Saksham Rathi

Curriculum Vitae

Department of Computer Science,
Indian Institute of Technology Bombay
Mumbai—400076
✉ *22b1003@iitb.ac.in*
sakshamrathi21.github.io/

Education

2022 - 2026 **Indian Institute of Technology Bombay** *Bachelor's of Technology*
Pursuing majors in Computer Science and Engineering (CSE) along with honors and minor in Machine Intelligence and Data Science (CPI - 9.6/10)

2020 - 2022 **Disha Delphi Public School, Kota** *Senior Secondary Education*
Secured 99.0% in CBSE Class 12th Board Examination

2008-2020 **Delhi Public School, Kota** *Primary and Secondary Education*
Secured 98.6% in CBSE Class 10th Board Examination

Research Experience and Internships

Current **Software Engineering Internship**
Citadel, London

2024 **Applied Scientist Internship**
Amazon, Bangalore

(a) Worked on Amazon's Large Language Model Olympus and improved its instruction following ability
(b) Implemented Classifier-free Guidance method to enhance focus on key parts of user queries and system prompts, optimizing the balance between conditional and unconditional probabilities using a hyper-parameter
(c) Evaluated the performance of Olympus and some open source models on various single and multi-turn datasets

2024-25 **Compressive Lognormal Regression**
Indian Institute of Technology Bombay. Guide: Prof. Ajit Rajwade.

(a) Improving on the current viral load estimators used in compressed sensing pool testing methods for RT-PCR
(b) Utilizing Bayesian inference to estimate distributions of infected samples and errors in their testing parameters
(c) Using combinatorial group testing and compressed sensing to improve upon algorithms for deconvoluting pooled tests

Academic Achievements

2022 Secured **All India Rank 18** in **Joint Entrance Examination Advanced** among 250,000 selected students
2023 Secured **Department Rank 12** in a batch of 174 students, in Computer Science and Engineering, IIT Bombay
2023 Awarded the **Institute Academic Prize** for being among the **top 20** out of 1400 students in first year
2023 Achieved **10** Semester Performance Index **(SPI)** by scoring a perfect grade in the Spring Semester of first year
2020 Awarded the **NTSE Scholarship** after a two-tier merit-based procedure by NCERT, Government of India
2021, 2022 Recipient of the **Kishore Vaigyanik Protsahan Yojana**, a coveted fellowship by the Department of Science and Technology, Government of India by securing **All India Ranks 24** and **33** in the SX and the SA streams
2022 Secured **All India Rank 321** in Joint Entrance Examination Main among 900,000 students

Olympiads and Competitions

2022 Among the **top 26** students to clear the Indian National Astronomy Olympiad (INAO) and selected to attend the **Orientation-Cum-Selection Camp** for **International Astronomy Olympiad** (IOAA)
2024, 2025 Was among the **top 50** at Limestone Data Challenge conducted by **Tower Research Capital**, India in collaboration with the Finance Club, IIT Bombay amongst 200+ participating candidates across all academic years
2020 Selected among the **top 40** students to clear the Indian National Junior Science Olympiad (INJSO) and selected to attend the **Orientation-Cum-Selection Camp** for **International Junior Science Olympiad** (IJSO)
2022 Among the top 300 students selected for the **Indian National Physics Olympiad** conducted by HBCSE
2018 Selected among the top 300 students for the **Indian National Mathematics Olympiad**, HBCSE

Key Projects

Autumn 2023 **Socket-Based Trading Engine with Arbitrage Detection**
Guide: Prof. Ashutosh Gupta | Course Project: Data Structures and Algorithms
Devised trading strategies utilizing **sockets** and **threads** to enhance market responsiveness and execution efficiency
Developed a **dynamic market** platform that intelligently matches traders based on optimal prices, enhancing

overall market performance and has robust measures to identify and prevent **arbitrage** opportunities
Implemented **median trading** and **statistical arbitrage**, to exploit market anomalies and drive consistent returns

Summer 2023 **Modeling Economic Systems with Reinforcement Learning**
Web and Coding Club | Seasons of Code
Formulated and implemented various economic problems as **Markov Decision Processes** in the Gym framework
Employed a combination of **Bandit** algorithms and **Reinforcement Learning** algorithms, known for their adaptability and learning capabilities, to address complex matching markets, auction dynamics, and allocation problems
Modeled **stock exchange** as a **double auction**, which incorporated market sentiment and the individual objectives of users and conducted simulations involving a diverse group of over **100** participants to assess the model's efficacy

Summer 2023 **Working with Low Level Systems**
Guide: Prof. Biswabandan Panda | Course Project: Digital Logic and Computer Architecture
Utilized the **champsim** simulator to implement and analyze **stream** and **IP stride prefetchers**, while evaluating the effectiveness of **LRU**, **FIFO**, **LFU** and **BIP** replacement policies based on IPC and accuracy metrics
Designed a **VHDL** circuit which encodes **musical chords**, achieving conversion of 8-bit binary notes into chords
Implemented **Heap Sort**, **Merge Sort** and Binary Search algorithms in the **MIPS** and **x86** Assembly Language

Other Projects

Positions of Responsibility

2025 **Teaching Assistant** | Discrete Structures, IIT Bombay
Instructor: Prof. Akshay S

2025 **Teaching Assistant** | Operating Systems, IIT Bombay
Instructor: Prof. Mythili Vutukuru
Collaborated with the professor in creating labs, exams and autograders

2024-25 **DAMP Mentor** | Department Academic Mentorship Programme, IIT Bombay CSE
Selected via a rigorous procedure of SoP, Peer Reviews, and Interviews to be part of a team of 37 out of 90 applicants
Guiding sophomores on academic and extra-curricular decisions and helping them navigate their curriculum

2024 **Teaching Assistant** | Data Analysis and Interpretation, IIT Bombay
Instructor: Prof. Sunita Sarawagi
Instructed sophomore students, offering guidance and support both during tutorials and doubt solving sessions
Collaborated with the professor in creating weekly quizzes, exams, assignments, practice problems, tutorial notes and grading

2024 **Teaching Assistant** | Software Systems Lab, IIT Bombay
Instructor: Prof. Kameswari Chebrolu
Instructed a cohort of 50 freshman students, offering guidance and support both during tutorial and lab hours
Collaborated with the professor in creating labs, exams, autograders, quizzes, practice problems and tutorial notes

2024 **Mentor** | Seasons of Code, IIT Bombay
Web and Coding Club
Instructed a group of 25 students for Competitive Programming and provided them the appropriate resources and problems for Dynamic Programming, Sorting, Greedy, Graphs, Trees, Range and String Algorithms

2023 **Teaching Assistant** | Calculus, IIT Bombay
Instructor: Prof. Ravi Raghunathan
Guided and instructed a group of 40 freshmen students enrolled in a semester-long calculus course
Actively collaborated with the professors to ensure the seamless and effective execution of the course

2023 **Mentor** | Winter in Data Science, IIT Bombay
Analytics Club
Provided mentorship to a team of 10 students for a **data analysis** project involving **Python** and **MATLAB**, guiding them in presenting results on a personal website through HTML, JavaScript, and CSS integration

Coursework

Computer Science Data Structures and Algorithms[§], Design and Analysis of Algorithms, Digital Logic Design and Computer Architecture[§], Computer Networks[§], Programming Paradigms[§], Implementation of Programming Languages[§], Database and Information Systems[§], Logic and theory for Computation, Operating Systems[§], Software Systems Lab[§], Computer Programming and Utilization[§], Computing and Science[§], Applied Algorithms, Game Theory and Algorithmic Mechanism Design, Blockchains, Cryptocurrencies and Smart Contracts

Matematics Discrete Structures, Calculus, Linear Algebra, Differential Equations, Mathematical Structures for Control

Data Science Data Analysis and Interpretation, Optimization, Medical Image Computing, Artificial Intelligence and Machine Learning[§], Digital Image Processing, Advanced Image Processing, Advanced Machine Learning

Others Organic and Inorganic Chemistry[§], Physical Chemistry[§], Classical and Quantum Physics, Makerspace, Management, Philosophy, Biology, Economics, Design Thinking for Innovation, Development of Mathematics in India, Physiology, Environmental Studies, Entrepreneurship

[§] *along with a lab component*

Technical Skills

Programming Languages C++, Python, HTML, CSS, Git, JavaScript, VHDL, MIPS, Sed, Awk, Shell, Bash

Software Tools LaTeX, Qiskit, GitHub, Autodesk Fusion 360, Arduino, Pygame

Data Science Matplotlib, MATLAB, NumPy, Keras, TensorFlow, PyTorch, SciPy, Pandas

Verbal Debate, Group Discussion

Extracurriculars

2024 Received the **Excellence** in **CSE Teaching Assistantship** Award for the Software Systems Lab course

2023 Engineered a manually controlled **robot**, imbued with the ability to navigate through a diverse array of obstacles while participating in the prestigious **XLR8** Competition, the Robotics Club of IIT Bombay

2019 Secured **third rank** in Rajmata Gayatri Devi National Inter-School **Verbattle Debate** Competition

2019 Appointed as the **Prime Minister** during a **Model United Nations** session, which serves as a platform aimed at fostering political discourse and encouraging the exchange of thoughtful ideas of international affairs

2023 Completed a one-year course in **Weightlifting** under National Sports Organization, IIT Bombay

2019 Secured **First Rank** in **Science Quiz** organised by Defence Laboratory, Jodhpur on National Science Day

2019 Secured **First Rank**in **Science Quiz** organised by Career Point World School on National Science Day