Rohan Bavishi

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CONTACT & PROFILES

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RESEARCH INTERESTS

Program Analysis & Verification
Program Synthesis
Compiler Optimizations

RESEARCH-RELEVANT SKILLS

Source Code Knowledge:
Expert: CBMC • Intermediate: Z3

API Knowledge:
Proficient: MathSAT | MiniSAT

RELEVANT COURSEWORK

Fundamentals of Computing
Data Structures & Algorithms
Discrete Mathematics
Introduction to Electronics
Mathematics - Calculus
Mathematics - Linear Algebra
Logic for Computer Science
Abstract Algebra
Computer Organisation
Operating Systems
Theory of Computation
Advanced Algorithms

PROGRAMMING SKILLS

C • C++ • Python • LaTeX • Bash
HTML • Verilog

COMPETITIVE PROGRAMMING

SPOJ
SOLVED: 145 | WORLD RANK: 964

Project Euler
SOLVED: 234/502
INDIA RANK : 12 | WORLD : 895

EDUCATION

B.Tech | Computer Science | INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
Expected July 2013 – Aug 2017 | GPA : 9.6/10.0 (Overall)

HSC | Class 12 | SHIVAJI SCIENCE COLLEGE, NAGPUR
May 2013 | Aggregate : 90.16%

AISSCE | Class 10 | MODERN SCHOOL, NAGPUR
May 2011 | Aggregate : 96.4%

RESEARCH PROJECTS

Fault localization using Craig Interpolants

July 2015 - Ongoing | Under Prof. Subhajit Roy | (Source will be released after publication)

Ongoing research project in fault localization, using the CBMC model checker, coupled with interpolation procedures from the MathSAT 5 solver.

- Modified major sections of CBMC to accomodate trace formula generation for test-cases.
- Added significant number of modules in CBMC for efficient interaction with the MathSAT interpolation engine.
- Developed a working version of the state-of-the-art fault localization tool BugAssist for comparision. Quality of our tool's fault localization results is higher as compared to BugAssist.

DirectFix Implementation in CBMC

May 2015 - July 2015 | Under Prof. Subhajit Roy | Code

Implemented the automated repair algorithm, from scratch, described in the DirectFix publication using the model checker CBMC, and the Z3 solver for the MaxSAT formulation.

- Added multiple modules in CBMC to use the trace formula to generate the component based encoding (CBE) to be passed as an SMT-Lib formula to Z3.

ACADEMIC PROJECTS

Median Algorithms for Disk-Resident Data

Aug 2014 – Nov 2014 (Second Year) | Under Prof. Surender Baswana | Report

Independently developed a 2-pass deterministic and a 2-pass randomized algorithm to find median of large data-sets (1 Terabyte) with performance tests.

- Deterministic algorithm similar to the original paper by Munro-Paterson(1980) - An ϵ-approximate median is calculated in the first pass, followed by the exact median value in the second pass.
- Randomized algorithm employed basic random-sampling techniques using Mersenne-Twister PRNG. Success probability close to 0.6 achieved for medium-sized data-sets (10-50 GB)

Peer-to-Peer Dropbox

Aug 2013 – Nov 2013 (First Year) | Under Prof. Subhajit Roy | P2P Dropbox

A Linux application for back-up and syncing of files between two or more peers

- Users have a shared folder across different machines, with local copies, in which any changes made are synced across all devices
- Linux inotify API used to track changes in the shared folder and rsync used to sync the modifications to ensure efficient transfer
- Multithreading with mutexes used to parallelize syncing and file-monitoring operations

AWARDS & ACHIEVEMENTS

- Academic Excellence Award 2013-2014
- Secured an All-India-Rank of 202 in JEE Advanced 2013 amongst 150,000 candidates
- Secured an All-India-Rank of 175 in JEE Mains 2013 amongst 20,00,000 candidates
- Secured an All-India-Rank of 33 in AMTI - Mathematics Olympiad 2013
- Best Overall Student (2011-2013) - Shivaji Science College, Nagpur