

SAURAV SHEKHAR

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

sauravshekhar01@gmail.com

(+91) 8953441464

EDUCATION

Year	Degree/Certificate	Institute	CGPA/Percentage
2016 (expected)	Bachelor of Technology	Indian Institute of Technology, Kanpur	9.1/10 (7 semesters)
2012	AISSCE, XII (CBSE)	Jawahar 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

- Received **Academic Excellence Award** for the year 2012-13.
- 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

Probabilistic Modelling using Deep learning techniques

Jan '16 - Apr '16

Course project in Probabilistic Machine Learning under Prof. Piyush Rai, IIT Kanpur

- Studied Deep exponential families, a class of latent variable models and used a working version for topic modelling on KOS blog entries from the UCI ML Bag of Words dataset
- Studied Generative Adversarial networks, a framework for estimating generative models and implemented a working version on MNIST and CIFAR datasets

Object classification in Surveillance videos

Jan '16 - Apr '16

Course project in Machine Learning, tools and techniques under Prof. Harish Karnick, IIT Kanpur

- Aim of the project was to classify objects into pre-defined classes (2/4 wheelers, pedestrian etc)
- Used selective search and background subtraction techniques to extract candidate region proposals for classification
- Extracted feature using various methods like SIFT, HOG, Convolutional Neural Networks, Autoencoders and Restricted Boltzman Machines. Used classification algorithms like Random Forests, SVM and Decision trees and compared the results.
- On image classification, achieved an accuracy of more than 90% using CNNs.

Low Rank Matrix recovery and completion via Convex Optimization

Apr '16

Term paper in Convex Optimization under Prof. Ketan Rajawat, IIT Kanpur

- Studied, implemented and compared the current best algorithms for low rank matrix recovery like the accelerated proximal gradient algorithm, Augmented Lagrange Multiplier method etc.
- Also compared them with other matrix completion via nuclear norm minimization techniques.

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.

Random Graphs

July '15 - Nov '15

Undergraduate project under Prof. Surender Baswana, IIT Kanpur

[link to report](#)

- Studied Erdos-Renyi phase transitions and explored simple proofs for the same
- Explored expected linear time algorithms for finding connected components and biconnected components
- Worked 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).

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

Advanced audio equalizer

May '13 - June '13

Summer Project under Programming Club, IIT Kanpur

- Developed an audio equalizer in Java that used Fourier transform to break a song into its frequency range.
- Variable ranges of frequency could be filtered out accurately using GUI.
- Used Minim Audio library and Processing development Environment.

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.

Takneek,IITK 2013

(Aug '13)

- Implemented an application to search through timeline of a given friend of the user or the user himself based on the given time interval and keywords and auto comment on the search results.
- Used Facebook's SDK and fuse.js for robust search. Won 1st place.

Cuckoo Hashing

Apr '15

Term paper 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, L^AT_EX, Perl, HTML, PHP, Bash Shell Scripting

Softwares: MySQL, MongoDB, GIT, MIPS Assembly, Gnuplot, Octave

RELEVANT COURSES

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

* Expected to be completed by April 2016

MISCELLANEOUS

- Secured 6th position among top 25 teams selected (among 8000 in online rounds) for the Codechef Snackdown onsite finale 2015
- 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. Teaching Assistant for Data Structures and algorithms course
- Secured position **11** and **20** among 6000 Indian participants in Codechef July challenge and June challenge 2014 respectively
- Secured 1st place in **IHPC**, high performance computing contest in **Techkriti 14**.
- Secured 2nd place in **Battlecity**, AI bot programming challenge in **Techkriti 14**.
- Github Handle [sshekh](#)