Anubhav Sharma
Computer Science & Engineering
Indian Institute of Technology Bombay

143059004
M.Tech.
Male
DOB: 21/03/1991

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2017	9.43
Undergraduate Specialization: Computer Science				
Graduation	Panjab University	CCET	2012	78.80
Diploma	PSBTE	CCET	2009	79.00
Matriculation	CBSE	GMHS	2006	85.80

POST-GRADUATION RESEARCH WORKS

- **An abstraction based approach towards translation validation**
  M.Tech Project, Guided by Prof. Amitabha Sanyal and Prof. Supratik Chakraborty *(May 2016 - Ongoing)*

  Objective

  To formally validate the equivalence of a program before and after optimization.

  Approach:

  - Since peephole optimizations leave most portions of the code unchanged, we abstract out identical regions of code between the source and target programs.
  - A joint transition graph which captures concurrent and synchronized execution of the source and target programs along these abstract blocks is then constructed.
  - A set of properties of the joint transition graph are then used to prove the validity of the translation.

- **A survey on software verifiers**
  M.Tech Seminar, Guided by Prof. Amitabha Sanyal and Prof. Supratik Chakraborty *(Spring 2015)*
  - A survey on the effectiveness of software verifiers to help solving the problem of translation validation was done.
  - Working of various bounded and unbounded software verifiers such as SATABS, Corral, CBMC, UFO was analyzed and experimented with.
  - Learned about predicate abstraction and counter-example guided abstraction refinement.

WORK EXPERIENCE

- **Infosys, India**
  Software Engineer *(12 months)*
  - Implemented UI and functionality enhancements and corresponding automated unit test cases for Open Rules Engine based management system.
  - Attended training modules on network security covering SQL injection, XSS attacks, shell injection, HTTP headers modification etc.
  - Learned basics of JSP, Servlets, Hibernate and the MVC architecture.

TECHNICAL SKILLS

- **Programming Languages**: C, C++
- **Scripting Languages**: Python, bash, awk, sed
- **Tools**: Git, LaTeX, Vim, Beamer, Eclipse
- **Basic Knowledge**: Java, OpenGL, Javascript
- **Designer Tools** : Photoshop, Illustrator, Flash, Kuler
- **Operating Systems**: Windows, Linux

SELECTED COURSES

Functional Programming	Kernel Programming	Machine Learning
Formal Specification and Verification	Program Analysis	Computer Networks
Computer Graphics	Algorithms and Complexity	Automata and Logic

KEY PROJECTS

- **Formally verified correctness of the STL implementation of red-black trees**
  Formal Specification and Verification of Programs, Prof. Supratik Chakraborty *(Autumn 2015)*
  - Analyzed the function **_Rb_tree_insert_and_rebalance** in STL implementation which inserts a new node into the red-black tree and rebalances if necessary.
  - Verified the property that after insertion of a new node, the new tree still satisfies the constraints of a red-black tree.
  - Used separation logic based verifier **Verifast** to write heap based preconditions, postconditions and loop invariants for validation.

- **Performance monitoring tool using PMU**
  Kernel Programming, Prof. Purushottam Kulkarni *(Spring 2016)*
  - Interfaced with the PMU provided by modern CPUs to sample the occurrences of various events in the system.
  - Wrote a **linux kernel module** which calculates the amount of time spent in each function of a program and the number of L1 caches misses, branch mispredictions at each instruction in a program.
  - Studied the source code of the linux utility **perf** and compared its results with our module.

- **Discovering global variable accesses made in procedures**
  Program Analysis, Prof. Uday Khedkar *(Autumn 2015)*
  - An access based **interprocedural analysis** was done to partition the data space for procedures based on the variables accessed within a procedure and its callees.
  - Discovered such variables locally and then propagated information over the call graph.
  - Implemented this module as a plugin in gcc-4.7.2 by analyzing **GIMPLE**, the intermediate representation (IR) of GCC.

- **Modeled and Animated a Transformer using OpenGL**
  Computer Graphics, Prof. Parag Chaudhuri *(Autumn 2014)*
  - An interactive Transformer model was created using **OpenGL** primitives.
  - Implemented a basic animation recording interface using OpenGL library to capture keyframes.
  - Designed and created a short animation by interpolation of captured key-frames.
  - Grasped the basics of **Modeling Viewing Pipeline**, 3D Transformations, Shading and Animation.

- **Song Genre Classification based on Audio Spectrum**
  Foundations of machine learning, Prof. Ganesh Ramakrishnan *(Spring 2016)*
  - Used YAAFE for extracting various features of an audio such as ZCR, loudness, spectral flux, spectral roll-off, timbre.
  - Experimented with various classification algorithms like SVM, Neural Network, Random Forest in R.
  - Achieved an accuracy of **85%** on GTZAN standard song dataset.

- **Network simulation trace analysis with NS3**
  Software Lab, Prof. Bhaskar Raman *(Autumn 2014)*
  - Integrated multiple software tools to automate the analysis and report generation of experiments.
  - Analyzed simulated network data transfer logs using python, sed, awk and automated report creation using pyplot and LaTeX.

- **REPA - Regular Parallel Arrays**
  Functional Programming, Prof. Amitabha Sanyal *(Autumn 2014)*
  - REPA is a Haskell library for high performance, regular, multi-dimensional parallel arrays.
  - Implemented a subset of the functionalities provided by the REPA library.
  - Analyzed the effect of parallelization while running various types of algorithms that involve arrays.

POSITIONS OF RESPONSIBILITY

- **System Administrator, IIT Bombay (2014-2016)**
  - Replaced the department's single database server with a multi-master three node cluster setup.
  - Added **haproxy**, a high availability proxy server to provide load balancing between the server nodes.
  - Wrote scripts in bash and python for network monitoring, iptables manipulation and lab maintenance.
  - Wrote **puppet** modules to automate installation of softwares and creation/deletion of users.

ACHIEVEMENTS AND ACTIVITIES

- Was among top **0.5%** in GATE Computer Science among 1.5 lakh candidates.
- Won the Kresit Premier League and runners up in PG Cricket Tournament and Department Cricket League.
- Participated in the Department Football Tournament and Hostel Carrom Championship.
- Successfully designed, developed and sold various web-based computer games.