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Education

Degree / Certificate	Institution	CPI / Percentage
B.T, Computer Science and Engineering (2015)	IIT Kanpur,India	7.8 / 10.0*
Class 12 : CBSE Board (2011)	KV 2 GCF, Jabalpur	88.8%
Class 10 : CBSE Board (2009)	KV 2 GCF, Jabalpur	91.6%

*after completion of 6 semesters

Scholastic Achievements

- Achieved an **All India Rank (AIR) 210** in **IIT-JEE'11** in which nearly 5Lac students appeared.
- Secured **AIR 17 Rank (State Topper)** in **AIEEE'11** in which nearly 11Lac students appeared.
- Secured AIR 18 in 13th National Science Olympiad *(2010 – 11)*.
- Secured AIR 54 in 12th National Science Olympiad *(2009 – 10)*.
- Secured AIR 65 in 10th National Cyber Olympiad *(2010 – 11)*.
- Secured International Rank 147 in 4th International Mathematics Olympiad *(2010 – 11)*.
- Secured AIR 155 in 9th National Cyber Olympiad *(2009 – 10)*.
- Secured AIR 558 in 10th National Science Olympiad *(2008 – 09)*.
- Secured AIR 32 in KV JMO, class 10th *(2008-09)*.

Algorithmic Programming

- **ACM-ICPC** regionalist *2013*, Kanpur region.
- **ACM-ICPC** regionalist *2013,* Amritapuri region.
- My team secured overall 15th rank (1st from IIT Kanpur) in IOPC, Techkriti'14, IIT Kanpur.
- My team secured 2nd prize at XCEED'13 (optimization problem contest), organized by Kurukshetra'13, Anna University.
- My team came 2nd in Instant (Algorithmic programming contest), organized by Techkriti'13, IIT Kanpur.
- Best rating of **1385** in algorithm competitions at **Topcoder** (Handle: bhupkas).
- Best rating of **1710** in **codeforces** (Handle: bhupkas).
- World rank in top **600** at **Spoj** among more than 130, 000 registered users. (Handle: bhupkas).

Internship

Summer Intern Project at Samsung Research Institute , Noida   (May '14 – July '14)
- Improvised Linux kernel 3.4.5 for **IPv6 android CTS test**.
- Analyzed the complete packet flow through linux kernel for RX and TX packets.
- Developed **Android application** to ping devices on IPv4 and IPv6 addresses using socket communications.
- Designed python script to parse and find C functions and add desired statements in a file.

Projects

Multiclass Object Classification   (Aug '14 - ongoing)
Undergraduate project under Prof. Vinay Namboodiri, IIT Kanpur
- Aim is to classify huge set of images into one of given thousand classes using **Machine Learning** techniques such as **Exemplar SVMs.**
- Image is represented as a vector containing maximum scores of each **Classifier Patch** in each dimension.

Compiler for C#: Compiler Design   (Jan '14 – April '14)
Compilers course project under Prof. Subhajit Roy, IIT Kanpur
- Built a C# compiler in C, which generates code for SPIM architecture.
- The final compiler had support for **basic data types, composite date** types like multi-dimensional arrays, **operators, statements, functions (pass by reference and value, recursion)**.
- Input programs passes through four analysis stages (**lexical analysis, syntax analysis, semantic analysis, and code generation**) to give assembly code for SPIM.

Document Clustering for Hindi and English documents (Jan '14 – April '14)
Artificial Intelligence course project under Prof. Amitabha Mukherjee, IIT Kanpur
- Clustered Hindi and English documents into various groups using **k-means** clustering algorithm.
- The preprocessing was done by removing the stop words , stemming the similar words to a single word and then using then using the **Bag of Words** model for document representation.
- Similarity measures used for measuring the distance between documents are **Euclidean , Cosine , Pearson , Jaccard , Manhattan** and **Chebychev**.

Extention of NachOS (Aug '13 – Nov'13)
Operating System course project under Prof. Mainak Choudhary, IIT Kanpur
- Implemented **syscalls** such as **fork**, **execv** , **join** , **sleep** on NachOS.
- Implemented **shared memory** along with semaphore support and virtual memory to run large programs.
- Implemented **page replacement algorithms** and **process scheduling algorithms** such as **random** , **FIFO** , **round-robbin** and **shortest job first.**

Packet Sniffer (Aug '13 – Nov'13)
Computer Networks course project under Prof. Dheeraj Sanghi, IIT Kanpur
- Implemented a packet sniffer in C which works on LAN as well as Wifi.
- Based on parameters given , we can filter packets based on protocol type , length , interface type , destination.

Smallest Enclosing Circle (May '13 – July '13)
Summer project under Prof. Surender Baswana, IIT Kanpur
- Implemented the existing **randomized algorithm** for finding the smallest enclosing circle of given points in a plane.
- Analyzed the algorithm experimentally, and proved the **average linear time complexity** of the algorithm experimentally.
- Designed **online applets** which shows how the algorithm works.

8-bit programmable computer on FPGA (Jan '13 – April '13)
Computer Architecture course project under Prof. Subhajit Roy, IIT Kanpur
- Built 8-bit programmable **general purpose computer on FPGA** using Verilog as hardware description language.
- The computer could perform basic **arithmetic and logical** operations on 2 inputs.
- Using these instruction set , functions like **Fibonacci(n)** , **Factorial(n) ,** uptimer and downtimer were implemented.

Jigsaw Puzzle (Jan '13 – April'13)
Computing Laboratory under Prof. Arnab Bhattacharya, IIT Kanpur
- Designed Jigsaw Puzzle, in which user can drag the pieces and put them in their correct places to win the game.
- Algorithm was implemented in python and the GUI was provided using Pygame.

Card Game 29 (May'12 - July '12)
Summer project under Programming Club, IIT Kanpur
- Developed a computer version of the card game 29, which provides an interface to play the cards.
- A single user plays against **three computer players**.
- Used elementary **Artificial Intelligence algorithms** to design the moves of the computer players.
- Provided GUI using wxPython.

Genetic Programming (Jan'12 - April'12)
Semester project under Association of Computing Activities, IIT Kanpur
- Implemented a genetic algorithm to solve the **Brachhistochrone Problem**.
- Took random sample and genetically improve them, till we get an almost optimal solution.

Technical Skills	
Programming Languages	C, C++, Python
Web	HTML,CSS, JavaScript, PHP,mysql
Platforms	Windows, Linux , Android
Tools	Latex, Beamer, Make, Shell, GNU Octave, wxPython, PYgame

Relevant Courses

- Operating Systems
- Computer Networks
- Compilers
- Theory of Computation
- Randomized Algorithms
- Artificial Intelligence
- Design and Analysis of Algorithms
- Intro. to Computer Organization
- Probability and Statistics
- Discrete Mathematics
- Data Structures and Algorithms
- Introduction to Mathematical Logic
- Fundamentals of Computing

Positions of Responsibility

- **Student Guide, Counseling Service**, IIT Kanpur for academic year 2012 – 13
    - Mentored 6 freshmen students and assisted them in getting familiar to the college environment.
    - Assisted in the successful organization of the orientation programme for the benefit of around 880 students in IIT Kanpur.

- **Senior Web Executive, Techkriti'13,** IIT Kanpur.
    - Contributed in designing and developing the main website for the Annual Technical Festival of IIT Kanpur, Techkriti'13.

- **Assistant Coordinator, Software Corner, Techkriti'13,** IIT Kanpur.
    - Managed various events under Software Corner.
    - Contributed in designing the problem statements for the events.

- **Pool Captain, Takneek'13.**
    - Supervised scientific and technological events from Rajput pool, consisting of 3 hostels and ensured healthy participation.

- **Hall Captain, Takneek'12.**
    - Supervised the hall level scientific and technological activities during Takneek'12 and led contingent of over 200 participants to victory with greatest margin ever recorded in IIT KANPUR technical fest.

Extra-curricular Activities

- Won 3rd prize in design competition, HUL CODE, conducted by Hindustan Unilever Limited, where we designed products catering to the future needs of the customers.
- Participated in robotics events in Takneek'11, where the robot had to perform 3-d space manipulation and object recognition.
- Won 2nd prize in Weekend Programming Contest organized by Programming club, IIT Kanpur.

EDUCATION

Year	Degree	Institution	Performance
2015	B.T., Computer Science and Engineering	IIT Kanpur	**7.8*/10.0**
2011	Class 12 : CBSE Board	Kendriya Vidyalaya 2 GCF ,Jabalpur	88.8%
2009	Class 10 : CBSE Board	Kendriya Vidyalaya 2 GCF ,Jabalpur	91.6%

* At the end of 6 semesters

SCHOLASTIC ACHIVEMENTS

- Achieved an **All India Rank (AIR) 210** in **IIT-JEE'11** in which nearly 5Lac students appeared. **Percentile : 99.95%**
- Secured **AIR 17 (State Topper)** in **AIEEE'11** in which nearly 11Lac students appeared. **Percentile : 99.99%**
- Secured AIR 18 in 13th National Science Olympiad *(2010-2011)* and AIR 54 in 12th National Science Olympiad*(2009-2010)*
- Secured AIR 32 in Kendriya Vidyalaya, Junior Mathematics Olympiad organised by Kendriya Vidyalaya Sangathan*(2008-2009)*
- Secured AIR 65 in 10th National Cyber Olympiad organised by Science Olympiad Foundation*(2010-2011)*

ALGORITHMIC PROGRAMMING

- Participated in ACM **International Collegiate Programming Contest** and was a **regionalist** at **Kanpur** and **Amritapuri** regions
- My team secured an overall 15th rank (1st from IIT Kanpur) in IOPC, Techkriti'14, annual technical festival of IIT Kanpur
- My team secured 2nd prize at XCEED'13 (optimization problem contest), organized by Kurukshetra'13, Anna University
- My team came 2nd in Instant (Algorithmic programming contest), organized by Techkriti'13, IIT Kanpur
- Best rating of **1385** in algorithm competitions at **Topcoder** (Handle: bhupkas) and **1710** in **codeforces** (Handle: bhupkas)

INTERNSHIP

Linux Kernel Patch for Broadcom chipset (Samsung Research Institute, Noida)   *(May-July 2014)*

Technology used: coding in C and Python, Lex and YACC, Eclipse IDE

- **Android Application**: Developed an application to ping devices on IPv4 and IPv6 addresses using socket communications
- **Python based C function parser**: The parser can detect C functions in all file inside a directory and insert desired statement
- **Learning the packet flow**: Analysed the complete flow and processing of packet transfer in Linux kernel
- **Linux Kernel Patch**: Updated Linux kernel customized for Broadcom chipset to pass and Android CTS test suit

UNDER-GRADUATE PROJECT

Shadow guidance for real-time user drawing in android   *(ongoing)*

Technology used: C++, Java, openCV, Eclipse IDE, git

- The project aims at providing guidance to user drawings based on pre-collected database of images using fast edge matching
- Database of edge image is created using long edge detector as proposed by *Bhat* in his paper "A gradient-domain optimization framework for image and video filtering" and edges are encoded using **BiCE** descriptor proposed by *Zitnick*
- **Image matching**: Dense BiCE descriptors of user drawings are obtained and using min-hashing method a list of candidate matches are obtained and the best match is scaled and aligned under user pen as shadow for guidance

PROJECTS

Compiler for C#: Compiler Design   *(Jan-April 2014)*

- Designed a C# compiler which can generate code for SPIM architecture with the following features support: **basic data types, composite date** , multi-dimensional arrays, **operators, statements, functions** (pass by reference and value, recursion)
- Input programs passes through four analysis stages (**lexical analysis, syntax analysis, semantic analysis, and code generation**) to give assembly code. Intermediate code was **three address code,** intermediate data structure used was abstract syntax tree

Document Clustering for Hindi and English documents: Artificial Intelligence   *(Jan-April 2014)*

- Set of Hindi and English documents were clustered into various groups where the number of clusters was taken as input and then the corresponding seeds were generated randomly. The clustering algorithm used was **k-means** clustering algorithm
- The preprocessing of an input document was done by first removing the stop words, stemming the similar words to a single word, and then using then using the **Bag of Words** model with the remaining key words for document representation
- Similarity measures used for measuring the distance are **Euclidean, Cosine, Pearson, Jaccard, Manhattan** and **Chebychev**

Packet Sniffer: Computer Networks   *(Aug-Nov 2013)*

- Implemented a packet sniffing tool in C which was able to sniff packets of any type over both LAN and wireless network
- Based on parameters given, tool was able to filter packets based on their protocol type, length, interface type, destination
- Implemented P2P file sharing system(in socket programming) with **central server** to keep log of all the files shared by all users
- A user (client) queries central server for file which in turn returns name of all users who have shared that file. Client could now connect with any listed user (server) and receive that file. Every user could be both Client and Server

Extension of NachOS: Operating Systems   *(Aug-Nov 2013)*

- The project aimed at improvising various functionalities to Nachos, a single processor OS simulator implemented in C++
- Built support for multiprocessing and implemented various system-calls like Fork, Exec, Join, Yield. Implemented shared memory with the semaphore support to resolve synchronization issues and virtual memory support to run large programs

- Implemented various process scheduling algorithms such as **Random, First In First Out, Round Robin, Shortest Job First**. LRU several other page replacement algorithms were implemented to reduce page faults and effectively using main memory

Smallest Enclosing Circle *(May-July 2013)*
- Implemented the existing **randomized algorithm** for finding the smallest enclosing circle of given points in a 2D plane
- Analyzed the algorithm experimentally, and proved the **average linear time complexity** of the algorithm experimentally
- Designed **online applets** which shows how the algorithm works if a particular point is added to a given set of points

8 bit programmable computer on FPGA: Computer Architecture *(Jan-April 2013)*
- Implemented 8 bit Programmable general Purpose Computer on FPGA using Verilog, based on load-store architecture
- The user can give two inputs and perform basic set of arithmetical and logical operation as indicated by operation code
- Using these operation functions like recursive and iterative Fibonacci(n), Timer, Factorial calculators were implemented

Jigsaw puzzle *(Jan-April 2013)*
- Developed a computer version of Jigsaw Puzzle using python, having different levels and an interactive user interface
- The interface displayed the original image along with the empty image box and the pieces of image scattered over the screen
- The interactive GUI was provided using wxPython. The user can drag and drop the piece of image at any specific position

Card Game 29 *(May-July 2012)*
- Developed a computer version of the card game 29 using python, having a single user player and three computer players
- Computer players uses elementary **Artificial Intelligence** algorithms and experience based heuristics to design their moves
- Provided an interactive GUI using wxPython, where the user can play a card from his cards by clicking the image of the card

Genetic Programming *(Jan-April 2012)*
- Implemented a genetic algorithm in C to solve the **Brachhistochrone Problem** where the path was divided into small steps
- Took the started and ending coordinates and generated random sample of intermediate coordinate and genetically improved the random path by changing the values of coordinates with some probability till an almost optimal solution was achieved

TECHNICAL SKILLS	
Programming Languages	C, C++, Python, HTML, PHP, Java Script, Assembly Language ,Verilog, mysql
Platforms	Windows, Linux, Android
Tools	LaTeX, Beamer, Yacc, Make, Shell, GNU Octave, GDB, wxPython, PYgame

RELEVANT COURSES

Computer Science: Operating Systems, Computer Networks, Compiler Design, Theory of Computation, Randomized Algorithms, Artificial Intelligence, Design and Analysis of Algorithms, Introduction to Computer Organisation, Data Structures and Algorithms
Mathematics: Discrete Mathematics, Multivariable Calculus, Differential Equations, Linear Algebra, Introduction to Mathematical Logic, Probability and Statistics

POSITIONS OF RESPONSIBILITY

- **Student Guide, Counselling Service**
  - Mentored 6 freshmen students and assisted them in getting familiar to the college environment
  - Assisted in the successful organization of the orientation program for the benefit of around 880 students in IIT Kanpur
- **Senior Web Executive, Techkriti'13**
  - Contributed in designing and developing the main website for the Annual Technical Festival of IIT Kanpur, Techkriti'13
  - Managed various event pages and automated registration process using content management system
- **Assistant Coordinator, Software Corner, Techkriti'13**
  - Managed the organization of four programming events under Software Corner in which over 35 teams participated
  - Contributed in designing the problem statements and coding problems for the various programming events
- **Pool Captain, Takneek'13**
  - Supervised scientific and technological events from Rajput pool, leading a contingent of around 250 participants
  - Ensured healthy participation and smooth conduction of the annual intra IIT Kanpur technical festival, Takneek'13
- **Hall Captain, Takneek'13**
  - Supervised the hall level scientific and technological activities, leading a contingent of around 200 participants
  - Led the team to victory with the greatest margin ever recorded in IIT KANPUR inter-hostel technical festival

EXTRA-CURRICULAR ACTIVITIES

- **Product Designing:** Won 3rd prize in IIT Kanpur in design competition, HUL CODE, conducted by Hindustan Unilever Limited, where we designed products catering to the future needs of the customers
- **Robotics:** Participated in robotics events in Takneek'11, where the robot had to perform object recognition and manipulation
- **Programming:** Won 2nd prize in Weekend Programming Contest organized by Programming club, IIT Kanpur