**PARUL AGARWAL**

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| **Education** |

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| **Degree / Certificate** | **Institution** | **Year** | **CPI / Percentage** |
| M.Tech. (Dual Degree) | Indian Institute of Technology, Kanpur,India | 2013\* | 9.6/10.0\*\* (3.84/4.00) |
| B.Tech. (Dual Degree) | Indian Institute of Technology, Kanpur,India | 20  2013\* | 8.9/ 10.0\*\* (3.56 / 4.00) |
| Class 12 : CBSE Board | Kalka Public School, New Delhi,India | 2007 | 88.8% |
| Class 10 : ICSE Board | Christu Jyoti Convent School, Baghpat, UP,India | 2005 | 92.8% |

\*expected year of graduation \*\*after completion of 8th semester

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| **Awards And Scholarships** |

* Received **Google India Anita Borg Memorial Scholarship Award 2012**, awarded to 11 students all over India
* Awarded scholarship to attend **MSR India 2012 Summer School** on Distributed Algorithms, Systems, and Programming
* Awarded scholarship to attend **South Asia Workshop on Research Frontiers** organised by National University of Singapore
* Selected among the 50 students from IIT Kanpur, CalTech, Rice University and École Centrale Paris in the **SURGE Programme** (Summer Undergraduate Research Grant for Excellence) for May - July 2010
* Selected among the 60 students across India in **IPTSE Winter School 2010** organised by Carnegie Mellon University at IIITH and awarded **2nd** **Best Project Award**
* Awarded **Best Poster Presentation Award** among 300 students in Eureka, the paper presentation contest of Techkriti 2011, the annual inter-collegiate technical festival of IITK

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| **Internships / Work Experience** |

**HPC: Graph 500 on IBM’s Supercomputer Blue Gene/P** (IBM-IRL, May 2011 – July 2011) (OMP, MPI, C++)

Mentors: [Dr. Yogish Sabharwal](https://researcher.ibm.com/researcher/view.php?person=in-ysabharwal), [Anamitra Roy Choudhury](https://researcher.ibm.com/researcher/view.php?person=in-anamchou) and [Anshul Mittal](https://researcher.ibm.com/researcher/view.php?person=in-mittal.anshul) , IBM India Research Labs, New Delhi

* Analysis of Graph 500 Benchmark 1 (“Search”) on IBM’s Blue Gene Supercomputer Watson4P
* Implemented and optimized BFS search on a large random graph of size 238 vertices, with average degree of 16. It was tested on 32K nodes of supercomputer.
* The work was submitted to Graph 500 list of **November 2011 submission.**

**Machine Learning: Emotion Recognition from Speech** (CMU IPTSE Winter School, Dec 2010) (SVMs, AdaBoost, Matlab, Python)

Mentors: [Dr. Bhiksha Raj](http://www.cs.cmu.edu/~bhiksha/), Carnegie Mellon University and [Dr. Kishore S. Prahallad](http://sites.google.com/site/kishoreprahallad/), IIITH India

* Involved extraction of new features from a given sample speech file, classification by machine learning using binary classifiers and selection of best features for various emotion pairs
* Introduced a new classification by integrating SVMs and AdaBoost
* Won **2nd Best Research Project Award** and paper accepted for poster presentation in **Grace Hopper Celebration 2011**

**Data Mining and Bio-informatics** (SURGE Summer Internship, May 2010 - July 2010) (MySql, Java, Python, Graphviz)

Mentors: Dr. Harish Karnick, [Dr. Arnab Bhattacharya,](http://www.cse.iitk.ac.in/users/arnabb/) CSE IITK and [Dr. Amitabha Bandyopadhyay](http://www.iitk.ac.in/bsbe/Amitabha.html), BSBE IITK

* Designed and implemented an algorithm that built tissue specific metabolic networks, gene-regulatory network and find the relation between various genes from them
* Analyzed and predicted transcription factor binding sites on DNA sequences using **p-match algorithm**
* Predicted enhancer sites on DNA sequences and validated them with co-regulated genes

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| **Accepted Posters and Papers** |

* **Grace Hopper Celebration 2011:** Work done on “Emotion Detection from Speech using Adaboost and SVMs” accepted in General Poster Presentation Track.
* **SURGE 2010:** Paper presented in SURGE 2010 on “Predicting tissue specific metabolic networks and building gene-regulatory networks”

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| **Academic Achievements** |

* Achieved an **All India Rank 408 (AIR)** in **IIT-JEE’08** in which more than 320,000 students appeared
* Secured **448th Rank** inAIEEE’07 in which nearly 750,000 students appeared. Scored the **highest amongst female students** in Delhi with a state rank of **43**
* Secured **All India Rank 132** in National Level Science Talent Search Examination-2007 ,Unified Council
* Got certificate of merit from the **Indian Association of Chemistry Teachers** for excellent performance in Indian Standard Examination in Chemistry 2006-2007
* Got certificate of merit from the **Indian Association of Physics Teachers** for excellent performance in Indian Standard Examination in Physics 2006-2007
* Qualified FIITJEE Talent Search Examination 2006(**AIR 283**) and 2007(**AIR 236**) organized at national level

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| **Relevant Courses** |

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| * Indexing and Searching * Data Mining * Cryptography * Operating System * Compiler Design * Principles of Database Systems * Computer networks * Principles of programming lang. | * Multiagent Systems * Machine Learning * Algorithms II * Discrete mathematics * Theory of computation * Programming tools & techniques * Data structures & algorithms * Intro. to computer organization | * Advanced Compilers Optimizations * Artificial Intelligence * Multivariable Calculus * Complex Analysis & Linear Algebra * Fourier Analysis & Differential Equations * Probability and Statistics * Fundamental of computing(Java) * Introduction to Mathematical Logic |

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| **Technical Skills** | |
| **Programming Languages** | C, C++, Java, Python, Prolog, Oz |
| **Web Developments** | PHP, HTML, JavaScript, MySQL, CSS |
| **Tools** | LaTeX, Lex, Yacc, Make, Shell, Eclipse, Matlab, GNU Octave |

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| **Course Projects** |

**Approximate String Search** (Jan 2012- April 2012) (coding in Java)

Mentor: Dr. Arnab Bhattacharya, CSE IITK

* Approximate string search using space constrained gram-based indexing
* Proposed and implemented a novel method of reducing the size of inverted list index structure by discarding some lists and combining some lists based on certain parameters
* Experiments done on actress names from IMDB site showed that an accuracy of 98% was retained with improved query processing time when there was reduction in 30% of inverted list index structure

**Escape Analysis in Java** (Jan 2012- April 2012) (coding in Java, Soot framework)

Mentor: Dr. Amey Karkare, CSE IITK

* Implemented a novel algorithm for static escape analysis in Java using Soot framework
* Escaping objects were recognised and freed from heap using the *free* statement of FReg JFreeVM

**Voting System in India** (Jan 2012 – April 2012)

Mentor: Dr. Harish Karnick, CSE IITK

* Modelled Indian voting system, government elections at the constituency level and parliament level
* Was able to formulate it as a game with a 2\*2 matrix at parliament level where the players consist of small and big parties

**Machine Learning: Question Classification** (Aug 2011 – Nov 2011) (Winnow, Perceptron, NB, MaxEnt, SVMs)

Mentor: Prof. Kritika Venkataramani, CSE IITK

* Classification of questions based on five categories : Abbreviation, Entity, Description, Human, Location and Numeric
* Worked on features like bag-of-words, higher order language features like POS tags, chunk tags and Named-entity Relations
* Worked on the database and tools available at The Cognitive Computation Group at UIUC
* Analysed and compared the results of 5 classifiers for analysis: Winnow, Perceptron, Nave Bayes (NB), Maximum Entropy (Maxent) and Support Vector Machines (SVM) with SVMs giving the best result of 87.2%

**Machine Learning: Emotion Recognition from Audio and Video** (Aug 2011 – Nov 2011) (SVMs, AdaBoost, Matlab, Python)

Mentor: Dr. Arnab Bhattacharya, CSE IITK

* Analysis of video sequences which combines facial expressions observed visually with acoustic features to automatically recognize five universal emotion classes: Anger, Disgust, Happiness, Sadness and Surprise
* Evaluates the facial expressions using a bank of 20 Gabor filters that spatially sample the images
* The emotions are instantaneously classified using a Support Vector Machine
* Combined the two modalities at feature and score level to compare the respective joint emotion recognition rates

**Cryptanalysis of Popular Cryptosystems** (Aug 2011– Nov 2011) (coding in C, Mathematica)

Mentor: Prof. Manindra Agrawal, CSE IITK

* Performed Cryptanalysis of ciphers including permutation & substitution cipher, Variant of DES, AES and RSA
* Cracked 4 round DES using differential cryptanalysis, reduce round AES by Square Attack and 1024 bit RSA with low exponent using LLL attack

**Compiler for C++** (Feb 2011 – April 2011)

Mentor: Dr. Amey Karkare, CSE IITK

* Designed a **partially fledged compiler** for source language C++, target language as Mips and implementation in python
* Implemented features like basic types, arrays, pointers, functions (recursive, function overloading), literals and control structures. Generated 3-address code
* Project was nominated for the **Best Project Award** among 16 other projects

**Automated Attendance Management System** (2011 – April 2011) (MySql ,Xampp)

Mentor: Prof. Sumit Ganguly, CSE IITK

* Designed and implemented an automated attendance management system optimized for 3CNF
* Implemented **convenient viewing** of attendance and timetable, viewing students above threshold attendance, giving attendance, ensuring security (**no proxy** attendance) and rescheduling classes by the instructor, maintaining sessions

**Navigational bot to detect movable objects in a 2D grid** (Mar 2011) (coding in Python)

Mentor: Prof. Harish Karnick, CSE IITK

* Designed and implemented software for navigational robot that would move in **unknown grid** and identify and report location of all the objects present in it, subject to condition that objects can move

**Simulation and analysis of various features of OS** (Aug 2010 – Nov 2010) (coding in Java)

Mentor: Prof. Sumit Ganguly, CSE IITK

* Simulated and analyzed different **system calls** and scheduling algorithms using operating system simulator-NACHOS
* Implemented and analyzed performance of different **mutual exclusion algorithms**
* Simulated and evaluated page replacement algorithms for memory management and a fully associative TLB

**Search Engine** (Feb 2009 - March 2009) (Apache Lucene, coding in Java)

Mentor: Dr. Amitabh Mukherjee, CSE IITK

* Documents were indexed using techniques of **stemming, filtering** and **text normalization**. Query entered by the user was also tokenized in a similar way
* The results were presented to the user in a tabular manner with the option to view any particular document
* Obtained search results with **high precision** and good relevance on a dataset of 50 documents

**Chat facility** (Aug 2010- Nov 2010) (coding in C)

Mentor: Prof. Dheeraj Sanghai, CSE IITK

* Implemented a chat facility which enables two clients chat over network, such that server **keeps a log** of everything including who chats with whom at what time. It would also let the user know whether a friend is online or not

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| **Extra Curricular Activities/Interests** |

* **Robotics Club**, IIT Kanpur
  + **Secretary** for academic year 2009-2010
  + Made an **autonomous line following robot** in Summer Camp’09 organized by Science and Technology Council, IITK
  + **Guided students** in robotics events in Techkriti and Takneek, the Intra-college Technical Festival of IITK
  + Participated in Takneek’08 and grabbed **consolation prize** for coding an autonomous robot
* **Institute Basketball Team,** Games and Sports Council, IIT Kanpur
  + **Team member,** Girls Basketball Team since 2008
  + Event **Coordinator,** Women’s Basketball Udghosh’10, the Annual Sports Festival of IITK
  + **Won Bronze Medal** in Inter-IIT Sports Meet’09 and **Bronze Medal** in Women’s Basketball Udghosh’10
* **K’OS Dance Club,** IIT Kanpur
  + Participated in **Dance Drama** and **Group Dance** in Galaxy’09, an intra-hostel cultural festival and won **first prize**
  + Performed in **Choreo** in Fresher’s Party’08, talent show for incoming batch (first year students)
  + **Compered** in Dance Extravaganza’09, annual Dance Club festival