



Navnit Kumar
Electrical Engineering
Indian Institute of Technology, Bombay
Specialization: Microelectronics and VLSI

16D070053
Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 18-12-1998

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	
Intermediate	CBSE	Delhi Public School, Bokaro Steel City	2016	92.60%
Matriculation	ICSE	Don Bosco Academy, Mccluskieganj	2014	95.60%

Scholastic Achievements

- Nationwide **top** in **JEE Main** among 1.5 million candidates with **AIR** [2016]
- Secured **AIR** in **IIT JEE Advanced**, top in general category (among 0.2 million) [2016]
- Qualified for **interview stage** of the Kishore Vaigyanik Protsahan Yojana (**KVPY**) (among 50 thousand) [2015]
- Recipient of **Scholar Badge** given to **high-performing** class 12 students of **DPS Bokaro** (among 600) [2015]
- Achieved **International Rank 634** in the 16th National Science Olympiad, 2013 conducted by **SOF** [2013]

Internships and Research Project

Ubisoft India Studios | Automation Intern

May 2019-July 2019

Quality Control Team | **Project:** Bug detection in graphic images

- Researched on **Deep Learning** algorithms: R-CNN, faster R-CNN and Mask R-CNN, to **detect clipping** bugs
- Implemented** a Mask R-CNN based model for **detection** and **segmentation**, achieved **77%** accuracy
- Reduced false positives by using **data augmentation**, test time augmentation and improved model performance

Hopfield Network for Optimization Problems

Autumn 2019

Supervised Research Project | **Guide:** Prof. Udayan Ganguly

- Understanding** the capability of Hopfield networks to find **optimal** solution to the **traveling salesman** problem
- Investigated** the mapping of graph to **network** of sinusoidal oscillators and performed circuit simulations
- Explored the **phasor arithmetic method** for phase evolution to ensure energy **function minimization**

Key Academic Projects

Employee Attrition Analysis and Prediction

Spring'20

Introduction to Machine Learning

Course Project

- Built a **machine learning** pipeline to predict employee attrition on the basis of their performance
- Analysed data**, employed supervised classification algorithms viz. **Random Forest**, **SVM**, achieved **87%** accuracy

Movie Recommendation System

Spring'20

Source: Kaggle

Self Project

- Explored candidate generation methods: **content-based** and **collaborative filtering** to build recommender system
- Represented** items and queries as **embeddings**, built a regularised **Matrix Factorization** model and trained it
- Implemented a **softmax** model and inspected its learned embeddings by looking at **nearest neighbours** and **norms**

Flight Delay Prediction

Spring'20

ML for Remote Sensing

Course Project

- Employed** machine learning techniques to predict flight delays based on various parameters
- Preprocessed** data and did exploratory **data analysis** to determine **feature importance** for making decisions
- Applied **supervised algorithms** viz. Logistic Regression, Random Forest and achieved **90%** test accuracy

Authentication system for Vehicle Identification

Spring '19

Digital Signal Processing

Course Project

- Extracted** number plate of malefactor car using **image processing**, under Make in India programme
- Used **bounding box detecting** techniques and alphabet dataset **correlation** to read the text in the plate

Latency and Scheduling using Graph Algorithms

Autumn'18

Foundations of VLSI CAD

Course Project

- Used **Topological Sort** to find optimal ordering of circuit elements in a combinational multi-level **Boolean network**
- Implemented resource scheduling with time constraints, estimated latency using **longest path** algorithm in a DAG

Deep Learning and Convolutional Neural Networks

Spring'18

Online course

Self Project

- Built car detection system using **YOLOv2 object detection** algorithm to generate bounding boxes around it
- Used Score-thresholding, Non-max suppression methods to select **best bounding box** and achieved **76%** accuracy

Intelligent Power Board

Electronics Design Laboratory

Spring'19

Course Project

- Developed power board prototype capable of **logging** voltage, current and power consumption on a remote computer over bluetooth, to **monitor power surges** (achieved 1V resolution over 150-250V and 10mA resolution above 30mA)

Reaction Game

Digital Circuits Laboratory

Spring'18

Course Project

- Implemented** a game on Krypton board which uses **Altera's Max V CPLD** device
- Added feature for **score calculation** based on time difference between LED 'ON instant' and **reaction time** of player for eight iterations to display **total delay** as score on LCD Display
- Designed **RTL** machine in **VHDL** to meet game specifications, simulated and tested implementation on **ModelSim**

Digital Stopwatch

Introduction to Electronics

Spring '17

Course Project

- Developed** a basic **prototype** of digital stopwatch with **pause, play, record** features for **tracking time**
- Used **LM555 timer**, **MOD-6 counter** and 7-segment **decoder** and displayed output on a set of 7-segment display

Analog Audio Equalizer

Analog Laboratory

Spring'18

Course Project

- Built a **6-channel tunable** audio equalizer to adjust the frequency components within an **audio signal** input
- Implemented** features to **boost** and **cut** the energy of specific frequency bands using **Bandpass filters**
- Added **LM386 amplifier** to amplify output signal and introduced **volume controller** for Equalizer

Technical Skills

Programming

C, C++, Python, VHDL

Software Tools

Git, NumPy, Pandas, Matplotlib, TensorFlow, MATLAB, L^AT_EX

Design Tools

Cadence Virtuoso, Intel Quartus, NGspice, TCAD, TI CCS

Relevant Coursework

Digital

Digital Systems, VLSI Design, Systems Design, Testing & Verification of VLSI Circuits, VLSI CAD, VLSI Design Lab, Microprocessors, VLSI Technology

Electives

Machine Learning, Data Analysis & Interpretation, Probability & Random Processes, Digital Signal Processing, Image Processing & Remote Sensing, Linear Algebra, Calculus

Computer Science

Computer Programming and Utilization, Data Structures^{*}

^{*} Online Course

Positions of Responsibility

Teaching Assistant | Introduction to Electrical and Electronic Circuits

Aug'20 - Present

- Responsible for setting assignments, organising tutorials and evaluating answer sheets for a batch of **28 students**

Class Representative | Electrical Dual Degree Batch 2016-21

July'17-July'18

- Represented a batch of **64 students** for a year, acting as a link between professors and students
- Handled** logistical issues faced by students in courses offered by **Electrical Department, IIT Bombay**

Coordinator, Team Pronites | Mood Indigo 2017

May-Dec'17

Asia's largest college cultural festival with **141,000 footfall**, **210+events**, **160+international artists**, **30+venues**

- Worked in **team** of **20** and responsible for execution of concerts with footfall **20,000**
- Ideated** and revamped the structure for **LiveWire**, India largest and oldest semi-professional band event
- Lead a team of **20+** to execute India's largest student organized concerts attended by a crowd of **20,000**

Extra-Curriculars

- Volunteered for **Green Campus, IIT Bombay** under the **National Service Scheme (NSS)**, IIT Bombay [2016]
- Conducted **Bio-Diversity Mapping** along Main Gate Road in association with **NSS**, IIT Bombay [2016]
- Participated in **RC Plane** and **Line Follower Bot** Competition organised by the **STAB**, IIT Bombay [2017]
- Attended **workshops** on Arduino and AVR microcontroller, conducted by **Electronics Club**, IIT Bombay [2018]
- Attended and successfully completed **Communication Workshop** by **Indian Training Co.** [2020]
- Contributed to **Open source** projects and successfully completed the **Hacktoberfest challenge** [2019]