster Presentation:** AxProf: Statistical Algorithmic Profiling for Randomized Approximate Programs: Midwest PL Summit 2019
- **Conference Talk:** Statistical Algorithmic Profiling for Randomized Approximate Programs: ICSE 2019
- **Seminar Talk:** Statistical Algorithmic Profiling for Randomized Approximate Programs: Brett Daniel Software Engineering Seminar, UIUC
- **Seminar Talk:** Monitor-Based Statistical Model Checking for Weighted Metric Temporal Logic: Brett Daniel Software Engineering Seminar at UIUC
- **Lightning Talk:** Implementation of a Cache Miss Calculator in LLVM/Polly: LLVM in HPC workshop, SC 2017
- **Seminar Talk:** Triangular inequality for compiler-based strength reduction: Brett Daniel Software Engineering Seminar at UIUC

Teaching Experience

- Fall 2020 – Teaching assistant for the Software Engineering course at UIUC (*ongoing*)
- 2016 – Teaching assistant for the Compilers course at IIT Hyderabad
- 2015 – Teaching assistant for the Programming Languages course at IIT Hyderabad

Tools

- **AxProf:** Statistical Algorithmic Profiling for Randomized Approximate Programs: available with tutorial at `axprof.org`

Skills

- **Languages:** Extensive experience with C,C++, Python, Java, LaTeX, and LLVM
- **Programming Environments:** Experience using Visual Studio and Emacs

Activities

- **Leadership:** Served as the head of the Programming and Security Clubs at IIT Hyderabad
- **Social Service:** Volunteered for the National Service Scheme (NSS) of India