**PARUL AGARWAL**

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| **Education** |

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| **Degree / Certificate** | **Institution** | **Year** | **CPI / Percentage** |
| B.Tech.–M.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 7th semester

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| **Awards And Scholarships** |

* 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 800 students in Eureka, the paper presentation contest of Techkriti 2011, the annual inter-collegiate technical festival of IITK.
* Selected for **best three** in poster presentation in Eureka and **third position** in SOFTKriti-The Open Software Contest, Techkriti 2012.
* Awarded for **Most Innovative Design Award** in **NIRMAAN-** National Bridge Design Challenge organised in Techkriti 2010 among 35 teams from across the country.
* Awarded **Merit-cum-Means Scholarship** for meritorious performance for academic years 2009-‘10 and 2010-’11.

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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, ways to **optimize** it and its implementation
* 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 for **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**
* 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(HOD), [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, **bibliomics** of research papers and find the relation between various genes from them
* Analysis and prediction of transcription factor binding sites on DNA sequences using **p-match algorithm**
* Predicting enhancer sites on DNA sequences and validating them with co-regulated genes
* Planning to submit a **research paper** to a premier international conference on Data Mining

**Image Processing: Indian Currency Detector** (Dec 2009) (OpenCV, C)

Mentor: Dr. Phalguni Gupta, CSE IITK

* Designed and implemented an **efficient algorithm** to detect features in Indian notes using concepts of match template with ROI and phase correlation
* Features like size of the note, intensity of color, noise in note and various other **security features** obtained by RBI were considered
* Achieved **70% accuracy** in detecting notes

**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: Prof. 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
* 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

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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 the work “Predicting tissue specific metabolic networks and building gene-regulatory networks”
* **Eureka 2011:** Awarded **Best Poster Presentation Award** in Eureka, the paper presentation contest of Techkriti 2011, the annual inter-collegiate technical festival of IITK. Work was in Data Mining and Bio-informatics on “Prediction of Enhancer Sites on DNA Sequences”

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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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| * Data Mining * Cryptography * Operating System * Compiler Design * Principles of Database Systems * Computer networks * Principles of programming lang. | * Machine Learning * Algorithms II * Discrete mathematics * Theory of computation * Programming tools & techniques * Data structures & algorithms * Intro. to computer organization | * 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** |

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

Mentor: 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: Dr. 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: Dr. 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: Dr. 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: Dr. 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
* **Social Services**
  + Awarded **Certificate of Special Effort** in Mass Awareness Campaign against AIDS and Cancer organized by Caring Souls Foundation to alleviate the sufferings of the Needy Cancer Patients.
  + Participated in Poster Painting and Slogan Writing Competition in **18th National Eye Donation Fortnight**
* **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
* **Public Relations,** Techkriti, IIT Kanpur
  + **Coordinator** and **Executive** in Techkriti’11 and Techkriti’10 respectively
  + Responsible for organizing of **workshops** and lectures by Nobel laureates and renowned scientists
  + Organized **events** like laser show, magic show and robotics exhibition