



Shubham Raj
Energy Science and Engineering
Indian Institute of Technology Bombay

22B0665
B.Tech.
Gender: Male
DOB: 04/06/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	7.47
Intermediate	CBSE	Army Public School, Mhow	2021	94.40%
Matriculation	CBSE	Army Public School, Mhow	2019	93.80%

SCHOLASTIC ACHIEVEMENTS

- Awarded a **Branch Change** to department of **Energy Science and Engineering**, granted to **6 out of 1400+** students ('23)
- Received **AA grade** for exceptional performance in **Computer Programming and Utilization (CS 101)** course ('23)
- Secured **All India Rank 3219** in JEE Advanced 2022 amongst **0.16 million+** candidates across the nation ('22)
- Achieved **99.56 percentile** in JEE Main 2022 amongst **1.02 million** candidates across the nation ('22)
- Successfully passed the selection process for the **National Defence Academy (NDA)** 145 and 147 Batch ('21)

PROFESSIONAL EXPERIENCE

Web Developer Intern | Paathshala | NextJS

(July '24 - Present)

- Developed **Learning Management System (LMS)** UI comprising course consumer and the course creator's interface
- Utilized NextJS for **Server-Side Rendering (SSR)** and **Static Site Generation (SSG)**, to enhance performance and SEO
- Leveraged version control systems for efficient collaboration and code management collaborating with senior developers

KEY PROJECTS

KRIYETA 3.0 | National Level Hackathon | Python, LangChain, React, Flask

(June '24)

Problem Statement: Create an AI system that monitors user's mental health through their interaction and provides support

- Implemented chatbot utilizing **Retrieval Augmented Generation (RAG)** to deliver tailored and context aware responses
- Fine-tuned **DistilBERT** with **LoRA** for sentiment analysis integrating with **RAG**, predicting user's mental health state
- Developed a dynamic responsive React powered website integrated with Flask backend, delivering great user experience

Image Deblurring with UNet Architecture | Python, PyTorch

(March '24 - April '24)

GNR 638 | Course Project | Machine Learning for Remote Sensing - II | Prof. Biplab Banerjee

IIT Bombay

- Implemented a UNet Architecture with **3 encoders** and **3 decoders** for image deblurring and **7.7M training parameters**
- Utilized Python libraries including NumPy, PIL and scikit-image along with PyTorch to accomplish the project objectives
- Conducted hyperparameter tuning for optimal model performance using **learning rate schedules** and **Adam optimizer**
- Trained the model on dataset of 58K blur sharp image pairs and achieved **PSNR score of 27.5** on 14K test image dataset

Real-Time Facial Recognition System | Python, TensorFlow

(December '23 - January '24)

Winter in Data Science | Analytics Club

Undergraduate Academic Council, IIT Bombay

- Implemented **Siamese Neural Network** Architecture in TensorFlow and CV2 to extract real time high-level facial features
- Image Embeddings** calculated in images captured through a webcam, instantly comparing them against **anchor images**
- Dissimilarity between embeddings is calculated by **distance metric**, which is used to calculate similarity between images

Digital Dining in Night Canteen | Hostel 5, IIT Bombay | MERN Stack

(May '24 - Present)

- Developed a full stack web application using MERN stack to establish an efficient food ordering platform for Hostel 5
- Integrated a **secure payment gateway** with **Express REST APIs** to seamlessly connect with the dynamic React front-end
- Implemented **user authentication and authorization** features integrated with MongoDB database management system
- Streamlined the dining experience by allowing order food remotely, **reducing wait times** and **enhancing convenience**

Aavhan Unify Portal | Aavhan, IIT Bombay | MERN Stack

(July '24 - Present)

- Fabricated an interactive Ambassador Web App to track the progress of college ambassador & better admin workflows
- Utilized **React** powered frontend, robust **Node** backend & **MongoDB** to create a dynamic web app and **API development**
- Utilized **GitHub** and **Google Sheet APIs** for dynamic storage of documents and data and deployed a full-stack application
- Enhanced collaboration with college ambassadors by providing easy access to assignments, progress tracking & better UX

COLLIDE | Game Engine Development | SDL Library, C++

(July '23 - August '23)

Seasons of Code, Web and Coding Club

Institute Technical Council, IIT Bombay

- Designed and developed a custom 2D game engine using **SDL** and **OpenGL** libraries, optimized with **OOPs** for efficiency
- Designed user interface with a total of 4 games with **resolution system**, enhancing interactivity in the game environment
- Implemented a **randomization algorithm** that generated dynamic levels/worlds, ensuring unique gameplay experiences

Fine-Grained Image Classification | Python, PyTorch

(February '24 - March '24)

GNR 638 | Course Project | Machine Learning for Remote Sensing - II | Prof. Biplab Banerjee

IIT Bombay

- Trained a **CNN model** for fine-grained image classification with **6.8M parameters** using the **CUB dataset** with 200 classes
- Implemented transfer learning with an **ImageNet pretrained EfficientNet model**, adapting its classifier layer for the task
- Achieved a **top-1 accuracy of 71.48%** on the test dataset after series of fine tuning the classifier and training the model

Hostel 5 Website | IIT Bombay | React, Firebase

(December '23 - January '24)

- Developed a dynamic & responsive **React Web App** integrated with **Firebase** for database management and cloud storage
- Implemented **CRUD** functionality using Firebase APIs for easy maintenance and enhanced UI/UX with dynamic features
- Incorporated **GitHub workflow** to automate the seamless deployment of the website on Firebase, enhancing efficiency

OTHER PROJECTS

Mountain Cargo Line Follower Bot | Course Project: Makerspace

(June '23)

Guide: Prof. Ankit Jain, Mechanical Engineering Dept. & Prof. Joseph John, Electrical Engineering Dept.

IIT Bombay

- Developed an autonomous line-follower bot that could climb inclines upto **30 degrees** with a payload of **300 grams**
- Guided by **2 IR Sensors** programmed in **Arduino Microprocessor** and integrated **conveyor belt** unloading mechanism
- Implemented a bonus feature enabling the bot to automatically return to its starting position after dumping the payload

Washing Machine Timer | Jarvis GC | Institute Technical Council, IIT Bombay

(October '23)

- Engineered a **custom wash timer**, prominently featured on the hostel's website for monitoring wash times conveniently
- Developed robust functionalities using **Django** and **React** to efficiently process data and create intuitive user interfaces
- Integrated **ESP32** and **LED screen** circuit to facilitate wireless transmission of timer data to the backend server seamlessly
- Addressed **laundry management challenges** by providing **real-time monitoring**, enhancing convenience for students

POSITIONS OF RESPONSIBILITY

Web Manager | Aavhan | IIT Bombay

(July '24 - Present)

India's largest collegiate sports tournament | Budget: INR 10M+ | Footfall: 100k+ | Events: 20+

- Responsibilities**
1. Enhancing participation enrollment and event coordination by implementing better UI/UX in website
 2. Leading a two-tier team of volunteers to enhance online presence and streamline digital interactions
- Initiatives**
1. Integrated document uploads in the website to enhance user experience by integrating cloud storage
 2. Switched to React for building dynamic and efficient UI, significantly enhancing user experience

System Administrator | Hostel 5 Council | IIT Bombay

(April '24 - Present)

Lead in managing Website, App and Server, Elected by 450+ students of the hostel, hostel representative in network committee

- Responsibilities**
1. Leading 3 Web and App Secretaries to enhancing hostel's website and app, improving functionality
 2. Actively maintaining LAN & WiFi connections, ensuring reliable and uninterrupted network services
- Initiatives**
1. Digitizing the mess system to enhance student dining experiences and meal tracking capabilities
 2. Digitizing inventory management system, improving inventory tracking and resident experience

TECHNICAL SKILLS

Programming Languages C, C++, Python, HTML, CSS, JavaScript, TypeScript, Dart

Software and Tools Autodesk Fusion 360, LaserCAD, Adobe Premiere Pro, Canva, Microsoft Office

Data Science and ML TensorFlow, Keras, PyTorch, Numpy, Pandas, Matplotlib, OpenCV, Beautiful Soup

Development ReactJS, NodeJS, ExpressJS, MongoDB, Flask, Firebase, Tailwind, Flutter

COURSES UNDERTAKEN

Programming and ML	Computer Programming and Utilization , Machine Learning for Remote Sensing - II, AI and Data Science, Neural Network and Deep Learning (Coursera)
Energy Science	Power Electronics, Dynamics and Control*, Energy Systems Modelling and Analysis*, Fluid Mechanics and Heat Transfer, Electrical Networks and Machines
Mathematics	Linear Algebra, Differential Equations, Calculus I, Calculus II

(* Currently pursuing)

EXTRACURRICULARS

Sports	<ul style="list-style-type: none">• Took part in 5KM Crossy (Marathon) GC showcasing my commitment to physical fitness• Engage in Table Tennis and Swimming for recreational pursuit and Study-Life balance
Mentorship	<ul style="list-style-type: none">• Mentored 16 Students under Seasons of Code (WnCC) over a course of two months• Instructed 600+ students as CS101 Teaching Assistant with weekly labs and exam revisions
NSS IITB volunteer	<ul style="list-style-type: none">• Volunteered 50+ students by being the part of Educational Outreach NSS IITB• Volunteered free JEE live class to a student in Summer '23 helping them qualify JEE Adv