Shubhi Ajmera | **22B1234**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Female**
DOB: 21/04/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	

Pursuing a **minor** degree from the **Department of Computer Science and Engineering**, IIT Bombay

Scholastic Achievements

- Secured an All India Rank of **1225** amongst **0.16 million**+ qualified candidates in **JEE ADVANCED** [2022]
- Secured an All India Rank of **1025** with **99.89** percentile amongst **1.2 million**+ **JEE MAIN** aspirants [2022]
- Qualified for the **Service Selection Board (SSB) interview** round, ranking in the top **1.5%** among **0.5 million**+ aspiring cadets in written test of the prestigious **National Defence Academy (NDA)** exam [2021]

Experience

Research Internship | CG Power And Industrial Solutions Limited [July '24 - present]

- Conducted research on **CEA regulations** regarding **reactive power support** for **RE generation** companies
- Investigated the impact of inadequate reactive power support on **grid stability and security**
- Recommended solutions based on existing literature for **power quality issues** including **power factor correction, harmonics**, voltage stability and flickers to ensure compliance with **CEA Connectivity Regulations**

Women in Banking | Barclays International India Centre Mentorship program [July '24]

- Selected as **one of only 5 mentees** through a rigorous selection process including interviews and **case studies**
- Engaged in mentorship sessions with **business leaders** on **global markets** and complex financial concepts

Key Projects

Pipelined RISC Processor Design [Feb '23]

Digital Systems & Microprocessors | Course Project | Guide: Prof. Virendra Singh

- Implemented a **16-bit multi-cycle processor** with provided Instruction Set Architecture on **VHDL** and further reduced it to a **6-stage pipelined processor** with **hazard mitigation** techniques like **forwarding mechanism**
- Implemented the functionality for executing instructions like **arithmetic operations, store, load and jump**
- Utilized **behavioural and structural modelling** to design a **finite state machine** and circuit designs for components including **Arithmetic and Logical Unit, Register File and memory unit**
- Developed comprehensive **testbenches** to simulate and test the robust functioning of the CPU using **ModelSim**

Image Super Resolution & Sudoku Solver [June '24 - present]

Seasons of Code | Web and Coding Club | IIT Bombay

- Performed **Principal Component Analysis (PCA)** for **optimal linear fit line** using **NumPy and Matplotlib**
- Used **Tensorflow** to train neural networks on the **MNIST** and printed digits' databases for implementing a digit detection system with **98% accuracy**, and also worked on the **backtracking algorithm** for solving the puzzle
- Implemented research paper on **Super Resolution using Deep Convolutional Networks (SRCNN)** to enhance resolution of images using PyTorch library utilizing **Patch and End-to-End** learning

Electrocardiogram Amplifier [April '24]

Analog Lab | Course Project | Guide: Prof. Anil Kottantharayil

- Simulated and implemented a **square root amplifier**, optimizing **logarithmic and anti-logarithmic functions** through detailed analysis of **diode characteristics** to accurately compute the square root of **input voltages**
- Designed and tested an **ECG amplifier circuit**, involving LTSpice simulations for **optimal component selection and circuit behaviour,** and circuit construction for **ECG signal capture**
- Employed advanced debugging techniques in the lab to refine the ECG circuit using **right leg drive and filtering sections**, enhancing signal integrity with **50 Hz notch filters** to **mitigate noise and interference**

Low-Pass Digital FIR Filter [April '24]

Microprocessors Lab | Course Project | Guide: Prof. Nikhil Karamchandani

- Designed a filter of required **cutoff frequency** in Python using **SciPy library** and obtained the **filter coefficients**
- Interfaced **ADC** to receive signals from an **AFG** to **Pt-51** board using **SPI protocol** and implemented a **filtering algorithm in C** to run on Pt-51 with real-time **signal processing** by storing the present and past input samples
- Established **UART communication** between PC and Pt-51 to send filtered output signals; plotted and analyzed results, demonstrating effective **low-frequency signal passing** and **high-frequency attenuation**

Line follower and cleaning bot [Nov '23 - Dec '23]

Makerspace | Course Project | Guide: Prof. Joseph John

- Designed and built a **line following bot** integrated with **mechanical sweeper** to clean the track it takes
- Modelled the chassis and sweeper arm using **CAD** and procured these through **lasercutting**
- Incorporated functionality of 2 **Servo motors** using a single Servo motor by the application of levers

Self-Balancing Bot [July '24]

Control Theory Bootcamp | Electronics and Robotics Club | IIT Bombay

- Modeled and simulated control systems like **PID controllers** using **MATLAB Simulink**
- Modeled and simulated a **self-balancing bot** in Simulink, using the solution of an **inverted pendulum problem**
- Gained insights into **swarm robotics**, difference between making of theoretical control systems and digital systems

Option Pricing Models and Accuracy Study | FinSearch Project [June '23 - Sept '23]

FinSearch Project | Research oriented program | Finance Club | IIT Bombay

- Conducted an in-depth study of option pricing models including **Monte Carlo simulation**, **Black-Scholes Model**, and **Binomial Model**, examining their **similarities and differences**
- Implemented the **Black-Scholes model in Python** for pricing option contracts, using data from the **Nifty 50 index** that was filtered and cleaned in **MS Excel**
- Plotted and analyzed the **absolute & relative errors** in the model's predictions using visualization techniques

Positions of Responsibility @IIT Bombay

Business Team | Autonomous Underwater Vehicles Tech-Team [March '23 - May '24]

- Secured **YRP** in **IEEE** and **3rd position** in video presentation category in **RoboSub 2020** among 30+ teams
- Conducted orientation & interviews, and and managed **work distribution of 5 recruits**
- Ideated & designed **posters, videos and other publicity media** for various events & international competitions

Institute Student Mentor | Student Mentorship Program [July '24 - present]

- One of only **19 third-year students** selected as an ISMP mentor among the entire batch of **1300+ students**
- Part of a handpicked team of 150 mentors aimed at **providing counsel** to **upcoming first year students**

Department Academic Mentor | Electrical Engineering Department [June '24 - present]

- Selected to be a part of a **50-member team** through extensive interviews and peer reviews, out of **170+ applicants** and appointed as a **Teaching Assistant in the English Language Improvement Training program**
- Guiding **6 sophomores** in their academic, personal and co-curricular pursuits

Technical Skills

Software	Keil, AutoCAD, LaTeX, Quartus Prime, Atmel FLIP, Realterm, LTspice, Git, MS Excel, Canva
Programming	C, C++, Java, Python, VHDL, Embedded C
Hardware	Arduino Uno, Xen10 CPLD board, Pt-51 board
Libraries	NumPy, Pandas, Matplotlib, TensorFlow, OpenCV, Scikit-learn

Courses undertaken

Electrical	Control Systems, Microprocessors, Analog Circuits, Electronic Devices, Digital Systems, Signal Processing - I, Power Engineering - I & II, Microprocessors Lab, Analog Lab, Power Engineering Lab, Digital Circuits Lab, Electromagnetic Waves*, Communication Systems*, Controls Lab*, Devices Lab*, Communications Lab*
Maths & Computing	Probability & Random Processes, Linear Algebra, Differential Equations, Calculus - I & II, Computer Programming & Utilization, Computer Networks, Supervised ML: Regression & Classification*

**to be completed by Dec '24*

Extracurricular Activities

- Active member of the **Institute Table Tennis Community**, with participation in tournaments like **Aavhan**['24]
- Volunteering engagement with **Team Everest NGO** as a content developer for devising an **English Curriculum** to aid in providing quality **education to underprivileged children** ['24]
- Actively participated in **Socially Useful Productive Work (SUPW)** including tree plantation ['19]
- Selected out of **900+ others** to represent the school in the **Patwardhan Debate Competition**, were among **top 6** out of 15 qualifying teams to further advance to the finals ['19]
- Conducted month-long **dance classes** for 12 children and allocated the **funds raised to donate** food supplies to **Maher Crane Home** for children at Satara - Maher Ashram ['16]
- Member of the **school choir** for **10+ years** and further completed training under **NSO Vocals**, IIT Bombay