Ramneet Singh

Senior Undergraduate · Computer Science and Engineering
INDIAN INSTITUTE OF TECHNOLOGY DELHI
(+91) 97-7919-2615 | ramneet2001@gmail.com | ramneet-singh.netlify.app | Ramneet-Singh | ramneetsinghiitd

Education

Indian Institute of Technology, Delhi
New Delhi, India

Integrated B.Tech and M.Tech,Computer Science and Engineering
2019 - Exp. 2024

- Grade Point Average: **9.493/10.0**

Modern Vidya Niketan, Sec. 17
Faridabad, India

CBSE Board - XII Grade
2018 - 2019

- Score: **96.2%**

Honors & Awards

2020	**Third Place, HCL Hack IITK**, among 12,500 teams - students, professionals and startups from 12 countries.	*India*
2022	**IIT Delhi Semester Merit Award - Sem II, 2021-22**, for exceptional academic performance in a semester.	*IIT Delhi*
2020	**IIT Delhi Semester Merit Award - Sem II, 2019-20**, for exceptional academic performance in a semester.	*IIT Delhi*
2020	**Univ.AI**, full scholarship to take the ML/AI Basics course, taught by Pavlos Protopapas from Harvard.	*Online*
2019	**All India Rank 146**, Joint Entrance Exam Advanced among 170,000 candidates.	*India*
2019	**All India Rank 113**, Joint Entrance Exam Mains among 1.1 Million candidates.	*India*
2018	**State Rank 1**, Haryana State topper in the National Level Science Talent Search Examination.	*India*

Work Experience

Max-Reachability Policies in MDPs, Georgia Institute of Technology
Atlanta, USA

M. Tech. Project, Prof. Suguman Bansal
December 2023 - Present

- Designing a compositional algorithm to compute maximum reachability policies in MDPs, which is a foundational building block in all probabilistic model checking algorithms.

Platform Engineer, Chorus One
Remote

Infrastructure Team, Part-Time
August 2023 - October 2023

- Built tooling for secure key management and encryption of servers.
- Maintained, scaled & monitored existing infrastructure, including bare metal servers, cloud machines, & a Kubernetes cluster, to allow the organization to provide secure & reliable industry-leading Proof-of-Stake validation services.

Marketing Segment Flow Prediction, Adobe Research Big Data Experience Labs
Bangalore, India

Research Intern
June 2022 - August 2022

- Developed a novel temporal-graph-based model for marketing segments & applied neural edge weight prediction techniques for forecasting churn & flow of customers between segments.
- Designed network centrality & flow-based measures to identify high-activity segments, providing insights about market behaviour to marketers.

Data Driven Marketing Spend Optimisation, DataChannel Technologies
Gurugram, India

Data Analyst Intern
June 2021 - August 2021

- Developed a system to give optimal spend recommendations across media channels & adsets using historical marketing data, allowing marketing teams to focus on creativity and design.
- Implemented a revenue forecasting model to predict the revenue-budget relationship for each channel and adset, taking into account adstock transformation as well as the diminishing nature of returns. Dealt effectively with sparsity of data at the adset level.
- Implemented a cross-channel optimiser which used revenue forecasting models at both hierarchical levels to provide optimal spend allocations. Incorporated constraints like minimum/maximum channel spend keeping in mind practical marketing strategies.

Projects

Value Equivalence based Optimal Stateless Model Checking

IIT Delhi

Research Project, Prof. Subodh Sharma — *C++ | Formal Verification*

- Implemented a novel algorithm to verify the correctness of concurrent programs operating in the Sequential Consistency Memory Model.
- Added custom tool as part of a large open-source software (Nidhugg) used for finding bugs in concurrent programs.
- Created a custom class to execute the program and build execution sequences dynamically as well as analyse them.

ML based P2P Botnet Detection through Network Flow Analysis

HCL | IIT Kanpur

Third Place Winner, HCL Hack IITK [GitHub] [Presentation] — *LightGBM | Python | Scapy*

- Built a command line tool to identify P2P Botnet traffic over a network & also detect the hosts involved.
- Consulted multiple research papers to identify useful features for classification, hand engineered certain statistical features & selected the best through RFE & Select-K-Best methods.
- Used the LightGBM Model based on Gradient Boosted Decision Trees, which is efficient and capable of handling large-scale data. Obtained increased accuracy compared to Random Forest, as well as faster training time.

Parser & Evaluator for a Functional Language

IIT Delhi

Course Project, Programming Languages, Prof. S. Arun-Kumar [GitHub] — *Standard ML | mllex | mlyacc*

- Parser and evaluator for a custom defined, strongly typed functional language of integer & boolean expressions.
- Supported static lexical scope rules (through `let in` statements) and named as well as lambda function declarations. Treated functions as first-class objects and supported higher order functions & recursion.
- Built a type-checker to operate on the abstract syntax trees and ensure type-safety of programs of the language.
- Evaluated well-typed input programs and displayed the value along with its type to the user.

Multi-Core Processor & DRAM Memory Simulator

IIT Delhi

Course Project, Computer Architecture, Prof. P. R. Panda [GitHub] — *C++ | MIPS Assembly*

- Built a simulator for both Processor & DRAM & integrated them to form the complete system.
- Modelled some timing and resource constraints of DRAM, printed summary statistics & cycle-wise analysis if specified.
- Supported the execution of multiple CPU Cores, operating on a shared DRAM Memory. Created a Memory Request Manager as the interface between memory and cores.
- Implemented the FR-FCFS memory scheduling algorithm & sw-lw forwarding to maximize throughput.

Traffic Density Estimation using OpenCV

IIT Delhi

Course Project, Design Practices, Prof. Rijurekha Sen [GitHub] [Report] — *C++ | OpenCV*

- Used OpenCV functions to estimate the traffic density at a junction from recorded videos.
- Calculated the queue and dynamic density for each frame using background subtraction and optical flow methods.
- Efficiently parallelized the above computations, taking advantage of the independent nature of computations for respective frames.

Relevant Coursework

- **Computer Science: Proofs and Types***, **Foundations of Automatic Verification***, **Logic for Computer Science***, **Verification of Concurrent Programs***, **Resource Virtualisation with Containers***,**Advanced Compiler Techniques***,**Compiler Optimisation***, **Compiler Design***, Semantics of Programming Languages, Data Mining, **Program Synthesis of Smart Contracts***, **Operating Systems***, Theory of Computation, Parallel & Distributed Programming, **Computational Neuroscience***, Artificial Intelligence, Machine Learning, Algorithm Design, **Computer Networks***, **Programming Languages***, **Data Structures & Algorithms***
- **Writings and Slides:** Lecture Notes on λ-definability ≡ Recursiveness and the Scott-Curry Theorem (Undecidability of β-equality in the untyped λ-Calculus), Report on "Program Synthesis Meets Smart Contracts", Lecture Slides on Incorrectness Logic, Slides on Compositional Reasoning for Weak Memory Models
- **Mathematics and Electrical:** Linear Algebra - II, **Linear Algebra - I****, Signals & Systems, Prob. & Stochastic Processes, **Calculus***.

*** - A Grade ** - Scored 100/100**

Extracurricular Activity

Co-WIN Vaccine Alerts Telegram Bot

Faridabad, Haryana

Personal Project [Telegram] — *Python*

- Created a Telegram bot to provide users with a flexible and user-friendly way to be notified about available vaccination slots.
- Enables users to join channels for their districts and subscribe to updates about slot availability periodically, or to search for slots one-time.
- Created channels for **400+** districts till now, & helped many people find available slots.