Saurav Shekhar

Final Year Undergraduate
Department of Computer Science and Engineering
Indian Institute of Technology Kanpur

sshekh@iitk.ac.in
(+91) 8953441464

Education

Year	Degree/Certificate	Institute	CGPA/Percentage
2016 (expected)	Bachelor of Technology	Indian Institute of Technology, Kanpur	9.2/10 (6 semesters)
2012	AISSCE, XII (CBSE)	Javahar Vidya Mandir, Ranchi (C.B.S.E.)	95.2%
2010	AISSE, X (CBSE)	DAV Public School, Gumla(C.B.S.E.)	10.0/10.0

Academic achievements and activities

- Received **Academic Excellence Award** for the year 2012-13
- Teaching Assistant for the Data Structures and Algorithms course
- Secured All India Rank **958** in **IIT-JEE** among 500,000 candidates
- Secured All India Rank **554** in **AIEEE** among 1,000,000 candidates
- Qualified **Regional Mathematical Olympiad(RMO)** 2012
- Selected in **Top 1%** of each of the National Standard Examination in Physics **(NSEP)**, Chemistry **(NSEC)** and Astronomy **(NSEA)**. Qualified for **Indian National Physics Olympiad**, **Indian National Chemistry Olympiad** and **Indian National Astronomy Olympiad** for the year 2011-12

Internships

Real-time Market Data Monitor *May '15 - July '15*

Summer internship at Goldman Sachs, Bangalore

Application is capable of consuming market data from various sources. Functionality includes monitoring and alerting on stale, missing or malformed data

- Implemented monitoring and alerting for latency spikes and various market data sanity checks
- Improved market data subscription
- Abstracted out various monitoring and alerting functionalities so that these can be reused across multiple market data source systems
- Technology Used: Java, JNI, Bash, Reuters RFA API

Projects

Random Graphs *July '15 - ongoing*

Undergraduate project under Prof. Surender Baswana, IIT Kanpur

- Studied Erdos-Renyi phase transitions and explored simple proofs for the same
- Explored expected linear time algorithms for finding connected components and biconnected components
- Currently working on average case analysis of Algorithm I (Surender Baswana and Shahbaz Khan, incremental algorithm for maintaining a DFS tree in an undirected graph, ICALP 2014). Aim is to show that on average, Algorithm I runs in time $O(n^2)$ (same as Algorithm II) compared to the worst case time of $O(n^{3/2}\sqrt{m})$

Intelligent Surveillance System *May '14 - July '14*

Summer project under Prof. Harish Karnick, IIT Kanpur

- Involved improving the video surveillance system for traffic monitoring in the campus of IIT Kanpur. Studied various methods for background subtraction and motion detection (optical flow) for selecting candidate frames that contain useful data in the surveillance video
- Implemented a real-time system for adaptive background subtraction using Gaussian Mixture Model
- Extracted candidate license plate areas from the images and enhanced those using morphological operations as a first step towards Optical Character Recognition
- Implemented Viola-Jones object detection framework for vehicle classification using OpenCV.

Scala to MIPS Assembly Compiler *Jan '15 - Apr '15*

Course Project in Compilers under prof. Subhajit Roy, IIT Kanpur

- Programmed a Scala to MIPS cross compiler with support for basic datatypes, conditional statements, looping statements, arrays, nested functions, recursion and object oriented features

- Awarded as the second best project for the course out of 22 teams

Extension of NACHOS *Aug '14 - Nov '14*

Course Project in Operating Systems under prof. Mainak Chaudhuri, IIT Kanpur

- Extended the standard system call library of NachOS and implemented Fork, Exec, Join, Yield, Sleep, Exit system calls
- Implemented process scheduling algorithms like UNIX scheduling, FIFO, Round robin, SJF and non-preemptive scheduling and assessed the results
- Programmed page replacement algorithms: Random allocation, FIFO, LRU and LRU-clock and evaluated relative performance

Concurrent data Structures in Haskell *July '15 - Nov '15*

Course project in Functional Programming under Prof. Piyush Kurur, IIT Kanpur

- Aim was to develop a non-blocking queue data structure in Haskell
- Implemented Michael & Scott's lock-free queue algorithm
- Used atomic-primops package for CAS and other atomic operations
- Project developed as an open source Cabal Package

R on Hadoop *Aug '14 - Nov '14*

Course project in CS52 under prof. Arnab Bhattacharya, IIT Kanpur

- Setup a Hadoop cluster on an IBM Bladeserver and install RHadoop packages on the server
- Allowed distributed processing of R-code on the Hadoop cluster
- This project was selected as one of the best in the course

Short Projects

Oz programming language interpreter *Sept '14*

Course project in Principles of Programming Languages(CS350) under Prof. Satyadev Nandakumar, IIT Kanpur

- Implemented a meta-circular interpreter for a declarative sequential model of Oz
- Implemented the semantic stack and single assignment store using an easy-to-parse abstract syntax tree

Cuckoo Hashing *Apr '15*

Course project in Randomized Algorithms under Prof. Surender Baswana, IIT Kanpur

- Studied Cuckoo Hashing and its average case runtime analysis

Planar Graph Visualisation *Jan '13 - Apr '13*

Semester project under ACA, IIT Kanpur

- Studied various methods like Coffman-Graham algorithm to minimize crossings in Planar Graph Drawing
- Studied basic Graph Theory along with various properties of Planar Graphs and heuristics of Graph drawing

Technical Skills

Programming Languages: C, C++, Java, Python, Haskell, LaTeX, Perl, HTML, PHP, Bash Shell Scripting
Softwares: MySQL, MongoDB, GIT, MIPS Assembly, Gnuplot, Octave

Relevant Courses

Fundamentals of Computing	Computer Organization	Approximation Algorithms
Computing Laboratory	Operating Systems	Compilers
Mathematics I (Basic Calculus)	Theory of Computation	Functional Programming (ongoing)
Mathematics II (Linear Algebra)	Principles of Programming	Applied Stochastic Processes
Data Structures and Algorithms	languages	(ongoing)
Discrete Mathematics	Randomized Algorithms	

Miscellanous

- Secured 6^{th} position among top 25 teams selected (among 8000 in online rounds) for the Codechef Snackdown onsite finale 2015
- Secretary, Programming Club (*Academic Year 2013-2014*) - Assisted in organizing Programming competitions and took introductory programming lecture for the freshers.
- Secured 1^{st} place in **IHPC**, high performance computing contest in **Techkriti 14**.
- Worked with a team of 5 members on creating and testing the problems for IOPC, the annual 24 hr long algorithmic programming contest during Techkriti 2015. 901 teams participated in the contest.
- Worked as Academic Mentor for Fundamentals of Programming course.