

# Shraddha Barke

<http://shraddhabarke.github.io/>

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## RESEARCH STATEMENT

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I am interested in programming languages and formal methods research, with an emphasis on automated program synthesis and verification techniques. My goal is to develop synthesis tools and apply the techniques to various domains such as Human-computer interaction and Linguistics.

## EDUCATION

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- **University of California San Diego** San Diego, CA  
*PhD in Computer Science; GPA: 4.00* *Aug. 2018 – Present*
- **Birla Institute of Technology and Science** Goa, India  
*Bachelor of Engineering in Electronics and Instrumentation* *Aug. 2013 – July. 2017*

## PUBLICATIONS

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- Bieniusa, A., Zeller, P., and **Barke, S.** *Collaborative Work Management with a Highly-Available Kanban Board*. Principled Software Development - Essays Dedicated to Arnd Poetzsch-Heffter on the Occasion of his 60th Birthday
- (Under Submission) Sarracino, J., **Barke, S.**, Polikarpova, N., and Lerner, S. *Targeted Program Synthesis for Programming with Invariants*.

## RESEARCH EXPERIENCE

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- **University of California San Diego** California  
*Graduate Researcher advised by Dr.Nadia Polikarpova* *August 2018 - Present*
  - Designing a constraint-based synthesis from examples system to tackle the problem of learning phonological rules.
  - Expressed phonological rule as constraints over the features of speech sounds and encoded them as SAT queries.
  - Developed an optimization which can be used to reduce the number of variables in the SAT queries.
  - Successfully synthesized Russian devoicing and Korean deaspiration, **PhonoSynthesis** is currently under rapid development.
- **University of California San Diego** California  
*Graduate Researcher advised by Dr.Sorin Lerner* *May 2018 - July 2018*
  - Worked on an HCI project of inferring loop invariants through gamification.
  - Contributed to the development of INVGAME, a game in which players guess loop invariants by implementing interesting data structures like arrays.
  - Successfully evaluated **PyBoogie** on multiple benchmarks which indicated that arrays work as expected.
- **Technische Universitt Kaiserslautern** Germany  
*Research Intern hosted by Dr.Annette Bieniusa* *July 2017 - February 2018*
  - Contributed to the development of **Repliss** verification system for developing correct applications on top of weakly consistent databases with strong guarantees
  - Extended the tool to support built-in conflict resolution data types for managing the state of replicas.
  - Developed a collaborative editing application as testing framework for **Antidote**, a distributed database with transactional causal consistency and replicated data types
  - Used stateless model checking tool, Concuerror for testing and verifying certain Antidote components.

## • **Tata Institute of Fundamental Research**

Mumbai, India

*Junior Research Fellow hosted by Dr. Ashutosh Gupta*

*May 2016 - Dec 2016*

- Contributed to the development of **TARA** verification system for fence synthesis of programs under relaxed memory models.
- Implemented optimizations for the happens-before formula synthesis algorithm and extended the tool to consider data and address dependencies
- Refined the constraint encoding formula that enables minimal fence synthesis using a Boolean maximal satisfiability solver
- Evaluated benchmarks using mutual exclusion algorithms and achieved optimal fence placement for small and medium-sized programs.

## • **Linux Foundation**

Remote

*Software Developer Intern mentored by Greg Hartman*

*Dec 2015 - Mar 2016*

- Contributed over **500** patches to kernel code that cover refactoring of code increasing efficiency, updating API interfaces and merged drivers out of staging after fixing checkpatch and sparse warnings.
- Implemented DMA support for drivers and error checking mechanism for memory allocation during DMA mapping.
- Ranked **6** among the most active developers in terms of patches for 4.4 Linux version by **LWN.net**

## TALKS AND WORKSHOPS

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- Attended **Verification and Mentoring Workshop (VMW)** and **CAV 2017**, Heidelberg with full scholarship.
- Attended **Programming Languages Mentoring Workshop (PLMW)** and **POPL 2017**, Paris with full scholarship.
- Invited speaker at LinuxCon Europe 2016, Berlin for **Outreachy** panel talk Staging drivers cleanup.
- Invited speaker at **Grace Hopper 2016**, India for workshop on **Diving into Open Source with Linux Kernel**.
- Invited speaker at **SciPy 2016**, India for talk titled **Raspberry PI based Smart Greenhouse for environment monitoring and control**.
- Awarded best presentation titled **Fence Synthesis in weak memory models** (among 24 students) at **CSA Undergraduate Summer school**, Indian Institute of Science, Bangalore
- Selected to attend **Coq Winter School 2018**, University of Nice Sophia Antipolis

## SERVICE AND LEADERSHIP

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- **Outreachy Linux Kernel Co-coordinator** - Outreachy coordinator for providing application support for Linux Kernel applicants, reviewing patches during the application period, collaborating with mentors for the Linux Kernel projects and being a communication bridge between mentors, applicants, interns and organizers of the program.
- **PhD Admissions Student Committee, UCSD** - Member of student committee for PhD admissions in the Computer Science and Engineering department.
- **Diversity Committee, UCSD** - Member of department-wide committee in Computer Science and Engineering, composed of students, faculty, and staff dedicated to highlighting and expanding efforts to improve diversity.
- **Grace Hopper Conference 2018** - Committee member responsible for reviewing applications for the open source track.
- **Grace Hopper Conference 2017** - Committee member responsible for reviewing applications for the open source track.

## TECHNICAL SKILLS

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- **Languages:** Scala, Python, Haskell, C++, Java
- **Web Development:** HTML, CSS,, Jekyll, Django, Flask, MySQL
- **Verifiers, Solvers and theorem provers:** Dafny, Infer, vcc, z3, why3, Coq
- **IDEs:** IntelliJ, Eclipse, Visual Studio