

Kushagra Gupta

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EDUCATION

INDIAN INSTITUTE OF TECHNOLOGY, DELHI

BACHELOR'S AND MASTER'S OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING

November 2021— May 2026 (expected) | India

CGPA : 9.53/10 | Department Rank 1

Relevant Coursework: Algorithms, OS, Compiler Design, Parallel & Distributed Programming, Computer Architecture, AI, ML, TOC, Cryptography, PL, Network & System Security, DBMS, Logic, Formal Methods, Verification, Algorithmic Graph Theory, Econometrics

EXPERIENCE

MPI-SWS, SAARBRÜCKEN, GERMANY | HYBRID FRAMEWORK FOR SECURE MPC PROTOCOLS (May 2024 - July 2024)

- Working with Prof. Deepak Garg on building a **novel hybrid multi-protocol** framework for Secure **Multi-Party Computation**.
- Implemented the **C++** framework on top of MP-SPDZ & extended it to support transfer between arithmetic & binary protocols.

JANE STREET SEE : IIT EDITION, HONG KONG | TRADING & SWE PROGRAMME (Dec 2023)

- Learnt **OCaml**, **trading research and statistical modeling**, and the tools and libraries integral to Jane Street's everyday work.
- Developed the backend and UI for a computer game in **OCaml** and **Dune**, using the acquired skills and technologies.

INRIA SOPHIA ANTIPOLIS, FRANCE - TITANE TEAM | PARSIMONIOUS ALPHA WRAPPING (May 2023 - July 2023)

- Worked with Prof. Pierre Alliez on improving the **Alpha Wrapping with an offset algorithm** in the open-source **CGAL** Library.
- Implemented a parsimonious approach to **reduce** algorithm complexity by up to **50%** for efficiently generating mesh wraps.

VDO.AI, IIM AHMEDABAD & CORNELL | VIDEO LONG-SHORT ADS (Aug 2022 - Jan 2023)

- Worked with Prof. Anuj Kapoor, IIMA and Prof. Omid Rafieian, Cornell on the **Data Science** Project using **Pandas & Sklearn**.
- Improved **ad-revenue** by analyzing data for Skippable, Non-Skippable & No-Ads Videos based on Ad-Video quartile completion.

KEY PROJECTS

ADVANCED MEMORY MANAGEMENT AND SCHEDULING IN XV6 | PROF. ABHILASH JINDAL (Jan 2024 - May 2024)

- Implemented demand paging along with the **COW (Copy on Write)** mechanism in **C** for the **xv6 Operating System**.
- Designed a **priority scheduler** to prioritize foreground processes while preventing starvation and added **undo logging** in xv6.

RELIABLE TRANSFER OVER UDP | DB362 DBMS | PROF. KAUSTUBH | PROF. AADITESHWAR (Jan 2024 - May 2024)

- Developed a **UDP-based** protocol for reliable data transfer with TCP-like features & **congestion control**, optimized with **AIMD**.
- Implemented our DBMS using **Java**, Apache **Calcite**, focusing on B+ Tree Indexing, Query Parsing, Execution & Optimization.

LLVM CODE GENERATION FOR C | PL(0) INTERPRETER | PROF. SORAV BANSAL | PROF. SAK (Jan 2024 - May 2024)

- Developed an **AST & LLVM** bitcode generator for **C** programs, with support for complex constructs and **local optimisations**.
- Implemented a **PL(0)** interpreter with **static** type checking, AST generation, and execution using **SML**, **ML-Lex**, and **ML-Yacc**.

ROLLERBALL CHESS PLAYING BOT | AR-MAXILLOFACIAL | PROF. MAUSAM | PROF. RAHUL NARIAN (Aug 2023 - Nov 2023)

- Implemented adversarial **search** algorithms with **minimax** tree search, optimized with α - β pruning and heuristic eval functions.
- Developed an AR app in **Unity** for maxillofacial surgery with **U-Net** Transformers for mesh extraction & AMASSS segmentation.

ACHIEVEMENTS

2024	DAAD-WISE & PLMW Scholar	Scholarships awarded for internship at MPI-SWS (by DAAD) and for PLMW@PLDI'24
2024	UPE/ACM Scholarship Awardee	Scholarship awarded by UPE & ACM for academic excellence to Top 6 students worldwide
2023	CMMRS Participant	Cornell, Maryland, Max Planck Pre-doctoral Research School (Top 90 students worldwide)
2023	Charpak Lab Scholar	Scholarship awarded by IFI - Embassy of France for internship at INRIA Sophia Antipolis
2023	IITD Semester Merit Award	Conferred for being in the Top 7% students in 1st, 2nd, 3rd, 4th & 5th semester
2022	Resource Person, APHo '22	Responsible for evaluating 22nd Asian Physics Olympiad hosted by IAPT, Dehradun, India
2022	Reliance Foundation Scholar	AI Fellowship awarded by Reliance Foundation to brightest 60 students across India
2021	JEE(A) & JEE(M) AIR 109 & 72	Secured Rank 109 & 72 in JEE Advanced and JEE Main amongst 1 Million Candidates
2021	MOOC-INMO Qualifier	Math Olympiad Orientation Camp held in lieu of IMOTC , for the 62nd IMO Russia
2021	KVPY & NTSE Fellow	Awarded KVPY (AIR 35 (SX) & 158 (SA)) & NTSE Fellowships by IISc, Bangalore & NCERT
2021	NSEP, NSEC, NSEA Top 1 %	National Top 1 % amongst Top 209, 179 & 82 candidates in IPhO, IChO & IOAA Stage-1
2021	RMO, NSEC, NSEA Qualifier	Qualified NSEC, NSEA, RMO 2021, NSEA 2020 & RMO 2019 conducted by HBCSE

EXTRACURRICULARS

Teaching Assistant - COL215 & COL226
Coordinator, iGEM, ACES-ACM, BlocSoc
Tower Research Data Challenge '23 & '24
1st Position, Techfest'22, IITB
BSW Student Mentorship '23 and '24

Taught, graded, & conducted labs for the courses Digital Logic & Programming Languages
Secretary, ACM Student Chapter and **Coordinator**, iGEM and Blockchain Society, IITD
TRC Data Challenge **Finalist** | **1st & 3rd** Position, Dalal Street & Abstractify, Tryst'23, IITD
In Stress Prediction, Techfest'22 | Qualified for IITB Winter School'22 - **ACM & Trust Lab**
Student Mentor for **1st Year CS5** students & academic mentor for **MTL100, Calculus**