Harshit Raj   **20D070033**
Electrical Engineering   **Dual Degree (B.Tech. + M.Tech.)**
Indian Institute of Technology Bombay   **Gender: Male**
                                   DOB: 30/07/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	HSC	PACE Junior Science College	2020	93.38%
Matriculation	ICSE	Lokhandwala Foundation School	2018	96.17%

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

SCHOLASTIC ACHIEVEMENTS

- Ranked **7th** in the **Department of Electrical Engineering** (Dual Degree) in a batch of 100 students

- **Topped** the 4th semester by securing a perfect SPI of **10/10** [2023]

- Awarded **AP grades** in the courses on Control Systems and Electronic Devices & Circuits [2023]

- Secured **All India Rank 676** out of 0.15 million eligible candidates in **JEE Advanced** [2020]

- Achieved **99.91 percentile** in **JEE Mains** among **1.02 million** candidates [2020]

- Received a **Cash Prize** for outstanding performance in All India Open Mathematics Scholarship Examination by Institute for Promotion of Mathematics [2017]

- Got selected for Level 2 of Homi Bhabha Competition due to meritorious performance [2016]

ML COURSES AND PROJECTS

RecogniVision | *Introduction to ML* | *Course Project* [April 2023]
Guide: Prof. Abir De, Department of CSE, IIT Bombay

- Built and trained a **deep learning** model from scratch in PyTorch using the **LFW Dataset**

- Experimented with **Hyperparameters** like Learning Rate, Dropout and also with the model size

- Implemented Batch Normalization and used Learning Rate **Scheduler** to improve convergence

Neural Networks and Deep Learning | *Maths and Physics Club, IIT Bombay* [May-July 2022]

- Successfully completed the course **CS231n**: Convolutional Neural Networks for Visual Recognition offered by the **Stanford University** in 2017, as a part of Summer of Science 2022

- Studied various **Optimization Techniques** like SGD with Momentum, AdaGrad, RMSProp, Adam and Second order optimization, and **Classifiers** like SVMs and Softmax

- Learned many training techniques like Preprocessing, **Initialization**, **Regularization**, Activation Functions, Normalization and Hyperparameter optimization to improve the performance

- Implemented CNNs on both **NumPy** and **PyTorch** to to effectively solidify my theoretical knowledge

Neural Networks and Deep Learning by Andrew NG | *Coursera.org* [December 2022]

- Learned **Vectorization**, and implemented Regression and Neural Networks in iPython Notebooks

- Studied solutions for **vanishing gradients** and explored the need for **Random Initialization**

Introduction to ML by Andrew NG | *Coursera.org* [April 2022]

- Learned Regression, Gradient Descent, **SVM**, k-Means clustering, **PCA**, and handling of skewed data

- Implemented Neural Networks and the **Backpropagation** algorithm in MATLAB

OTHER PROJECTS

IITB-RISC | *Microprocessors* | *Course Project*   [April 2023 - May 2023]
Guide: Prof. Virendra Singh, Department of EE and Department of CSE, IIT Bombay

- Developed a 16-bit **processor** with a standard 6-stage **pipelined** architecture using VHDL
- Incorporated efficient hazard mitigation techniques, such as **Data Forwarding** and **Pipeline Halting**
- Implemented **8 registers** including the Program Counter, following the Little Computer Architecture
- Employed **14** basic operations which are versatile enough to solve complex problems with ease

Microprocessors Lab | *Course Project*   [January 2023 - April 2023]
Guide: Prof. Saravanan Vijayakumaran, Department of Electrical Engineering, IIT Bombay

- Designed and implemented **Embedded C** code for FPGA unit monitoring, integrating **UART**-interfaced keyboard functionalities to efficiently issue and return units using RealTerm
- Coded an Embedded C application for a **Stopwatch** using LCD and AFG-generated external interrupts
- Implemented RSA encryption-decryption using **Assembly** on PT-51 Atmel AT89C5131 Board
- Built and tested a **voltmeter** on the PT-51 board with MCP3008 and **SPI** using Keil uVision

Digital Design in VHDL | *Digital Circuits Lab* | *Course Project*   [July 2022 - November 2022]
Guide: Prof. Maryam Shojaei Baghini, Department of Electrical Engineering, IIT Bombay

- Used Intel **Quartus**, **UrJTAG** and **ScanChain** to design and test digital circuits in VHDL
- Implemented various digital circuits like multiplier, ALUs, **BCD Adder-Subtractor**, sequence generator, FSM and **String Detector** on the **Xen10** (MAX10 FPGA) Board

IITB-CPU | *Digital Circuits* | *Course Project*   [November 2022 - December 2022]
Guide: Prof. Virendra Singh, Department of EE and Department of CSE, IIT Bombay

- Designed a 16-bit versatile **multi-cycle CPU** with 8 programmer's registers using **VHDL**
- Incorporates **3** distinct machine code **instruction formats** and performs a total of 15 operations

Analog Lab | *Course Project*   [January 2023 - April 2023]
Guide: Prof. Anil Kottantharayil, Department of Electrical Engineering, IIT Bombay

- Built circuits like Integrator, **Log Amplifier**, Active Filters, **Current Mirrors**, and Schmitt Trigger
- Synthesized netlists in **Ngspice** to simulate circuits and used plotting tools to analyze them

SKILLS

Programming Languages	Python, C++, Assembly, VHDL, Embedded C, MATLAB
Libraries	NumPy, PyTorch, TensorFlow, Keras

EXTRA CURRICULAR ACTIVITIES

- Secured **2nd** position in **Sci-Comp** GC 2021 conducted by the Maths and Physics Club, IITB
- Secured **2nd** position in **Energy** GC 2021 conducted by **Bosch** and the Energy Club, IITB
- Successfully completed the course on **Table Tennis** conducted by the **National Sports Organisation**
- Bagged **Gold** Medal in the Table Tennis Competition organised by Bombay Arts and Sports
- Donated food and clothes and spent a day at an Orphanage as part of SUPW organised by Lokhandwala Foundation School