Arijit Saha | **210050017**
Computer Science & Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 06/10/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	8.12
Intermediate	WBCHSE	Ramakrishna Mission Vidyalaya	2021	94.00%
Matriculation	WBBSE	Sargachi Ramakrishna Mission HS	2019	90.86%

Scholastic Achievements

- Secured **All India Rank *6(SC)*** in **IIT JEE-Advanced** out of 1.4 lakh candidates. *(2021)*
- Secured **All India Rank *19(SC)*** and ***99.91* percentile** in **JEE-Main**. *(2021)*
- Secured **All India Rank *1(SC)*** in **West Bengal Joint Entrance Exam(WBJEE)**. *(2021)*
- Qualified in **Chennai Mathematical Institute Admission Test**. *(2021)*
- Secured **All India Rank *4(SC)*** in **Indian Statistical Institute Admission Test**. *(2021)*
- Secured **All India Rank *76*** in **Kishore Vaigyanik Protsahan Yojana(KVPY) SX**. *(2020)*
- Secured **All India Rank *83*** in **Kishore Vaigyanik Protsahan Yojana(KVPY) SA**. *(2019)*
- Qualified in **Jagadis Bose National Science Talent Search, Kolkata**. *(2019)*

Internship

OCR Server to Straight Through Processing Client — SDE (Wells Fargo) *(20-May to 12-July 2024)*

- Developed an **OCR Server** to **STP (Straight Through Processing)** client system.
- Extracted important data from filled scanned copies of forms and converted them into **JSON** format.
- Implemented **Object Detection** and **Optical Character Recognition (OCR)** techniques.

Sports App — Full Stack Development (Eshway) *(15-May to 15-June 2024)*

- Developed a **Sports App** facilitating communication between **sponsors** and **event parties**.
- Utilized **MERN stack** (**MongoDB**, **Express.js**, **React**, **Node.js**) for **full-stack development**.
- Enabled **secure transaction processing** between **sponsors** and **event parties**.
- Incorporated **real-time chat functionality** for **negotiations** and **deal finalization**.
- Developed and maintained **user authentication** and **authorization** features.

Research and Development

Squre Page — Prof. Kameswari Chebrolu (IIT Bombay) *(Autumn 2023)*

- **Contributed to the development of a Question Bank & Paper Management System**, a web application designed to manage a centralized question bank, edit questions, and generate question papers in PDF format.
- **Enhanced question paper creation and integration** by implementing filtering, search, and pagination features to optimize performance for large question sets, and by integrating the Vue.js PDF upload interface with the Django server to ensure smooth data flow for question paper generation.
- **Containerized the project components** (Django server, Vue.js interface, and Flask PDF extraction) using Docker, enabling easier deployment and integration of the system.

Analysis of RNA sequencing data — Prof. Prakriti Tayalia (IIT Bombay) *(Autumn 2024)*

- **Analyzed RNA sequencing data** to identify key gene signatures for survival prediction, applying advanced statistical methods and visualization techniques to handle data from over 3000 patients.
- **Developed and implemented dimensionality reduction techniques**, including PCA and clustering algorithms, to effectively manage and interpret large-scale gene expression data.
- **Utilized R for comprehensive data analysis and visualization**, generating plots and insights to support the identification of top gene predictors and enhance understanding of survival correlations.

Key Projects

SCLP: A Language Processor for a Small C-like Language (C++) — Course Project *(Spring 2024)*
Prof. Uday Khedker | Implementation of Programming Languages Lab CS316 *IIT Bombay*

- Engineered a C-like language compiler that supports scanning, parsing and generating intermediate representations like Abstract Syntax Tree (**AST**), Three Address Code (**TAC**), and Register Transfer Language (**RTL**).
- Implemented visualization features for **tokens**, **AST**, **TAC**, and **RTL**, and provided options to generate **assembly code**, facilitating thorough **analysis** and **debugging** of the compilation process.
- Designed flexible control options to stop the compilation at any phase, offering users the ability to inspect intermediate results or directly obtain **assembly code**, enhancing the tool's **usability** and **effectiveness**.

Generating Representative Images from a sample via PCA (Python) — Course Project *(October 2022)*
Prof. Suyash P. Awate | Data Analysis and Interpretation CS215 *IIT Bombay*

- Developed a Python program for image processing, leveraging **Principal Component Analysis (PCA)** to generate new, representative fruit images from a diverse dataset of fruit images.
- Applied **PCA** to analyze handwritten digit images from the **MNIST** Database, successfully reducing the dimensionality of 28x28 images to 84 dimensions while achieving efficient image reconstruction.
- Utilized Python for advanced statistical analysis, including **hyperplane** fitting for two random variables and implementing a method to sample points in the Euclidean Plane, adhering to a specified multivariate distribution.

Commercial Website Development (ReactJs, Django, Sqlite3) — Freelance Project *(May 2023)*
Deetec Tools LLP Mumbai, India

- Designed and Developed a responsive and user-friendly commercial advertisement website using **ReactJs** for the frontend, **Django** for the backend, and **Bootstrap** framework for styling and layout.
- Implemented a dynamic product catalog with **search filter** using React components and **djangorestframework**, **django-cors-headers** to handle requests from the frontend, enabling seamless data retrieval and manipulation.
- Utilized **React Router** for seamless navigation between different pages of the website for smooth user experience.
- Conducted thorough testing & debugging of the website, ensuring cross-browser compatibility and responsiveness.

Memory Cache Hierarchy Optimization for SAT Solvers (ChampSim) — Course Project *(April 2023)*
Prof. Biswabandan Panda | Digital Logic Design and Computer Architecture CS230 *IIT Bombay*

- **Optimized the cache performance for SAT solvers** by evaluating different cache hierarchies and cache replacement policies and comparing them with a baseline cache hierarchy.
- Implemented **Inclusive, Exclusive and NINE** cache policies, **best-offset prefetcher** in **Champsim**.
- Used metrics of **IPC,LLC Miss rate** to compare **FIFO, LRU, LFU and RANDOM** replacement policies.
- Analyzed the performance of the leading SAT solvers (**kissat** and **cadical**) using different sizes of **L1, L2, LLC** Inclusive/Exclusive/Non-Inclusive Non-Exclusive and cache replacement policies.

Railway Planner (C++) — Course Project *(August-November 2022)*
Prof. Supratik Chakraborty | Data Structures and Algorithms Lab CS293 *IIT Bombay*

- Implemented various Algorithms (such as **Quicksort**, the **KMP Algorithm** and **Dijkstra's Algorithm**) and Data Structures (including **Dictionaries, BSTs, AVL Trees, Heaps, Tries, Graphs**, etc) in C++.
- These implementations were then used to support a Railway Planner, with multiple features such as adding and deleting **reviews**, **searching** for Journeys, reviews above threshold, etc.

Other Projects

Monte Carlo Analysis of Statistical Theorems (Python) — Course Project *(September 2022)*
Prof. Suyash P. Awate | Data Analysis and Interpretation CS215 *IIT Bombay*

- Using **NumPy** and **MatPlotLib** Python Libraries, implemented a Monte Carlo simulation of a given PDF.
- Used this to empirically verify various statistical theorems such as The Law of Large Numbers, The Poisson Thinning Effect and to verify that the PDF of the displacement for a 1-D **Random Walk** is a Gaussian.
- Analyzed properties such as the mean and variance of various statistical distributions such as the Poisson, Laplace, Gumbel and Cauchy Distributions and plotted these using the MatPlotLib Python Library.

Socket Programming (C++) — Course Project *(April 2023)*
Prof. Bhaskaran Raman | Computer Networks Lab CS252 *IIT Bombay*

- Utilized **TCP sockets** underneath to provide reliable file transfer by fine-tuning socket buffer sizes.
- Implemented simultaneous multiple client support at the server and large file transfer using **polling**.
- Implemented a connection in which the clients can receive as well as send files to the server.

Technical Skills

Programming	C++, Python, Java, C, MIPS, Bash, SQL, x86 Assembly
Web Development	HTML, CSS, Bootstrap, JavaScript, TypeScript, React, TailWind, Firebase
Software	Git/GitHub, LaTeX, AUTOCAD, Jupyter, Arduino, Doxygen, Sphinx, MATLAB

Courses Undertaken

Implementation of Programming Languages + Lab, Database and Information Systems + Lab, Topics in Virtualization and Cloud Computing, Introduction to Blockchains, Cryptocurrencies and Smart Contracts, Automata Theory, Operating Systems + Lab, Artificial Intelligence and Machine Learning + Lab, Artificial Intelligence and Machine Learning, Operating Systems, Game Theory and Algorithmic Mechanism Design, Design and Analysis of Algorithms, Computer Networks + Lab, Logic for Computer Science, Digital Logic Design and Computer Architecture + Lab, Discrete Structures, Data Structures and Algorithms + Lab, Data Analysis and Interpretation, Software Systems Lab, Abstractions and Paradigms for Programming + Lab

Extracurricular Achievements

- Engineered a WiFi-controlled car as part of the **XLR8** competition organized by Robotics Club IIT-B. *(2022)*
- Made a remote-controlled Aeroplane for the **RC Plane** competition organized by Aeromodelling Club IIT-B. *(2022)*