



Aakash Gupta  
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Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2027	11
Intermediate	CBSE	Gyankalash International School	2023	98.2%
Matriculation	CBSE	Gyankalash International School	2021	99.2%

Pursuing **Double Minor** in **Centre for Machine Intelligence and Data Science** & **Bioscience and Bioengineering**

## SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 28** in **Joint Entrance Examination (Advanced)** among **160,000+** candidates (2023)
- Secured **99.76** percentile in prestigious **Medical Entrance Test, NEET-UG** among **2M+** appeared (2023)
- Recipient of **Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship** by achieving **All India Rank 138** (2021)
- Achieved **99.86** percentile in **JEE Mains** with **100** percentile in **Maths** among **1.1M+** students appeared (2023)
- Qualified prestigious **National Talent Search Examination (NTSE) Stage 1** conducted by **NCERT** (2021)

## OLYMPIADS

- Conferred with **National Gold Medal** and attended **OCSC camp** for selection of Indian team for the **54th International Chemistry Olympiad (IChO)** after being in **Top 44** in **INChO** conducted by **HBCSE** (2023)
- Among the **Top 33** students in India who qualified for **OCSC camp** in **Astronomy and Astrophysics** (2023)
- Secured a **Top 450** position in **IOQM** and qualified for **INMO** (Indian National Mathematics Olympiad) (2023)
- Was among **Top 300** students selected to appear in **Indian National Olympiad in Biology and Physics** (2022)
- Awarded **Certificate of Distinction** in **American Mathematics Competition** conducted by Mathematics Association of America and qualified for **American Invitational Mathematics Competition (AIME)** (2022)

## CONTESTS AND COMPETITIONS

**Citadel India Terminal** | *Citadel and Citadel Securities*

(April 2025)

- Finished as **First Runners Up (2nd place)** among **30,000+** participants across the nation with a prize money of **1000 USD** in the AI programming contest involving **strategy-based defense game** in single-elimination matchups

**Researcher, iGEM IIT Bombay** | *Paris, France*

(Oct 2024)

- Won IIT Bombay's first-ever **Gold** at iGEM among **400+** teams; nominated for **Best Climate Crisis Project**
- Engineered **lipidome** and **calcification** pathways in **E. Huxleyi** for enhanced carbon capture using genetic tools

## EXPERIENCES

**Summer Research Internship** | *Technical University of Munich, Germany*

(May 2025 - Present)

- Designed RL pipelines with **Q-learning** and **Actor-Critic** to learn  $\epsilon$ -optimal strategies in black and grey-box
- Implemented **PAC-based** model checking for MDPs and SMGs using **Stormpy** for unbounded reachability
- Evaluated **convergence**, policy performance, and error guarantees across **PRISM benchmark models**

**Jane Street SEE IIT** | *Hong Kong SAR*

(Dec 2024)

- Learnt **OCaml**, Jane Street's favored programming language, along with the ins and outs of functional programming
- Created a modern version of the **classic snake game** by implementing **trie data structure** in **ocaml**

## KEY PROJECTS

**Operating Systems Enhancements** | *Course project*

(Jan 2025 - May 2025)

*Course: Operating Systems Labs, Instructor: Prof. Mythili Vutukuru*

- Extended the **xv6 OS** with a **weighted round-robin scheduler**, **demand paging**, and **copy-on-write** fork
- Built a Unix shell from scratch with foreground/background execution, **signal handling**, **parallel/serial** execution, process groups; **concurrency primitives** (threads, semaphores) and **IPC** via shared memory, pipes, and sockets

**MinNetSim: Network Simulator** | *Seasons of Code*

(May 2025 - Present)

*Web and Coding Club, IIT Bombay*

- Implemented a **OOPS-based** discrete event network simulator with dynamic scheduling and packet routing logic
- Designed UML-based architecture using **smart pointers** to support **IP/TCP** for congestion-aware topologies
- Simulated network scenarios with variable **link delays**, **queueing**, and routing dynamics to analyze performance

**Top-k Selection & Range-Query** | *RnD Course Project - Prof. Sujoy Bhowe* (Jan 2025 - April 2025)

- Studied **approximation** algorithms for **bicriteria top-k** selection with **diversity-utility** trade-offs in  $O(n + k \log k)$
- Implemented **Max-Sum** and **Min-Max** diversification algorithms using  $\epsilon$ -net constructions and greedy methods

## Plagiarism Checker | *Course project*

(Aug 2024 - Nov 2024)

Course: Data Structure & Algorithms Lab, Instructor: Prof. Ashutosh Gupta

- Implemented efficient algorithm for **exact** and **approximate** string matching leveraging **Lavenshtein's algorithm**
- Designed modular **APIs** for integrating student, professor and submission objects using **queues** and **sets**
- Implemented **multithreading** using mutex locks and condition variables for efficient real-time submission handling

## OTHER PROJECTS

### Predictive Analytics and Time series Analysis | *Course project*

(Aug 2024 - Nov 2024)

Course: Data Analysis and Interpretation, Instructor: Prof. Sunita Sarawagi

- Conducted comprehensive time series analysis analysing stationarity through **ACF**, **PACF** and **Dicky Fuller test**
- Developed fraud detection model using **KDE(Epanechnikov kernel)** by identifying low-probability transaction
- Implemented Nadaraya-Watson kernel regression for estimation and reduced dimensions using **PCA** and **tSNE**

### Image Processing and Reconstruction | *Course project*

(Jan 2025 - May 2025)

Course: Medical Image Computing, Instructor: Prof. Suyash Awate

- Bayesian MR **denoising** using gradient MAP with 4-neighbour **MRF** priors and **sparse dictionary learning**
- Developed CT **Radon -FBP -ART** pipelines and MR brain segmentation via **fuzzy-C-means** and **GMM-MRF**
- Reconstructed histopathological images for **breast cancer detection** using **Generative Adversarial Networks**

### Price Moment forecasting using Double Ensemble | *Course project*

(Jan 2025 - May 2025)

Course: Machine Learning, Instructor: Prof. Pushpak Bhattacharya

- Developed **ensemble** learning techniques using multiple baseline models like **gradient boosting** and **random forest** with a dynamic decay-factor in **sample-reweighting** trajectories and optimized via stacking (meta-learner)
- Engineered a robust **feature-selection** pipeline by fusing correlation, information-gain, and shuffle-based importance

### Maximising Returns in Stock Trading using Deep RL | *Finsearch*

(May 2024 - July 2024)

Finance Club, IIT Bombay

- Developed a **Deep-Q Network (DQN)** model for **CartPole v1**, gaining hands-on experience in RL algorithms
- Analyzed **Nifty100** data with ARIMA and LSTM models, achieving a **Sharpe Ratio** of 1.71 based on **ROI**

### Bash-Grader with Version Control | *Course project*

(Jan 2024 - April 2024)

Course: Software System Labs, Instructor: Prof. Kameswari Chebrolu

- Implemented automated **Gaussian Distribution-based relative grading**, comprehensive performance analysis with detailed statistical breakdowns and incorporated **spelling correction** using **Levenshtein's Algorithm**
- Generated **individualized report cards** with **personalized performance** and incorporated **git VCS**

### Karatsuba Multiplier Algorithm & sorting in MIPS | *Course Project*

(Aug 2024 - Nov 2024)

Course: Digital Logic & Computer Architecture, Instructor: Prof. Bhaskaran Raman

- Designed a **16-bit Binary Multiplier** using **Karatsuba algorithm** in **Verilog HDL** and further optimized it for **32-bit binary** using Karatsuba multiplier by **sequential** circuit thereby making the algorithm more efficient
- Implemented **Heap Sort**, **Merge Sort** and **Binary Search** algorithms in **MIPS 32** Assembly language

### String Algorithms | *Course project*

(Aug 2024 - Nov 2024)

Course: Data Structure & Algorithms Lab, Instructor: Prof. Ashutosh Gupta

- Designed an **autocomplete** recommendation using **tries** based on scores on **user text history** and **word context**
- Implemented the **Knuth-Morris-Pratt** search algorithm and various data structures for storing textual data efficiently including **tries** and **suffix trees** from scratch and benchmarked their performance for runtime efficiency

## POSITION OF RESPONSIBILITY

**Dept. Academic Mentor, SMP** | Selected among **70+** applicants to mentor sophomores (May 2025 - Present)

**Council Member, CSEA** | Design nominee; created graphics and merchandise (Jul 2024 - April 2025)

**Mentor, Learnerspace** | Mentored **50+** students; created Synthetic Biology content (May 2024 - Jul 2024)

**Mentor, WiDS** | Created content on Twitter Sentiment Analysis using NLP (Dec 2024 - Jan 2025)

## COURSES UNDERTAKEN

### Computer Science

Software Systems Lab, Discrete Structures, Data Structures & Algorithms <sup>†</sup>, Digital Logic Design & Computer Architecture <sup>†</sup>, Data Analysis & Interpretation, Logic for CS, Game Theory & Algorithmic Mechanism Design, Artificial Intelligence & Machine Learning <sup>†</sup>, Operating Systems <sup>†</sup>, Design & Analysis of Algorithms, Medical Image Computing, Computer Networks<sup>†\*</sup>, Abstraction & Paradigms of Languages<sup>†\*</sup>, Automata Theory<sup>\*</sup>

### Mathematics

Calculus, Linear Algebra & Differential Equations

<sup>†</sup> Course with corresponding Lab <sup>\*</sup> To be completed by Dec 2025

## EXTRACURRICULAR ACTIVITIES

- **First Runners Up** in the **XLR8 Competition**, ERC club IIT Bombay by engineering a robot (2023)
- Top 16 finalist in **CodeWars v4**, **Wncc IITB** involving maximum space-spanning algorithm in **pygame** (2024)
- Proficient in pencil shading, water colour and drawing still life in **Fine Arts**, **National Sports Organization**(2023)
- Performed solo and group dances in **Annual Insync Dance Show**, **CSE Trad day** and **freshers night** (2023,2024)