Shubham Hazra
Computer Science & Engineering
Indian Institute of Technology Bombay

210100143
B.Tech.
Gender: Male
DOB: 01/11/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	9.14

Pursuing a **Minor** degree in **Artificial Intelligence** and **Data Science** from **C-MInDS, IIT Bombay**

Scholastic Achievements

- Achieved **99.81 Percentile** in **JEE-Main** out of over 1 million candidates *(2021)*
- Achieved **99.14 Percentile** in **JEE-Advanced** out of over 0.14 million candidates *(2021)*
- Achieved **AP grade** for excellent performance in **PH 108-Basics of Electricity & Magnetism** *(2022)*
- Secured a **Branch Change** to **Computer Science** department on the basis of academic performance *(2022)*
- Secured **AIR 275** in the prestigious **KVPY SX** and awarded fellowship by **IISc Bangalore** *(2021)*

Work Experience

Applied AI Researcher at Brance Technologies *(Summer 2023)*

- Developed high-performance chatbot systems using **vector embeddings** and **Large Language Models (LLMs)**
- Utilized **Haystack, FAISS, vectorDBs**, and **Hugging Face models** for indexing, retrieval and ranking of data
- Employed **Locality-Sensitive Hashing (LSH)** for caching queries with **semantic search**, optimizing data retrieval
- Leveraged **Nginx, FastAPI** and **async calls**, on an **AWS EC2** for seamless communication and reduced latency

Key Projects

Latent Diffusion for Image Generation *(Summer 2023)*

Self Project

- Developed and implemented each component of a **Latent Diffusion** model using **PyTorch**, including a Variational Autoencoder (VAE), **Diffusion U-Net** with timestep embeddings and self-attention, and various scheduling techniques
- Trained the **VAE** on the Fashion MNIST dataset using reconstruction loss and **KL-Divergence loss**. Implemented both unconditional and conditional **Denoising Diffusion Probabilistic Models (DDPM)** on CIFAR-10 dataset
- Implemented **latent diffusion** by encoding images to latent representations using the **Hugging Face diffuser's** VAE Trained a DDPM on these latents using the LSUN churches and bedrooms dataset to generate high-quality images

Discrete Event Simulator for Bitcoin Network *(Spring 2023)*

Guide: Prof. Vinay J. Ribeiro | Course Project : Introduction to Blockchains and Smart Contracts *IIT Bombay*

- Implemented a discrete event simulator for the Bitcoin Network and **analyzed the forking** and length of the main chain. Additionally, simulated **selfish mining** and **stubborn mining** attacks on the network by an adversary node
- Analyzed the **adversary's relative profitability** under various factors like hashing power and network latency etc.
- Utilized the **Networkx library** to create a connected **P2P network** and generated visual representations of the blockchain. Used the **SimPy library** to maintain a **global clock** and simulate the **mining and transaction events**

KYC-Website *(Summer 2023)*

Self Project

- Developed a secure web application using **Node.js, Express.js**, and **MongoDB** for KYC verification. Integrated **easy-ocr** library for **ID information extraction** and **face-recognition library** for **real-time face matching**
- Implemented **full-stack development** with **Bootstrap, EJS, and Passport.js** for a web application with secure authentication. Utilized **FastAPI** to wrap ML components, ensuring seamless communication with ML API servers

Deep Learning *(Summer 2023)*

Self Project

- Implemented and trained **Google's Deeppose**, a deep learning model for **human pose estimation** on LSP dataset
- Implemented a **Cycle-GAN** architecture for image-to-image translation, enabling conversion between two classes
- Trained an agent to play **lunar lander** game using **Deep Q-Network (DQN)**, a reinforcement learning algorithm
- Implemented **neural style art transfer** using **VGG19** to combine the content of one image with the style of another
- Implemented the **U-Net** architecture and applied it to CARLA, a self-driving car dataset for **semantic segmentation**
- Implemented **ResNets** from scratch and utilized **transfer learning** for image classification and recognition tasks

Technical Skills

Programming	C, C++, Python, Bash, Solidity, Java, JavaScript, VHDL, Sed, Awk
Data Science	Tensorflow, Pytorch, Keras, Trax, Scikit-learn, OpenCV, NumPy, Pandas, Matplotlib
Software & Tools	MATLAB, Git, LaTeX, Docker, Wireshark, Z3, Doxygen, Sphinx, Ngingx, FastAPI
Web Development	HTML5, CSS, JavaScript, BootStrap, jQuery, Node.js, Express.js, SQL, MongoDB

Extracurricular

- Mentored two groups of students during the **SoC (Summer of Code)** program conducted by **WNCC, IITB** *(2023)*
- Successfully completed one year under **National Sports Organization(NSO)** in **Chess** at IIT Bombay *(2022)*
- Pitched a **Business Model Canvas** for a startup in the health sector which entailed making online ambulance bookings, for the EnB Buzz contest conducted by the **Entrepreneurship cell of IIT Bombay** *(2021)*
- Worked as team of 4 to make a remote controlled bot using ESP32 for XLR8 - an event of **ERC, IITB** *(2022)*