

# SHUBHAM KUMAR

Masters of Technology (M.Tech) Final Year  
Department of Computer Science & Engineering, IIT Kanpur

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## EDUCATION

Year	Degree/Certificate	Institute	CPI / %
2020 - Present	M.Tech. (Computer Science & Engg.)	Indian Institute of Technology(IIT), Kanpur	8/10
2015 - 19	B.Tech. (Computer Science & Engg.)	KNIT, Sultanpur	80.58 %
2013 - 14	XII (CBSE)	Kendriya Vidyalaya, Ghaziabad	75.40 %
2011 - 12	X (CBSE)	Kendriya Vidyalaya, Ghaziabad	9/10

## RESEARCH EXPERIENCE

- **Security Aspects of IPv6 Implementation** | Supervisor: Dr. Sandeep K. Shukla (Aug. 2021 - Present)
  - Developing IPv6 Framework for testing using simulation of network in GNS3 consisting VMs & Docker.
  - Testing the implementation of IPv6 (Sniffing, Fuzzing, Filtering, MITM & Analysis).
  - Exploring various Attacks and Security issues in IPv6 Implementation (IPv6 Associated Protocols Security & Internet wide IPv6 Security).

## COURSE PROJECTS

- **Exploiting Web Based Vulnerabilities in Computer Systems** (Jan. 21 - May. 21)  
Computer Systems Security (CS 628A) | Guide : Prof. Sandeep Shukla
  - Performed network penetration testing using NMAP(Network Mapper) & live network traffic analysis using Wireshark.
  - Leveraged aircrack-ng to crack WEP & WPA-2 passwords. Performed SQL, CSRF & XSS attacks on web applications
  - Exfiltrated the employee credentials from organisation's database by exploiting MySQL Vulnerability.
- **Game of Caves: Breaking Cryptosystems** (Jan. 21 - May. 21)  
Modern Cryptology (CS 641A) | Guide : Prof. Manindra Agrawal
  - Implemented differential cryptanalysis to find the key for a 6-Round DES encryption using chosen plaintext attack.
  - Used Coppersmith's algorithm and low-exponent Lattice Reduction technique (LLL) to decrypt RSA encrypted text.
  - Decrypted the cipher text using Playfair decryption algorithm by utilizing the key deciphered from Morse code.
- **Halo Exchange & Topology Aware Optimization of MPI Blocking Collectives** (Jan. 21 - May. 21)  
Parallel Computing (CS 633) | Guide : Prof. Preeti Malakar
  - Implemented MPICH to perform halo exchange with 4 neighbouring processes on Multi-core Clusters of IIT-K.
  - Compared Performance of data exchange using MPI\_Send/Recv, MPI\_Pack/Unpack & MPI Derived Datatypes.
  - Did topology aware optimization of collective calls MPI\_Bcast, MPI\_Reduce, MPI\_Gather & MPI\_Alltoallv.
- **Terrorist Meeting Network Detection and Reporting Algorithm** (Sep. 20 - Nov. 20)  
Data Mining (CS 685) | Guide : Prof. Arnab Bhattacharya
  - Detected and Reported highly probable terrorists based on Hotel Booking & FIR Records.
  - Investigated Terrorists Connections with Call Details Record(CDR) data using DBSCAN.
- **Two Level Cache Hierarchy Simulation** (Sep. 20 - Nov. 20)  
Advanced Computer Architecture (CS 622) | Guide : Prof. Mainak Chaudhuri
  - Passed L1 Cache Miss trace of 6 SPEC CPU 2006 applications to a 2 level cache hierarchy (L2 & L3)
  - Reported counts of L2 & L3 cache misses & hits for Inclusive, Exclusive & Non-Inclusive Non-Exclusive(NINE) policies.
  - Classified the misses into cold misses, conflict misses, & capacity misses.
- **COVID-19 Statistics Analysis and Prediction** (Sep. 20 - Nov. 20)  
Data Mining (CS 685) | Guide : Prof. Arnab Bhattacharya
  - Preprocessed & analysed Covid-19 cases progression in India at state & district level and effect of neighbour districts.
  - Performed cluster analysis, district-level susceptibility, predicted hotspots and coldspots from March'20 to Sept'20
  - Predicted the estimated number of COVID cases in the near future based on previous trend of infection.
- **Leukemia Detection using Image Processing** (Jul. 18 - May. 19)  
UG Final Year Project, KNIT Sultanpur | Guide : Dr. Awadhesh Kumar
  - Aimed to identify blood disorder (Leukemia) by extracting data from human blood microscopic images.
  - Developed model using Image Acquisition, Image Pre-processing, Image Segmentation, Feature Extraction & Image Classification.

## SELF PROJECTS

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- **Handwritten Digits Recognition using CNN MNIST Classifier** (Mar. 20 - Jun. 20)
  - Build a model to recognize text from images using Multi-layer Sequential Convolutional Neural Network(CNN).
- **Develop a Face Recognition System** (Sep. 20 - Jan. 21)
  - The objective was to identify and verify a person based on a photograph of their face using FaceNet in Keras.

## ACHIEVEMENTS

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- Achieved **AIR 239 (99.75 percentile)** in Graduate Aptitude Test in Engineering (GATE) 2020 (Mar. 2020)
- Achieved **AIR 69** in Indian Space Research Organisation (ISRO) 2021 final Interview for Scientific Officer (Aug. 2021)
- Achieved **AIR 71** in Bhabha Atomic Research Centre (BARC) 2021 written Test for Scientific Officer 'C' (Sep. 2021)

## RELEVANT COURSES

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- Data Structures
- Operating Systems
- Parallel Computing
- Computer Systems Security
- Design and Analysis of Algorithms
- Introduction to Machine Learning

## PROGRAMMING SKILLS

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- **Tools** : Nmap, Zenmap, Wireshark, Burp Suite, SQLmap
- **Languages** : C, C++, Python, Java
- **Utilities** :  $\LaTeX$ , MySQL, Git, HTML, MPI, Bash

## ACADEMIC WORK EXPERIENCE

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- **Teaching Assistant (TA)** | Department of Computer Science & Engineering, IIT Kanpur
  - Worked as a TA for the Course CS 685 [Data Mining] (Jul. 21 - Dec. 21)
  - Worked as a TA for the Course ESC 101 [Introduction to C Programming] (Oct. 20 - Jul. 21)
- **NHAI Cyber Security Project Team Member** | C3i Center - Cyber Security Center, IIT Kanpur (Sep. 2021)
  - Visited National Highways Authority of India (NHAI) Headquarters, New Delhi for Audit.
  - Worked as a Cyber Security Engineer from C3i Center.
  - Worked on the Real NHAI Network & Submitted 60+ Findings during Audit.
- **Freelance Content Developer - (Computer Science)** | Testbook Edu Solutions Pvt. Ltd. (Sep. 20 - Present)
  - Contribute 80+ New GATE level Questions for GATE-CS Test Series.
  - Provide 100+ solutions for Previous year questions of PSU's like UPPCL, ISRO, NIELIT.
- **Chegg Expert - (Computer Science)** | Chegg India (Mar. 21 - Present)
  - Solved 160+ Chegg Computer Science Questions on Chegg Online Portal

## POSITIONS OF RESPONSIBILITY

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- **International Conference Organiser** | E-Cell and Innovation & Incubation Centre (Mar. 2017)
  - Organised International Conference on Innovative Entrepreneurship & Startup at KNIT Sultanpur.
  - Design the Official Certificates & PPT for the Conference.
- **Sports Festival Organiser** | KNIT Sultanpur (Oct. 2018)
  - Organised various Sports events in the National Level Sports Festival - TVARAN-18.
  - Manage TVARAN-18 official website and worked with the designing Team.

## EXTRA-CURRICULAR ACTIVITIES

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- Secured 1<sup>st</sup> Position in Volleyball Event in TVARAN-18 National Level Sports Fest (Mar. 2018)
- Participated in ANTARAGNI-18, the Annual Cultural Festival of IIT Kanpur. (Oct. 2019)
- Played National Level Volleyball Game at SPARDHA 2016, Sports Festival held at IIT (BHU) (Oct. 2016)
- Participated in the GREEN Olympiad 2011, Supported by Ministry of Environment & Forests Govt. of INDIA (Sep. 2011)