

Nishant Totla

University of California, Berkeley

CONTACT INFORMATION

nishant@eecs.berkeley.edu

(510) 684 5667

<http://www.eecs.berkeley.edu/~nishant/>

EDUCATION

University of California, Berkeley

August '12 - present

Graduate Student in Electrical Engineering and Computer Sciences

Advisor: Sanjit Seshia

Areas of interest: Formal Methods, Programming Languages, Software Synthesis and Verification

Indian Institute of Technology Bombay

July '08 - May '12

Bachelor of Technology in Computer Science, Minor in Mathematics

GPA: 9.36/10

SCHOLASTIC ACHIEVEMENTS

- *Qualcomm Innovation Fellowship* for the year 2013-14
- *Gold Medal* at the 39th International Physics Olympiad (2008), Hanoi, Vietnam
- *Aditya Birla Group Scholarship 2008* for securing an *All India Rank 2* in IIT Joint Entrance Examination (IIT-JEE) 2008 out of 320,000 students
- Placed among *top 25* students in India in the Indian National Mathematics Olympiad (2007)
- *National Gold Medal* in the Indian National Physics Olympiad (2008)
- *National Gold Medal* in the Indian National Chemistry Olympiad (2008)
- *National Gold Medal* in the Indian National Astronomy Olympiad (2007, 2008)
- *CBSE merit scholarship* for securing an *All India Rank 43* in All India Engineering Entrance Examination (AIEEE) 2008 out of 800,000 students

INTERNSHIPS

Twitter, Inc.

June '14 - August '14

Growth Tactics Engineering Team

[Software Engineering Intern]

- Worked on designing dashboards for internal metrics
- Contributed to internal Scala frameworks for running batch jobs

Synthesis from Incompatible Specifications

May '11 - July '11

Advisors: Pavol Černý, University of Colorado, Boulder; Thomas Henzinger, IST Austria

[Research Intern, IST Austria]

- Developed algorithm to create optimal implementation to minimize distance from two incompatible specifications using simulation and bisimulation distance defined between state machines
- Published work in 2012 EMSOFT Conference, Tampere, Finland

Complete Instantiation-based Interpolation

May '10 - July '10

Advisors: Thomas Wies, New York University; Thomas Henzinger, IST Austria

[Research Intern, IST Austria]

- Built a generic framework to build new interpolation procedures via reduction to existing interpolation procedures. Problems in an extended theory are reduced to those in a base theory
- Obtained the first complete interpolation procedures for theories of arrays and linked-lists
- Published work in 2013 POPL Conference, Rome, Italy

PUBLICATIONS

- Phitchaya Mangpo Phothilimthana, Tikon Jelvis, Rohin Shah, **Nishant Totla**, Sarah Chasins, Rastislav Bodík, “Chlorophyll: Synthesis-Aided Compiler for Low-Power Spatial Architectures”, *Proceedings of the 35th Annual Conference on Programming Language Design and Implementation (PLDI)*, ACM Press, 2014
- **Nishant Totla**, Thomas Wies, “Complete Instantiation-based Interpolation”, *Proceedings of the 40th Annual Symposium on Principles of Programming Languages (POPL)*, ACM Press, 2013
- Pavol Černý, Sivakanth Gopi, Thomas A. Henzinger, Arjun Radhakrishna, **Nishant Totla**, “Synthesis from Incompatible Specifications”, *Proceedings of the 12th Annual Conference on Embedded Software (EMSOFT)*, ACM Press, 2012

RESEARCH
EXPERIENCE

Programming Model for Secure Hardware

September '14 - present

Advisor: Sanjit Seshia, UC Berkeley

[Graduate Student Researcher, UC Berkeley]

- Exploring approaches for programming hardware that provides security features (eg. Intel SGX) such as memory protection and attestation
- Focusing on automatic program partitioning using security annotations

Massive Parallelization for SAT Solvers

June '13 - May '14

Advisor: Sanjit Seshia, UC Berkeley

[Graduate Student Researcher, UC Berkeley]

- Designed a hybrid parallelized SAT Solver based on a combination of the portfolio and divide-and-conquer approaches
- Optimized the solver specially for model checking and verification benchmarks

Synthesis-based Compiler for GreenArrays

November '12 - September '14

Advisor: Rastislav Bodík, UC Berkeley

[Graduate Student Researcher, UC Berkeley]

- Developed a retargetable (hardware independent) compiler toolchain
- Framework based on program synthesis, currently optimized for the GreenArrays GA144 chip
- Published work in 2014 PLDI Conference, Edinburgh, UK

Comparing Expressive Power of Temporal Logics

August '11 - May '12

Advisors: S Krishna, IIT Bombay; Paritosh Pandya, TIFR

[Bachelors' Thesis, IIT Bombay]

- Proved results comparing expressive powers of various fragments of Metric Temporal Logic, using Ehrenfeucht-Fraïssé (EF) games
- Discovered several previously unknown expressibility results, with simple proofs

CLASS
PROJECTS

Automatic Generation of Program Invariants

August '12 - December '12

Guide: George Necula, UC Berkeley

- Extensively surveyed major theoretical and heuristic techniques for automatically generating program invariants
- Techniques specially focused on completeness for integer programs

Crowd-sourcing for Software Debugging and Verification

August '12 - April '13

Guide: Sanjit Seshia, UC Berkeley

- Designed a framework for human-aided program verification
- Users provide complex invariants that require creativity, and automatic techniques are used to discharge proofs

Extracting Variant Data from Templatized Web Pages

January '11 - May '11

Guide: Sudarshan S, IIT Bombay

- Developed a tool that learns the template of a website from a small set of representative web pages, and uses the template to extract only relevant variant data
- Built a search index on specific sites using this tool, demonstrating more relevant search results

LEADERSHIP
EXPERIENCE

- Institute Student Mentor during 2011-12, responsible for mentoring 14 freshmen and providing guidance for academic and extracurricular activities at IIT Bombay
- Department Academic Mentor during 2011-12, part of a team of student mentors to guide and motivate academically weak students from the Dept. of Computer Science, IIT Bombay
- TechniC Core Group Member, worked for promotion and organization of technical activities and competitions at IIT Bombay

EXTRA-
CURRICULAR
ACTIVITIES

- *19th position* at the onsite regional finals of the *ACM International Collegiate Programming Contest 2011* held at Amrita University
- Selected (among 14 students from around the world) to witness the launch of the satellite Measat 3a from Baikonur Cosmodrome, Kazakhstan (June 22, 2009)
- Awarded Certificate of Special Mention for excellence in technical activities for 2008-09 by IIT Bombay