Aaryan Sharma
Electrical Engineering
Indian Institute of Technology Bombay

210110003
Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 24/02/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	CBSE	BVB Vidyashram,Pratap Nagar, Jaipur	2020	94.80%
Matriculation	CBSE	BVB Vidyashram,Pratap Nagar,Jaipur	2018	89.80%

Pursuing a **Minor** in **Artificial Intelligence and Data Science**

Scholastic Achievements

- Currently ranked among **top 7** within the Dual Degree Program in the Department of Electrical Engineering *(2023)*
- Earned a **Change of Branch** to the Department of **Electrical Engineering** in the **Dual Degree program** among **15** out of **1200+** students owing to excellent academic performance in the first year *(2022)*
- Awarded **AP grades** in **Materials and Technology(MM152)** and **Planetary Sciences(GNR649)** course *(2023)*

Professional Experience

EPR Strategy Intern | IFP Petro Products Private Limited *(Dec 2022)*

Established in 1977 and has been providing its refining and blending services to many companies like IOCL, BPCL, etc.

- Developed models for improving sustainability of lubricant oil and improving supply chain for used oil collection
- Analyzed the **Used Oil policy** by NITI Aayog and Plastic EPR, researched on existing **EPR frameworks** available globally and provided recommendations for better implementation of **circular economy** and EPR in India
- Worked on the draft of **Investment Memorandum** to be presented in the UP Investor Summit '23 while developing strategic collaborations with various renowned firms including **Shell, Hindustan Oil and Mahindra**

Key Projects

Pipelined and MultiCycle RISC Processor | Course Project *(Aug 2022- Apr 2023)*

Guide: Prof. Virendra Singh, Department of Electrical Engineering

- Implemented a **6-stage pipelined** RISC processor with **26** instructions in **VHDL** to achieve an IPC close to 1
- Optimized the pipelined structure using **hazard mitigation** techniques such as forwarding,flush and branch prediction
- Implemented a **multicycle RISC** based processor with optimized flow charts and **FSM states** to reduce CPI
- Tested and verified the design of both processors by viewing the simulated waveforms generated by **RTL Simulation**
- Designed **Mini-8085** microprocessor with level 2 flow chart, including datapath and controller organization

Digital Logic Design in VHDL | Course Project *(Jul 2022 - Nov 2022)*

Guide: Prof. Maryam Shojaei Baghini, Department of Electrical Engineering

- Designed a **Server Access provider** by priority using **FSM** in VHDL and tested the design using Xenon Board
- Performed **RTL and Gate level simulation** on **Intel Quartus software** and also tested the designs using **UrJTAG software package** and verified the correctness of the model using **Scanchain** on **Xenon** board

Working with 8051 Microcontroller | Course Project *(Jan 2023 - Apr 2023)*

Guide: Prof. Saravanan Vijayakumaran, Department of Electrical Engineering

- Created and validated **embedded C** code for efficient **lab inventory tracking** of item issuance and returns
- Used a **USB-UART** module and realterm to couple keyboard with the **Pt-51** board through laptop for inputs
- Programmed Pt-51 board using embedded-C to simulate a **Stop-Watch** with an interfaced **LCD** display
- Developed a voltage displaying device by interfacing Potentiometer using **ADC MCP3008** and **SPI**

Data Analysis and Simulation | Course Project *(Jul 2022 - Nov 2022)*

Guide: Prof. D Manjunath, Department of Electrical Engineering

- Constructed a model to predict the height and weight of a person using **linear regression** on a given data set
- Estimated the total number of fish in Powai Lake using the **Capture-Release-Recapture** process by maximizing probability
- Simulated a transmitter given the probability of receiving and transmitting data packets for **1,000,000 time steps**
- Formulated an algorithm using **Hoeffding's inequality** to maximize reward given three biased coins and fixed number of tosses

Image Captioning | Summer Project *(May 2023- Present)*

Summer of Science | Maths and Physics Club, IIT Bombay

- Implemented an **Image Captioning** model using **keras** achieving a score of **BLEU-1:0.53** and **BLEU-2:0.31**
- Utilized pretrained **VGG** model to extract image features and added **GloVe** embeddings resulting in higher BLEU scores
- Implemented a classification model utilizing **Logistic Regression** on the Iris dataset with **96.67%** accuracy in PyTorch

Analog Circuit Design | Course Project *(Jan 2023 - Apr 2023)*
Guide: Prof. Anil Kottantharayil, Department of Electrical Engineering
- Designed and implemented **active filters**, **differential** and **logarithmic amplifier** using LM741 and TL084 ICs
- Synthesized netlist, devised **Ngspice** commands to perform the simulations to obtain desired parameters for Log-Amp

Option Pricing Models | Research Project *(Jun 2023 - Ongoing)*
Finsearch | Finance Club
- Learnt about the basics and main principles of Option Trading with focus on **Black-Scholes** and **Binomial model**
- Simulated a **Monte Carlo** random walk on previous **10** years of stock prices to predict future prices with quantiles

Obstacle Manoeuvring Bot | XLR8 RC bot competition *(Aug 2022)*
Electronics and Robotics Club, IIT Bombay
- Built an **RC bot** capable of negotiating different kinds of obstacles in its path and completed the competition path
- Implemented the controlling part with **ArduinoIDE** and used **differential steering mechanism** to steer
- Incorporated a wifi module **ESP32** and facilitated the use of an **L293D motor driver** for functioning of bot

Image Classification using CNNs | Course Project *(Jan 2023- Apr 2023)*
Guide: Prof. Biplap Banerjee, Department of C-MInDS
- Implemented a research paper on image classification using **Convolution Neural Networks** on **CIFAR-10** dataset
- Enhanced the neural network with more CNN layers, fine tuning them from a test accuracy of **76%** to **88%**
- Performed image augmentation on the **UC Merced** dataset and trained a CNN model with **85%** test accuracy

Street Fighter II - Reinforcement Learning | Summer Project *(May 2023- Present)*
Season of Code | Web and Coding Club, IIT Bombay
- Aim to implement RL techniques in **Street Fighter II** utilizing the knowledge acquired from David Silver's lectures
- Compared **Monte Carlo** and **TD Learning** algorithm in OpenAI **Gym Taxi** problem for convergence evaluation
- Implemented an **epsilon-greedy algorithm** for a multi-armed bandit problem with 5 arms and various epsilons

Detecting Depression through Tweets | Winter Project *(Dec 2022- Jan 2023)*
Winter in Data Science 2.0 | Analytics Club, IIT Bombay
- Applied **Text Pre-Processing** and **Exploratory Data Analysis** techniques to gain insights and refined the dataset
- Used Twitter Dataset and trained data using **LSTM** model with **Word2Vec** embeddings with **80%** test accuracy
- Achieved higher accuracy with LSTM model over **Logistic Regression** model which had **55.6%** test accuracy

Limestone Data Challenge | Algorithmic Trading Hackathon *(Mar 2023- Apr 2023)*
*Organised by **Finance & Analytics Club**, IIT Bombay in association with **Tower Research Capital***
- Selected as one of the **top 58** teams earning an exclusive invitation to a closed session with the Tower Research team
- Implemented **K-means** algorithm to group **100** stocks into clusters based on similarities in variance and mean of returns
- Using various **regression models** on stocks of a given sector, predicted returns of indices to achieve **high correlation**
- Classified indices into known sectors of stocks with **maximum correlation** of predicted and actual indices returns

Technical Proficiency

Programming	C/C++ | Python | Assembly | Embedded-C | VHDL | SQL | JavaScript | LaTeX | CSS | HTML
Software Tools	Intel Quartus | Keil μVision | Ngspice | MS-Office | GIT | ArduinoIDE
Machine Learning	NumPy | Pandas | MatPlotLib | PyTorch | TensorFlow | Scikit-learn | NLTK

Key Courses Undertaken

Electrical	Analog Circuits(with Lab),Digital Systems(with Lab),Power Engineering I & II(with Lab),Probability and Random Processes,Signal Processing I,Electronic Devices and Circuits(with Lab*),Control Systems(with Lab*),Microprocessors(with Lab),Communication Systems* - I(with Lab*),EM Waves*
CS/ML	Computer Programming and Utilization, Introduction To Machine Learning
Mathematics and Physics	Calculus I, Calculus II, Linear Algebra, Differential Equations I and II, Complex Analysis, Quantum Physics and Application, Basics of Electricity and Magnetism

**To be completed by Nov 2023*

Extracurricular Activities

- Secured **2nd** position in QuantHive's Algoswarm,Algo-Trading Hackathon,organised by Analytics Club (May 2023)
- Participated in **Optiver's Winter School 2023** organised by Economics Club, IIT Delhi (Jan 2023)
- Completed **Tinkering Bootcamp,Game Theory** and **Big Data Handling** in Learner's Space (Jul 2022)
- Worked in a team to design and build an **RC trainer aircraft** organized by Aeromodelling Club (Oct 2022)
- Participated in hostel tech **Jhatka General Championship**, 2023 and bagged **3rd** hostel position (Mar 2023)
- Mentored 7 mentees in an **Instagram Automation Tool** project using Selenium in **WiDS2.0** (Dec 2022)
- Guided two teams of **TinkerKar** by TL, IITB in making a robotic arm and visual analyzer (Jan 2023)
- Supervised two teams of **EnB Buzz** in modeling a business, organized by E-Cell, IIT Bombay (Dec 2022)
- Completed a year-long training program with **NSO Chess**, dedicated to enhancing chess playing abilities (2021-2022)
- Ranked 22 out of 72 teams in bot-programming contest,**CodeWars-V1** in a team of **3** using **Python** (Jan 2022)
- Elected as a **Prefect**, in BVB Vidyashram School, responsible for maintaining discipline (2019-2020)