Aman Kumar

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Education

Indian Institute of Technology, Delhi India
Bachelor of Technology - Computer Science and Engineering *Jul 2019 - May 2023*

Scholastic Achievements

- **MCM Scholarship Awardee:** Selected for Merit Cum Means Scholarship from the batch of 2019 (IITD) *2019*
- **JEE Advanced:** Secured All India Rank 53 (OB) amongst more than 1,61,000 shortlisted candidates *2019*
- **JEE Main:** Among top 0.17% of the 1.3 million applicants *2019*

Experience

- **Huawei Technologies India Pvt Ltd** Bengaluru, India
  Software Developer Intern *Jun 2022 - July 2022*
  - Built a Constrained Application Protocol(CoAP) library for OpenHarmony in Extended TypeScript for IoT devices
  - Ported various dependencies such as LRU-cache to avoid DDOS problems, and BufferList to Extended TypeScript
  - Designed product roadmap by thoroughly analyzing various open-source CoAP libraries

Research

- **Automatic JavaScript Parallelism For Web Computation** IIT Delhi
  Prof. Smruti R. Sarangi *Aug 2022 - Present*
  - Working on an optimized pipeline to automatically parallelize JavaScript on legacy webpages enabling unmodified browsers to leverage multiple CPU cores, drastically improving efficiency on commodity smartphones.
  - Servers will perform concolic execution of code to identify parallelism possibilities based on potential state accesses.
  - The client will run the rewritten code using a dynamic scheduler to offload tasks to worker threads.

Projects

- **Realtime Traffic Density Estimation:** *Prof. Rijurekha Sen* *Feb 2021- Mar 2021*
  - Estimation of dynamic and static traffic density from video taken by camera on the road using OpenCV library in C++
  - Used Homography for perspective correction, Background Subtraction, and Optical Flow for density estimation
  - Analyzed runtime trade-offs in software design by sub-sampling of frames, resolution reduction and multi-threading
- **Multiplayer 2D Maze Game:** *Prof. Rijurekha Sen* *Jun 2021 - Jul 2021*
  - Created a multiplayer 2D PvPvE top-down shooter game with random bot spawn using SDL2.0 library in C++
  - Implemented a Random Maze Generation Algorithm to generate a different map for every run of the game
  - Implemented an AI for bot movement using a Path Finding Algorithm based on Breadth First Search
- **Toy Kernel From Scratch:** *Prof. Sorav Bansal* *Feb 2022 - Apr 2022*
  - Implemented parts of the kernel having command line shell which supports commands like Fibonacci, Factorial, clear
  - Implemented threads in the form of coroutines and fibers with support of preemptive scheduling
- **Devanagri Handwritten Character Classifcation:** *Prof. Rahul Garg* *Nov 2021 - Dec 2021*
  - Implemented a neural network using Numpy library to classify handwritten Devanagri characters with 94.3% accuracy
  - Improved the accuracy to 97.9% by implementing a Convolutional Neural Network using PyTorch
- **Chat Application:** *Prof. Abhijnan Chakraborty* *Sep 2021 - Oct 2021*
  - Implemented chat application leveraging an HTTP-like protocol using multi-threaded socket programming in Python
  - Supports multiple clients, login, logout, unicast, broadcast operations and plain text messages of arbitrary length
- **CPU and DRAM Simulator:** *Prof. Preeti Ranjan Panda* *Feb 2021 - May 2021*
  - Implemented a MIPS interpreter in C++ using the DRAM model for memory and simulating elapsed clock cycles
  - Created a Memory Resource Manager which uses several heuristics to maximize throughput and reduce idle time

Coursework

- **Computer Science**: Introduction To Computer Science, Programming Languages, Digital Logic & System Design, Computer Architecture, Data Structures And Algorithms, Computer Networks, Principles Of Artificial Intelligence, Analysis & Design Of Algorithms, Theory Of Computation, Operating Systems, Data mining, Computer Science & Ethics
- **Others**: Calculus, Linear Algebra & Differential Equations, Probability & Stochastic Processes, Signals And Systems, Discrete Mathematical Structure, Linear Algebra & Applications

Technical Skills

- **Languages**: C++, Python, Java, C, TypeScript, JavaScript, SQL, HTML, CSS, Octave, Prolog, Bash, Standard ML/New Jersey, SML-LEX, SML-YACC, VHDL, MIPS, x86, LaTeX
- **Libraries/Frameworks**: OpenMP, MPI, PyTorch, Scikit-learn, Pandas, NumPy, OpenCV, SDL, STL, gSpan, Gaston, FSG
- **Miscellaneous**: Git, Jupyter Notebook, Autodesk inventor, Android Studio, OpenHarmony

Extra Curricular Activities

- **Winter Collection Drive:** Collected books, clothes, toys, etc. for donation to various NGOs (NSS - IITD) *2019*
- **Blanket Distribution Drive:** Distributed blankets among needy people suffering from cold (NSS - IITD) *2019*