Manoj **Kumar**

THIRD YEAR UNDERGRADUATE · IIT DELHI

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Education

year	Degree	Institute	%age or CGPA
- - - -	(Dual) B.Tech+M.Tech	Indian Institute of Technology, Delhi	8.082
2017	Class 12th	Navjeevan Public School, Sikar	98.20
2015	Class 10th	ABN Sr. sec. school, Maulasar(Raj)	93.50

Scholastic Achievements

2018 **Joint Entrance Examination(Advanced)** AIR 1097 among more than 1,500,000 students

2018 **Joint Entrance Examination(Mains)** AIR 405(OB) among more than 1,500,000 students

2017 Awarded with **silver medal** by Education Minister of Rajasthan for performing exceptionally well in class XII

2017 Secured **3rd merit** in Class XII(RBSE board) among more than **2,000,00** students who appeared in the exam

2020 Certified in Data Structures and Algorithms Program **(CCDSAP) by Codechef**

2020 **Mission Helix's Coding Contest** Rank **3** in All India organized by Coding Club, India

Engineering Courses

Computer Science Analysis and Design of Algorithms, Discrete Mathematical Structures, Data Structure and Algorithms, Design Practices in computer science, Intro to Parallel & Distributed Programming*, Operating Systems*, Intro to Automata & Theory of Computation*, Intro to Database Management Systems*, Machine Learning, Artificial Intelligence, Computer Networks, Computer Architecture

Mathematics Probability theory and Stochastic Process, Linear Algebra and Differential Equations, Calculus

*courses currently pursuing

Major Projects / Assignments

K-Medians In A Directed Tree

Prof. Smruti Ranjan Sarangi, IIT Delhi

INDEPENDENT PROJECT: ALGORITHMS, C++ — *May 2020 - July 2020*

- Module programmed in C++ that computes **k-medians** in a directed tree (edges directed from child to parent) in $O(Pk^2)$ complexity.
- The project aims to find the **optimal placement of *cache proxies*** in a computer network maintaining **minimum overall cost**.
- Implemented in 2 phases and each phase uses a space of **O(nk)** complexity (better than already established $O(n^2k)$ complexity).
- Method employs **dynamic programming** for efficiency whereas best known algorithm for undirected tree is **NP-hard**.

**k is the number of resources(proxies) to be placed ,'P' is the path length of tree & 'n' is number of vertices/nodes in tree.*

Job Schedulling and Management using advanced data structures

Prof. Subodh Kumar, IIT Delhi

COURSE PROJECT: DATA STRUCTURES AND ALGORITHMS, JAVA — *October 2019 - November 2019*

- Module analyze multiple jobs and their costs for different users and projects to maximize the projects done within a finite budge.
- It executes the jobs on the basis of priority and budget available with exhaustive record of status of all jobs and timed operations.
- Multiple efficient **Generic Data structures** like self-balancing **Red-Black Tree, Trie** and **MaxHeap** implemented. These data structures are completely generic and used their efficiency for optimization at large scales containing large dataset.

Multi-threaded Producer Consumer Platform

Prof. Subodh Kumar, IIT Delhi

COURSE ASSIGNMENT: DATA STRUCTURES AND ALGORITHMS, JAVA — *October 2019*

- Module programmed in Java for multiple buyers and sellers to purchase and sell items using **thread synchronization** and **locks**
- Maintained inventory and catalogue which sells product of the most preferred seller by maintaining priorities of each seller.
- Solved the problem of multiple threads to remain **synchronized** and sell the products from catalogue maintaining **thread safety**.

Emotion Detection from facial Features

Prof. Parag Singla, IIT Delhi

Course Project: Machine Learning, python — *February 2020 - March 2020*

- Implementation of **CNN**-based and **PCA+SVM** based machine learning models to predict emotion detection from facial features.
- Compared the accuracy of self-implemented models of Neural Networks, Decision Trees and SVM models with inbuilt python libraries.

Comparing the performance of similar open-source software

Prof. Smruti Ranjan Sarangi, IIT Delhi

Independent Project: Software Engineering — *December 2019 - January 2020*

- Comparison of softwares used as *web browsers, pdf readers, music players, mail clients* etc. based on with similar functionalities.
- Analyzing the reasons for the **less efficiency of a feature** of one software as compared to other softwares with same functionality.
- Debugging the software features of **statically linked, non-stripped** version of the software using **Flamegraph**.

UART Implementation on FPGA

Prof. Anshul Kumar, IIT Delhi

Course Project: Digital Logic & System Design, VHDL — *October 2019 - November 2019*

- The **Universal Asynchronous Receiver -Transmitter** (UART) implemented in VHDL for asynchronous serial communication that takes in serial data at given baud rate with a higher frequency of receiver to check discrepancies and converts it to parallel 8-bits for storage, which is then fed to the transmitter that generates serial data output.
- Implemented a memory of size **256 bytes** to store bytes (8 parallel bits) and by a single push signal, transmitter transfers the byte to the computer serially. **GTK terminal** is used for communication.

Activity Survey During COVID19 Lockdown in India

Prof. Manoj M, IIT Delhi

Project: Web Development — *April 2020 - July 2020*

- Technical Head of the team of IIT Delhi that aimed to take an activity survey of the people of India on a large subset of diversity.
- We conducted a survey to assess in-home and out-of-home discretionary activity engagement during covid19 lockdown in India.
- Developed a **website from scratch** to collect their responses. Took care of collecting the data **confidentially** and remain **private**.
- Collected and analyzed the activity data from various parts of the country. Analyzed the change in daily routine of people from different areas(rural/urban and state wise) during the lockdown.

Technical Skills

Programming Skills	C/C++, JAVA, Python, OCaml, Prolog, MATLAB, javascript
Softwares	Wireshark, Visual Studio, Git
Hardwares	Xilinx ISE Design Suite and Vivado (VHDL and Verilog), MIPS assembly
Development	HTML, CSS, JavaScript, php, Android Studio

Extracurricular Activities

Representative, Indoor Sports Club (ISC), IIT Delhi

April 2019 - March 2020

- Responsible for **administering all hostel affairs** related to *Chess, Carrom and Snooker Pool* in allotted hostel budget.
- Guided participants to **secure Silver** in Chess & Snooker Pool clinching **Prestigious ISC Trophy among 13 hostels.**
- Managed and executed various competitions- Inter-hostel and Inter-IIT Open Trials to increase Indoor Sports culture.

Volunteer, National Service Scheme (NSS), IIT Delhi

September 2018 - PRESENT

- **Apna Parivaar:** Selected as the *best volunteer* of the project. It aims to provide opportunities to orphan kids to gain confidence and develop their personality. It also consists of organizing educational trips, doubt clearing and teaching sessions.
- **Bachpan:** Voluneered in Bachpan that aims at improving the quality of life of the less fortunate children by providing them education and healthy childhood in and around IIT campus which include children of the construction site workers inside the campus.
- **Vidya Teaching Project:** Project aims to teach the students around IIT Delhi during COVID19 lockdown via video conferencing calls.

Academic Mentorship, Board of Student Wellfair, IIT Delhi

July 2019 - December 2019

- Selected for **Academic Mentor** of MCP100 (Engg. Visualization & Comm.) for one semester on the basis of academic performance.
- Guided First year students by organizing doubt clearing meetings and **tutorial solving sessions** to prepare them for the exams.

- Worked as **Marketing Team Head** in *the biggest cultural fest of north India, **Rendezvous, IIT Delhi*** — *July 2019 - October 2019*
- Worked on the position of **Events Team Head** in ***Tryst***, annual technical fest of IIT Delhi — *February 2019 - March 2019*
- **Intellify:** Developed problem solving video content for unprivileged students of Delhi govt. schools. — *May 2020 - June 2020*
- Technical Content Writer at **GeeksforGeeks**. — *May 2020 - PRESENT*
- Worked as a Content Developer Expert (Mathematics) intern at **Doubtnut**. — *May 2020 - June 2020*
- **Common Room Committee** member, Girnar House, IIT Delhi. — *May 2029 - April, 2020*