

Shaan Vaidya

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IIT Bombay

Computer Science & Engineering

4th Year Undergraduate

GPA: 9.18/10.0

INTERESTS

Programming Languages, Formal Methods, Logic in computer science

PUBLICATIONS

Verification of Timed Asynchronous Programs * [DOI]

Parosh Abdulla, Mohamed Faouzi Atig, Krishna S., **Shaan Vaidya**

38th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2018)

* Names of authors sorted alphabetically by last name

RESEARCH PROJECTS

On the Verification of Timed Asynchronous Programs

Ongoing since Summer'18

Guide: Prof. Parosh Abdulla, Prof. Mohamed Faouzi Atig

Uppsala University

- Modelled multi-threaded timed asynchronous programs with a set of timed automata augmented with multisets
- Defined and analysed the control state reachability and general reachability problems for the model
- Recognised a special class of the model with better complexity results for the verification problems
- Working on generalising the model with stacks (for recursive programs) and proving stronger complexity results
- Worked on writing a full length research paper which has been accepted at FSTTCS 2018

Sampling Traces of a Symbolic Transition System

Ongoing since Autumn'18

Guide: Prof. Supratik Chakraborty, Prof. Krishna S.

IIT Bombay

- Exploring algorithms to (approximately) uniformly sample n -length traces of a symbolic transition system
- Developed an exact sampling algorithm based on Algebraic Decision Diagrams
- Implemented and analysed the new algorithm using the CUDD package inside the ABC tool
- Contrasted the performance with an algorithm based on the Unigen tool for approximate sampling

Static C Program Analyzer

Autumn'17

Guide: Prof. Supratik Chakraborty

Elective Project

- Integrated predicate abstraction into a static verifier for C - CAnalyzer, developed at IIT Bombay
- Used Z3 SMT solver, for modelling the abstract state and for checking the validity of assertions
- Implemented domain operators for join, meet, widen, assignments and conditional statements

Transducer based learning text editor web tool

Summer'17

Guide: Prof. Mikołaj Bojańczyk

University of Warsaw

- Contributed in ideating and developing a text editor which can learn custom edits based on user selections
- Custom edits modelled on MSO formulae of the type A , $\text{next}A$, $\text{prev}A$, $\text{Auntil}B$, $\text{Asince}B$ and minimal classifier consistent with user input is selected

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 85** in **JEE-Mains** out of **1.3 million** candidates across India (2015)
- Secured **All India Rank 161** in **IIT JEE-Advanced** out of 150,000 students in India (2015)
- Amongst the **National Top 1%** in National Standard Examination in Astronomy (2015)
- Amongst the **Statewise Top 1%** in National Standard Examination in Physics (2015)

Scholarships

- Recipient of the prestigious **KVPY** (Kishore Vaigyanik Protsahan Yojna) Fellowship by the Dept. of Science and Technology, Govt. Of India (2014)
- Recipient of the **NTSE** (National Talent Search Examination) Scholarship by NCERT, New Delhi (2013)

ACADEMIC PROJECTS

Compiler for subset of C language

Guide: Prof. Uday Khedker

Autumn'17
Course Project

- Developed a compiler for a subset of C grammar involving pointers, for the MIPS instruction set using **ply** - a python version of the **lex/yacc** toolset
- Implemented type-conversion and scope resolution using control flow graphs and symbol tables
- Provided support for language constructs such as for-loops, while-loops, if-then-else
- Support for nested procedure calls, pointer indirection, dynamic memory allocation, procedure overloading

Buy & Sell Application

Guide: Prof. S. Sudarshan

Autumn'17
Course Project

- Developed an Android application that works as a platform to connect Buyers and Sellers in a small area/institution
- Used PostgreSQL as a backend database to store information of the objects posted, and authentication
- Provided support various features viz. item images, categorization, comments, likes, follow item, request an item
- Implemented a search algorithm for items using GIN indices

Classification of news articles based on headlines

Guide: Prof. Ganesh Ramakrishnan

Spring'17
Course Project

- Trained a model to classify news headlines into news categories using SVM and Neural Network as classifiers
- Used TFIDF and word2vec for feature extraction and compared performance
- Compared performance of Chi square, Variance Threshold, Principal Component Analysis algorithms

FPGA-based ATM controller

Guide: Prof. Supratik Chakraborty

Spring'17
Course Project

- Developed an ATM Controller in VHDL for an FPGA board; backend server with account database in C
- Implemented the Tiny Encryption Algorithm for encrypting all communication between ATM & backend
- Designed and implemented protocols for communication across FPGA boards over Ethernet

Gesture Recognition Tool

Institute Technical Summer Project

Summer'16
IIT Bombay

- Used libraries in Python (OpenCV, Numpy) to build a gesture recognition app
- Used webcam to detect hand, and track its lateral movements to record gestures
- Gestures used to perform tasks like toggle apps, volume control, etc. without external mouse/keyboard input

TECHNICAL SKILLS

Programming

Fluent in C/C++, Python, Java; familiar with VHDL, Bash & R

Web Development

JavaScript, HTML, CSS, Django, jQuery, PostgreSQL

Softwares

MATLAB, git, GNU Octave, Wireshark, \LaTeX

POSITIONS OF RESPONSIBILITY

Teaching Assistant, IIT Bombay

Spring '18

- CS 228 - Logic for Computer Science under Prof. G. Sivakumar

Mentor, Department Academic Mentor Programme

2018 - Ongoing

- Mentor to 6 students for their academic and general concerns, and helping them cope with the curriculum
- Mentor to 2 students in academic rehabilitation program (ARP), and helping them get back on track

EXTRACURRICULARS

- Attended the Third Indian **SAT+SMT School** at IIIT Hyderabad (2018)
- Attended the **UPMARC Multicore Computing Summer School** held at Uppsala University, Sweden (2018)
- Attended **Lipa Summer School** alongwith **ICALP** held in Warsaw (2017)
- Won Scratch Day - Game Making Competition organised by the Web & Coding Club, IIT Bombay (2015)
- Successfully completed a year of social service under the National Service Scheme (NSS) IIT Bombay recording audio-books for the visually impaired (2015)
- Attended the **Vijyoshi National Science Camp** organized by Indian Institute of Science, Bangalore (2014)