Nishant Thakre | **200070051**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 16/08/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	CBSE	Monnet DAV Public School	2020	94.80%
Matriculation	CBSE	Monnet DAV Public School	2018	96.60%

Pursuing **Minors** in **Computer Science & Engineering** from the Department of CSE, IIT Bombay

Scholastic Achievements

- Achieved **All India Rank 633** in **JEE Advanced** out of **1,50,000**+ candidates *(2020)*
- Scored **99.68 percentile** in **JEE Main** out of **0.85 million**+ candidates *(2020)*
- Successfully cleared **IISER Aptitude test**, earning a spot in the BS-MS program at IISER Pune *(2020)*
- Among the **458** students to qualify for the **Indian National Physics Olympiad** out of **53913** candidates *(2019)*
- Qualified for **Regional Mathematics Olympiad (RMO)** conducted by **HBCSE** *(2019)*
- Secured **All India Rank 3** in **International Olympiad of Science (Level 2)** conducted by **Silverzone** *(2018)*
- Bagged **State Rank 1** in **International Olympiad of Mathematics (Level 2)** organized by **Silverzone** *(2018)*
- Secured **State Rank 1** in **International Informatics Olympiad (Level 2)** conducted by **Silverzone** *(2017)*

Professional Experience

Software Developer Intern | Amazon *(May 2023- July 2023)*

Received manager's commendation and inclined vote for a full-time return offer

- Designed and executed a proof-of-concept project, crafting a generative AI solution by harnessing **Large Language Models** (LLMs), to create a specialized **Question Answering** system tailored for queries related to OS APIs
- Leveraged **web scraping** to extract information from OS API documentation and developed a basic Jupyter Notebook **chat interface** for proof of concept purpose, allowing users to submit queries and receive responses
- Expanded solution's utility to allow questions from **user-provided sources**, such as webpages, PDFs, & text files
- Utilized **AWS** service, **Amazon SageMaker** to establish endpoints for text2text and embedding models

Key Projects

Music genre classification using ML and DL techniques | *Course Project* *(April 2022)*

DS303: Introduction to Machine Learning (Guide: Prof. Biplab Banerjee)

- Coordinated a four-membered team to implement several Machine Learning methods and analyze their performances
- Decision Tree **(DT)**, Random Forest Classifier **(RF)**, Support-Vector Machines **(SVM)**, Naive Bayes classifiers **(NB)**, K-Nearest Neighbors **(KNN)** algorithm and Artificial Neural Network **(ANN)** were used for classification
- Performed **hyperparameter tuning** for all the classifiers to find an optimal combination of hyperparameters that minimizes a predefined loss function and maximizes the model's predictive accuracy to give better results

Image Processing using Python | *Course Project* *(Autumn 2022)*

EE610 : Image Processing (Guide: Prof. Amit Sethi)

- Employed **power transform** and **histogram manipulations** to improve night image and explored pixel intensities
- Implemented functions for **wavelet-based denoising**, and **PSNR/SSIM evaluation** using python libraries
- Implemented a fundamental **TF+Keras UNet model** to solve medical **image segmentation problem**, and investigated model architecture variations, **dice loss** for nucleus segmentation, and loss functions

PID Controller and Compensator Design | *Course Project* *(Autumn 2022)*

EE324 : Control Systems Lab (Guide : Prof Dwaipayan Mukherjee)

- Developed Arduino Mega PID controller for 180° motor rotation, optimizing transient response via parameter tuning
- Designed **line-follower robot**'s PID controller optimized for timely track completion and accurate turns
- Developed analog circuit with **second-order compensator** for 20dB **noise cancellation** in headphones, achieving significant attenuation at 100Hz frequency while ensuring stability with appropriate phase and gain margins

Cryptographic Analysis using Sagemath | *Course Project* *(Novemeber 2022)*

EE720 : An Introduction to Number Theory and Cryptography (Guide : Prof. Virendra Sule)

- Implemented **RSA encryption/decryption functions**, sequence generation, and minimal polynomial calculation
- Explored distribution of correct inverse solutions for RSA encryption, providing insights into **local inversion**

Digital Design using VHDL | *Course Projects* *(Autumn 2021)*

EE214: Digital Circuits Lab (Guide: Prof. M. Shojaei Baghini)

- Implemented a simplified functionality of an **ATM machine** that counts the number of notes of different denominations that sums up to the amount entered by the user, giving higher preference to a higher denomination
- Created **3-bit** and **4-bit sequence generators** using logic minimization and D flip-flop as basic entity
- Designed a **Finite State Machine** to count occurrences of a given word in a binary-coded letter string

Common Source LNA Design and Simulation | *Course Project* *(April 2023)*

EE 619: Radio Frequency Microelectronics Chip Design (Guide: Prof. Jayanta Mukherjee)

- Designed a simulated **CMOS cascaded common source Low Noise Amplifier** (CS-LNA) using theoretical equations to meet input/output matching, noise figure, and voltage gain specifications through **Cadence** tools
- Utilized Cadence tools for post-layout simulations to refine the CS-LNA design, ensuring accurate verification of key parameters such as frequency response, noise figure (<2 dB), and voltage gain (S21 > 15 dB)

Deep Learning and Neural Networks | *Summer of Science* *(May 2022 - July 2022)*

Maths and Physics Club, IIT Bombay

- Studied topics in Supervised Learning, Structured and Unstructured data and concepts related to **Binary Classification, Logistic Regression**, Cost Function, Gradient Descent, Activation Functions
- Studied about Deep L-layer Neural Network, **Forward & Backward propagation** and Hyper-parameters in detail
- Documented my learning outcomes and the interesting ideas grasped into a LaTeX report

Electronics and Instrumentation | *Summer of Science* *(May 2021 - July 2021)*

Maths and Physics Club, IIT Bombay

- Studied the concepts related to Boolean Algebra, Binary Numbers, **Combinational** and **Sequential** Logic Circuits, **flip flops**, **counters**, Multiplexer, Demultiplexer, and Display decoder under Digital Electronics
- Dealt with the concepts of **Diodes**, **Opamps**, **BJT**, **Mosfets**, and **Transformer** under Analog Electronics
- Drafted a detailed report containing a lucid explanation of all the concepts learned

Technical Skills

Skills	C++, Python, Java, Machine Learning, Data Structures & Algorithms, AWS, DBMS, SQL, Git, HTML, CSS, Javascript, VHDL, Embedded C, Assembly Language
Software	LaTeX, MATLAB, Octave, Excel, Arduino, Keil, Ngspice, Quartus, Cadence
Libraries	Numpy, Matplotlib, Pandas, Sklearn, TensorFlow, PyTorch, NLTK, OpenCV

Key Courses Undertaken

Electrical Engineering	Communication Networks, Image Processing, Communication Systems, Information Theory & Coding, Probability and Random Processes, An Introduction to Number Theory and Cryptography, Topics in Cryptology, Markov Chains and Queuing Systems, Microprocessors, Signal Processing, Analog Circuits, Digital Systems, Electronic Devices & Circuits, Control Systems, Power Engineering, Radio Frequency Microelectronics Chip Design
Computer Science	Introduction to Machine Learning, Computer Programming and Utilization, Logic for Computer Science, Discrete Structures
Lab Courses	Digital Circuits Lab, Analog Lab, Power Engineering Lab, Communications Lab, Control Systems lab, Electronic Devices lab, Electronic Design Lab, Microprocessors Laboratory
Mathematics & Physics	Calculus, Linear Algebra, Ordinary Differential Equations, Complex Analysis, Partial Differential Equations, Quantum Physics, Basics of Electricity and Magnetism
Other Courses	Technical Communication, Economics, Sociology, Engineering Graphics and Drawing, Organic and Inorganic Chemistry, Physical Chemistry, Biology

Extracurricular Activities

- Assembled a **Line Follower Bot** in a workshop organized by Electronics and Robotics Club, IIT Bombay *(2021)*
- Successfully completed two semester long training at **National Cadet Corps**, IIT Bombay *(2021)*
- Was 1st runner up in **cluster I, DAV National Sports** in chess *(2016)*
- Represented school in **DAV National Sports** at state level in chess *(2016)*
- Scored more than 50 percentile in **National Finance Literacy Assessment Test** *(2016)*
- Won 2nd Prize in a Debate competition conducted by **Punjab National Bank** *(2016)*
- Secured 2nd Position in Quiz competition on General Knowledge conducted in Monnet DAV Public School *(2016)*
- Awarded **Shaheed Bhagat Singh Certificate** in **Avantika Cultural Olympiad Essay Competition** *(2015)*