

# Shikhar Sharma

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## Educational Qualifications

- 2016 **M.Sc.**, *University of Toronto*, Toronto, Canada.  
(Expected) Computer Science
- 2014 **B.Tech.**, *IIT Kanpur*, Kanpur, India.  
CGPA 9.3/10.0 in Computer Science & Engineering
- 2010 **A.I.S.S.C.E.**, *Vidya Mandir Sr. Sec. School*, Kota, India.  
Obtained 92.6% in All India Senior School Certificate Examination conducted by C.B.S.E.
- 2008 **A.I.S.S.E.**, *Mayoor School*, Ajmer, India.  
Obtained 93.2% in All India Secondary School Examination conducted by C.B.S.E.

## Internships / Key Academic Projects

- 2014 **Speech Recognition using Deep Belief Networks and Hidden Markov Models.**  
B.Tech. Project under guidance of Prof. Harish Karnick (IIT Kanpur)
  - Used MFCC and its first and second order derivatives as features for the Deep Belief Network
  - The Deep Belief Network (DBN) was based on stacked Restricted Boltzmann Machines
  - The DBN later underwent a supervised fine-tuning phase
  - The DBN was integrated with a Hidden Markov Model which was used for the final classification
  - Tested on ISOLET and an IIT Kanpur dataset of roughly 120,000 Hindi audio recordings
- 2013 **Beyond Geometric Path Planning: Learning Context-Driven Trajectory Preferences via Sub-optimal Feedback, [Link](#).**  
Research Project under guidance of Prof. Ashutosh Saxena (Cornell University)
  - Learnt preferences over trajectories for 7 DoF robot manipulators of Baxter Research Robot
  - The algorithm required the user to incrementally improve the trajectory proposed by the robot
  - Theoretical regret bounds of the algorithm match the asymptotic rates of optimal algorithms
  - The project involved selecting features, creating a Trajectory Preference Perceptron and used a Structural Support Vector Machine and algorithms like Normalized Discounted Cumulative Gain
  - The robot was used to perform grocery checkout tasks
- 2012 **Logic Studio.**  
Research Project under guidance of Dr. Sumit Gulwani (Microsoft Research, Redmond), Prof. Amey Karkare (IIT Kanpur), Prof. Subhajit Roy (IIT Kanpur)
  - Focused on creating an Intelligent Tutoring System for teaching First Order Logic
  - Utilized the Stanford CoreNLP Parser to parse and retrieve meta-data
  - Generated logical formulae consisting of the appropriate quantifiers (if any), the atomic first order logic predicates and the connectives between the predicates
  - Generated new questions by replacing determiners in sentences from our corpus
- 2011 **Computer Hacking and Cracking.**  
Project under Programming Club, IIT Kanpur
  - Identified vulnerabilities in the IIT-K Campus network and found possible patches
  - Sniffing and its prevention on the network, cookie hijacking and SQL injections
  - Used Network Protocol Analysers like Wireshark, ZenMap and CainNAbel
  - Used Metasploit Framework to check some attacks on Open Ports

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## Publications

- Ashesh Jain, Shikhar Sharma, Ashutosh Saxena, "Beyond Geometric Path Planning: Learning Context-Driven Trajectory Preferences via Sub-optimal Feedback" accepted in the 16th International Symposium on Robotics Research (2013)

## Course Projects

- 2014 **Learning Heirarchical spatio-temporal features for Action Recognition using Independent Subspace Analysis.**  
Course Project in CS676 under guidance of Prof. Vinay P. Namboodiri (IIT Kanpur)
- Video features were learned using ISA implemented using fixed point method
  - Stacked convolution ISA along with PCA used to avoid problems of high dimensionality
  - Tested on Hollywood2 and UCF Sports Actions dataset
- 2013 **Movie Recommender and Score Prediction System, [Link](#).**  
Course Project in CS771 under guidance of Prof. Harish Karnick (IIT Kanpur)
- Applied collaborative filtering techniques to generate recommendations and predict ratings
  - Used Pearson correlation similarity and cosine similarity functions on movies and user data
  - Tested on MovieLens ml-100k dataset having 100,000 ratings from 943 users on 1682 movies
- 2013 **Knao Web Clipper.**  
Course Project in CS455 under guidance of Prof. T.V. Prabhakar (IIT Kanpur)
- Developed a web application using PHP, MySQL for intuitive web clipping into personally managed archives
  - Allow sharing of notes and notebooks publicly or for private collaboration
  - Used CodeIgniter MVC Framework for backend along with JavaScript for frontend UI
  - Utilized a bookmarklet to activate clipping on a webpage and sent data to the server using POST messaging
- 2013 **Compiler for Oberon to MIPS Assembly, [Link](#).**  
Course Project in CS335 under guidance of Prof. Sanjeev K. Aggarwal
- Implemented a compiler for a subset of programming language Oberon using C, LEX and YACC
  - Implemented variable and type declaration, conditionals, iterations and procedures
  - Focused on handling some of the inbuilt functions provided by Oberon
  - Implemented arrays, records and nested procedures also
  - Generated 3-Address Code as Intermediate Representation
- 2013 **Medical Store Inventory Management System, [Link](#).**  
Course Project in CS315 under guidance of Prof. Harish Karnick
- Implemented a medical store management system using PHP and MySQL
  - The table design was normalized into BCNF
  - Implemented functionality for 3 roles - Owner, Receptionist and Admin
  - Designed a simplistic and functional interface for beginners
- 2013 **Is lifetime ban too harsh a punishment for Match Fixing, [Paper](#).**  
Course Project in PHI448 under guidance of Prof. Vineet Sahu
- Explored the rationale behind lifetime ban for cases of match fixing
  - Attacked the deeper causes of indulging in match fixing and commented on their validity
  - Discussed the current punishment mechanisms
  - Discussed the correctness of such harsh punishments and their effects on the player's life
  - Proposed alternative punishments based on the philosophy of Restorative Justice
- 2012 **HTTP Proxy Server.**  
Course Project in CS425 under guidance of Prof. Dheeraj Sanghi
- Implemented a Proxy Server in C having Authentication, Blacklist and Caching
  - The Proxy Server could handle multiple simultaneous connections
  - The Proxy Server could handle the synchronization of cached files
  - The Proxy Server worked for HTTP connections

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- 2012 **Extension of an existing Operating System - PintOS.**  
 Course Project in CS330 under guidance of Prof. Subhajit Roy
- Implemented POSIX message passing queues and POSIX threads
  - Implemented "fork" and "exec" system calls
  - Implemented user processes, virtual memory and shared memory
  - Implemented indexed file system, hierarchical directory structure and buffer cache
- 2012 **Pedestrian Detection and Tracking, [Link](#).**  
 Course Project in CS365 under guidance of Prof. Amitabha Mukerjee
- Used deformable part based models of human body to detect and track pedestrians in a video
  - Robust and capable of detecting pedestrians in a wide variety of poses/clothing
  - Detection was successful even if some of the body parts were occluded
  - The main tracking algorithm employed was the Mean Shift Algorithm
- 2011 **Implementation of SDLX Processor on FPGA.**  
 Course Project in CS220 under guidance of Prof. Amey Karkare
- Implemented an SDLX Processor on a Field Programmable Gate Array using BlueSpecVerilog
  - The processor was capable of taking 2 4-bit inputs and performing mathematical operations
  - It could also store the resulting output and could be used to perform further operations on it

## Scholastic Awards and Achievements

- 2013 **Cornell-IIT Internship Program, Cornell University, NY, USA.**  
 Only student from IIT Kanpur's 2010 Computer Science batch to get selected for a Research Internship at Cornell University
- 2013 **Academic Excellence Award, IIT Kanpur, Kanpur, India.**  
 Received the IIT Kanpur Academic Excellence Award for the year 2011-12
- 2012 **Academic Excellence Award, IIT Kanpur, Kanpur, India.**  
 Received the IIT Kanpur Academic Excellence Award for the year 2010-11
- 2011 **OPJEMS, OP Jindal Group, India.**  
 Awarded the O.P. Jindal Engineering and Management Scholarship for excellence in academics and leadership
- 2010 **International Chemistry Olympiad Orientation-Cum-Selection Camp, HBCSE, India.**  
 Awarded a Certificate of Merit and a Gold Medal for being amongst the top 36 candidates from India selected for International Chemistry Olympiad Orientation-Cum-Selection Camp 2010
- 2010 **National Olympiads, HBCSE, India.**  
 Qualified for and awarded certificate of merit in Indian National Physics Olympiad (INPhO), Indian National Chemistry Olympiad (INChO) and Indian National Astronomy Olympiad (INAO) for being amongst the top 300 students in the nation in the subject
- 2010 **Merit Scholarship for Professional Studies, CBSE, India.**  
 Awarded the CBSE Merit Scholarship for Professional Studies - AIEEE for 2010-2014
- 2010 **99.91 percentile, IIT-JEE, India.**  
 Secured 99.91 percentile in IIT-Joint Entrance Examination from amongst 4.8 lakh candidates
- 2010 **99.98 percentile, AIEEE, India.**  
 Secured 99.98 percentile in All India Engineering Entrance Examination from amongst 11 lakh candidates
- 2008 **NTSE Scholar, NCERT, India.**  
 Awarded the prestigious National Talent Search Examination scholarship
- 2008 **SSTSE Scholar, Department of Science & Technology, Govt. of Rajasthan, India.**  
 Secured State Rank - 1 in State Science Quiz and State Rank - 3 in State Science Talent Search Examination

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## Research Interests

- Machine Learning
- Artificial Intelligence Algorithms
- Web and Network Security

## Technical Skills

Languages C, C++, C#, Java, Python, Bluespec System Verilog, MIPS Assembly, Oz  
Web HTML, PHP, CSS, JavaScript, JQuery, MySQL  
Tools OpenRAVE, Matlab, Visual Studio, GNU Octave, LaTeX, Lex, Yacc, Shell Scripting  
OS Linux, Windows

## Relevant Courses @ IIT Kanpur

CS698B	Mathematics for Machine Learning	CS676	Computer Vision and Image Processing
CS499	B.Tech. Project	CS628	Computer System Security
CS771	Machine Learning Techniques	CS345	Algorithms –II
CS365	Artificial Intelligence	CS201	Discrete Mathematics
CS498	B.Tech. Project	CS455	Introduction to Software Engineering
CS425	Computer Networks	CS350	Principles of Programming Languages
CS340	Theory of Computation	CS330	Operating Systems
CS302	Introduction to Mathematical Logic	PHI455	Philosophical Logic
CS335	Compiler Design	ECO101	Introduction to Economics
CS315	Principles of Database Systems	MTH203	Differential Equations
CS355	Programming Tools and Techniques	MTH102	Linear Algebra
ESO211	Data Structures and Algorithms	MTH101	Calculus
CS220	Introduction to Computer Organisation	MBA640	Intellectual Property Management
ESC101	Fundamentals of Computing	MBA654	Strategic Innovation for Sustainable Business Advantage

## Relevant Courses @ Cornell University

CS4990 International Research Internship

## Relevant Courses @ Coursera

Stanford Machine Learning      John Hopkins Exploratory Data Analysis

## Positions Of Responsibility Held

- Head, IIT Kanpur Gymkhana Web Team 2013-14
- Senior Design and Web Executive, Antaragni 2012
- Web Executive, Techkriti 2012
- Secretary, Programming Club 2011-2012
- Assistant Coordinator, Episteme, Techkriti 2011
- Secretary, Synchronicity, Antaragni 2011

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## Extra-Curricular Achievements and Activities

- Secured third place among 275 participants in Firewall (ethical hacking competition) in Phoenix 2013 – Delhi Technological University's Technical Festival.
- Awarded the Judges' Choice Award at Yahoo! HackU 2012 for a "Tweet Map and Sentiment Analyzer" built on node.js, socket.io, Google APIs and JavaScript.
- Secured second place in Coldfire (ethical hacking competition) in Effervescence 2012 - IIT Allahabad's Technical cum Cultural Festival
- Winner, Infobahn (Web Designing competition) at Spectrum 2012, IIT Kanpur.
- Active member of Programming Club, IIT Kanpur. Held lectures on programming and organized programming competitions. Organized and prepared the problem statements for CodeSprint, an ethical hacking competition which was also the flagship event of Takneek 2012 and saw a lot of participation from IIT Kanpur students.
- Made a promotional video for PRAYAS (an IIT Kanpur students' social initiative which teaches underprivileged children) as a course project in ART105 – Introduction to the Art of Video Making
- Participated in Yahoo! HackU 2011 held at IIT Kanpur and made a website similar to IMDb.
- Winner, State Level Science Quiz-2008 organised by Department of Science & Technology of Rajasthan Government.
- Regular hockey player in school. Represented Mayoora School, Ajmer in many district tournaments and a CBSE Zonal tournament. Also played Hockey at IIT Kanpur.
- Winner, Silver Medal for my painting entry in the Shankar's International Children's Competition.

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