Manoj Kumar

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Academic Details

year	Degree	Institute	%age or CGPA
- - - -	(Dual) B.Tech+M.Tech	Indian Institute of Technology, Delhi	7.855
2017	Class 12th	Navjeevan Public School, Sikar	98.20
2015	Class 10th	ABN Sr. sec. school, Maulasar(Raj)	93.50

Scholastic Achievements

- **Joint Entrance Examination(Advanced)**: AIR 119(OB) among more than **1,500,000** students 2018
- **Joint Entrance Examination(Mains)**: AIR 405(OB) among more than **1,500,000** students 2018
- Awarded with **silver medal** by Educational Minister of Rajasthan for performing exceptionally well in class XII
- Secured **3rd merit** in Class XII(RBSE board) among more than **2,000,00** students who appeared in the exam 2017

Engineering Courses

- **Computer Science**: Programming Languages, Discrete Mathematics, Data Structure and Algorithms, Computer Architecture, Digital Logic and Systems, Design Practices
- **Mathematics**: Probability theory and Stochastic Process,Calculus, Linear Algebra and Differential Equations
- **Electrical**: Signals and Systems, Principle of Electronic Materials, Introduction to Electrical Engineering

Major Projects

- **ENCRYPTED VOTING PROTOCOL** Prof. Subodh Sharma (CSE), IIT Delhi
  Modern Cryptography, OCaml *August 2020 -present*
  - An individually verifiable voting protocol with complete recorded-as-intended and counted-as-recorded guarantees.
  - Protocol does rely on several **cryptographic** constructs to maintain the Individual and community **vote secrecy**.
  - It is software independent and bare-handed. It uses random distribution of pre-printed ballots with an optional cast-or-audit component.
  - The protocol optionally supports **voter verifiable paper audit trails(VVPAT).**

- **K-MEDIAN IN A DIRECTED TREE** Prof. Smruti Ranjan Sarangi (IIT Delhi)
  Algorithms, C++ *February 2020 - April 2020*
  - Implementation of a program which computes **k-medians** in a directed tree better than $O(Pk^2)$ complexity
  - Uses a space of **O(nk)** complexity (better than already established $O(n^2k)$ space complexity)
  - Already implemented algorithm is **NP-hard** whereas dynamic programming is used here for efficiency

  *k' is the number of resources to be placed ,'P' is the path length of tree & 'n' is number of vertices in tree

- **SOFTWARE COMPARISON** Prof. Smruti Ranjan Sarangi (IIT Delhi)
  Software Engineering *December 2019 - January 2020*
  - Comparison of softwares used as web browser, pdf reader, music player, mail clients, etc. based on functions.
  - Analyzing the reasons for less efficiency of a feature of one software as compared to other softwares.
  - Debugging the software features of statically linked, non-stripped version of the software using Flamegraph.
  - Replacing less efficient feature of one software with a well efficient corresponding feature in other software.

Course Projects

- **Prrolog And Toy Ocaml Interpreter** — Prof. Sanjiva Prasad ,HOD (CSE), IIT Delhi
  Programming Languages, OCaml — *March 2020 -April 2020*
  - Implemented in Ocaml using Ocamllex, Ocamlyacc for reading and parsing the input respectively.
  - Prolog was implemented using the techniques of back tracking, rule unification for the resolution of queries while SECD, Krivine machine was used to implement Ocaml functionality.

- **Shooting Game** — Prof. Anshul Kumar, IIT Delhi
  Digital Logic and Systems, VHDL — *Spetember, 2019*
  - Module programmed a basic shooting game in the form of VHDL code of PmodOLED and constrained it to be performed on Basys-3-Board by connecting a PmodOLED in JA slot of the board
  - Based on 3 difficulty levels and consists the use of 4 digit seven segment display, LEDs, switches and push buttons
  - It also consists of the turn on, set brightness and set contrast command sequences of PmodOLED

- **3D Structures Using Graphs** — Prof. Subodh Kumar, IIT Delhi
  Data Structures and Algorithms, Java — *November, 2019*
  - Implemented Data Structure : Graph by storing vertices and edges to form triangles and linking triangle
  - Constructed 3D structures by joining triangles together (through the vertex , edge, face, etc.) and storing it
  - Answered queries such as insert, neighbors, the topological distance between two triangles, centroid, etc
  - Implementation was based on good time efficiency of the data structures and the queries answered

- **MIPS Processor** — Prof. Preeti Ranjan Panda, IIT Delhi
  Computer Architecture, VHDL — *January, 2020 - March, 2020*
  - Developed an general purpose MIPS multi-cycle processor on FPGA using VHDL
  - A state machine was used to control the processor and Block RAM to store instructions as well as memory data
  - Demonstrated on FPGA which contains the different components ALU, Register File and Memory and executes a large subset of the MIPS instructions

- **Multi-threaded Producer-Consumer Platform** — Prof. Subodh Kumar, IIT Delhi
  Data Structures and Algorithms, Java — *October, 2019 - November, 2019*
  - Implemented a platform for multiple buyers and multiple sellers using thread synchronization and locks in java.
  - Maintained inventory and catalogue which sells product of the most preferred seller using priorities.
  - Solved the problem of multiples threads to remain synchronized and sell the products from catalogue.

Technical Skills

Programming Skills	:	C, C++ and Java, Ocaml, Prolog, MATLAB, HTML, CSS, Javascript
Softwares	:	Android Studio, Autodesk, Visual Studio, Git
Hardware	:	Xilinx ISE Design Suite and Vivado (VHDL and Verilog), MIPS assembly

Work Experience

- **Class21A Pvt. Ltd.(Doubtnut)**: Intern position for Content Developer Expert (Mathematics) at Doubtnut pvt ltd. based on developing mathematical concepts and creating video content. May 2020 - June 2020
- **GeeksforGeeks**: Remotely monitored part time intern as Technical Content Writer at GeeksforGeeks that consists of writing articles based on algorithms. May 2020 - June 2020

Extra-curricular Activities

- **NSS IIT Delhi**: Regular volunteer in National Service Scheme, IIT Delhi that work on a diverse range of social issues through various events and projects which are aimed towards the benefit of people in and around IIT Delhi.
- **Intellify**: Volunteering for one month in Intellify that aims free teaching of the students of govt. schools in Delhi.
- Certified in Data Structures and Algorithms Program **(CCDSAP) by Codechef**.
- Selected for **Academic Mentor** of MCP100 for one semester on the basis of academic performance.
- Hostel Representative of **Indoor Sports Club, IIT Delhi**.
- **Hobbies**: competitive coding, teaching, Blog writing