Kumkum Narang
Electrical Engineering
Indian Institute of Technology Bombay

21D070040
Dual Degree (B.Tech. + M.Tech.)
Gender: Female
DOB: 27/10/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	CBSE	DAV Public School, Thermal Colony, Panipat	2021	97.40%
Matriculation	CBSE	DAV Public School, Thermal Colony, Panipat	2019	99.20%

Pursuing a Minor degree in The Centre for Machine Intelligence and Data Science (C-MInDS)

Scholastic Achievements

- Achieved a score of **99.29** percentile in **IIT-JEE Advanced 2021** among 0.25 million candidates *(2021)*
- Achieved a score of **99.76** percentile in **IIT-JEE Mains 2021** among 1.4 million candidates *(2021)*
- Felicitated with the **KVPY** fellowship by the Department of Science and Technology, Government of India *(2021)*
- Secured an **All India Rank 4** and aggregate percentage of 99.2% in class tenth CBSE-board examinations *(2019)*
- Awarded certificate of merit for being in the top scoring **0.1 percent** successful candidates in Mathematics, Science and Sanskrit in class tenth CBSE-board examinations *(2019)*

Technical Projects

Optimization of SPIMs of ceiling fans
May 2023 - Present

Research Project | Department of Electrical Eng. — *Prof. Baylon G. Fernandes*

- Studied in detail the working and performance parameters of SPIM of a commercially available ceiling fan
- Designed different machine models on **Simcenter MAGNET** by varying rotor bars' shape and cross sectional area
- Used **Finite Element Analysis** to analyse the effect of changed parameters on the efficiency and service value of the motor
- Achieved an input power of around **35 Watts** and a service value of **6**, close to realizing a **5-STAR induction motor**

Student Satellite Program, IIT Bombay
Jan 2023 - May 2023

A 50+ member student team with the vision of making IIT Bombay a centre of excellence in space technology

Sensor Modelling | Guidance, Navigation and Control (GNC)

- Studied in detail about different classes of three-axis gyroscopes and magnetometers used in modern-day **CubeSats**
- Modelled the **L3GD20H** gyroscope on **Simulink** to calibrate the actual gyroscope and verify its position data
- Executed a **three-stage** recruitment process involving a written test, an interview, and a mini-project to test the technical ability, practical approach, and teamwork of the applicants; selected **4** out of **50+** applicants

Neural Networks and Deep Learning
May 2022 - Jul 2022

Summer Of Science | Maths and Physics Club, IIT Bombay

- Studied the Gradient descent procedures and learning techniques of resilient backpropagation, momentum term, flat spot elimination, weight decay and second order backpropagation
- Explored prominent supervised learning techniques like Single and multi-layer perceptrons, **Radial Basis Function** (RBF), **Recurrent Neural Networks** (RNN) and **Learning Vector Quantization** (LVQ)
- Analysed common challenges with Neural networks like selection of appropriate learning rate and **activation functions**

Academic Projects

16 Bit Pipeline Processor
Apr 2023 - May 2022

Course Project | EE-309 - Microprocessors — *Prof. Virendra Singh*

- Designed a **16-bit RISC** based pipeline processor with six stages and implemented it using VHDL in **Quartus**
- Incorporated **26** instructions for arithmetic & logic operations, conditional and unconditional jumps and memory access
- Added support for **data forwarding** and **hazard mitigation** techniques to tackle load dependency and branch hazards

Analog Circuits Lab
Jan 2023 - Apr 2023

Course Project | EE-230 - Analog Circuits Laboratory — *Prof. Anil Kottantharayil*

- Implemented a **logarithmic amplifier** to convert analog values to decibels and simulated the circuit using **NGspice** to obtain precise parameter values which were further used to assemble the circuit using **TL084** operational amplifiers
- Designed a **sweep sine wave generator** that produces a sinusoidal signal whose frequency can be varied linearly keeping the amplitude constant, using a **Wein Bridge Oscillator** setup and LED-LDR pairs as the basic building blocks

FIFA World Cup Analysis and Winner Prediction
Oct 2022 - Nov 2022

Course Project | DS-203 - Programming for Data Science — *Prof. Amit Sethi*

- Gathered temporal data of prominent FIFA players, coaches and past FIFA matches and practises
- Built a machine learning model to predict success in a match based on various attributes associated
- Implemented a statistical prediction model using **Autoregression** and compared its performance with RNN-based models

Power Engineering Lab
Jan 2023 - Apr 2023

Course Project | EE-240 - Power Engineering Laboratory — *Prof. Sandeep Anand*

- Used the **three lamp dark method** and a stroboscope to synchronize the alternator with an infinite bus bar system and studied various techniques for the control of real and reactive power delivered by an alternator to the grid
- Studied the working principle of a single phase transformer and obtained its equivalent circuit parameters using the **Open Circuit** and **Short Circuit** tests and used them to estimate the system's efficiency and regulation at various loads

Bubble Trouble
Jan 2022 - Feb 2022

Course Project | CS-101 - Computer Programming and Utilization — *Prof. P. Chaudhuri*

- Created a single-player bubble shooter game with a user-interactive interface using **Turtlesim** and **Xlib** libraries
- Implemented **live input response**, smooth movement of shooter, **collisions** and randomised trajectory of bubbles
- Implemented a dynamic display of data for player score, number of remaining lives and an expiring timer

Movie Recommendation System
Mar 2023 - Apr 2023

Course Project | CS-419 - Introduction to Machine Learning — *Prof. Abir De*

- Performed Exploratory Data Analysis on datasets, employing **Pandas**, **NumPy**, **SciPy**, **Scikit-learn**, and **PyTorch** libraries
- Employed **K-means** clustering and developed a movie recommendation system based on **content based filtering**

Positions of Responsibility

Department Academic Mentor
May 2023 - Present

D-AMP | Department of Electrical Engineering

- Chosen as a mentor from a pool of **150+** applicants on the basis of **ethics**, **interviews** and **extensive peer reviews**
- Leveraging the institute's resources to guide **5 sophomores** in their academic and extra-curricular pursuits
- Collaborating with a team of 37 seniors towards building a support system for students in the department

Teaching Assistant
Feb 2023 - Jun 2023

CS-101 | Department of Computer Science and Engineering

- Responsible for **tutoring** a batch of **28** students for the course CS-101 (Computer Programming and Utilization)
- Evaluated answer scripts, maintained performance records for students and helped in **problem solving**
- Conducted weekly lab sessions to evaluate students' understanding of concepts and to clear their doubts

Teaching Assistant
Jun 2023 - Jul 2023

PH-108 | Department of Physics

- Selected to conduct problem solving and doubt resolving sessions in Electricity and Magnetism for 10 UG students
- Evaluated the exam answer scripts, monitored students' performance and assisted the professor in grading

Technical Skills

Programming	C/C++, VHDL, Assembly, Python, HTML, XML, Embedded C
Software	Simcenter MAGNET, Quartus, Keil, EAGLE, MATLAB, Simulink, LaTeX

Key Courses Undertaken

Electrical Eng.	Power Engineering, Analog Circuits, Control Systems, Microprocessors, Digital Systems, Probability & Random Processes, Signal Processing, Electronic Devices
Computer Science	Introduction to Machine Learning, Programming for Data Science
Others	Economics, Complex Analysis, Differential Equations, Linear Algebra, Basics of Electricity and Magnetism, Quantum Physics and Applications, Biology

Extracurriculars

- Hosted a **3 hour** hands on session for **150+** high school girls from rural areas of Maharshtra, Odisha and Bihar as a part of **Women In Science and Engineering from Rural Parts of India, IIT Bombay** (WiSE) *(2023)*
- Secured **second** position in Inter School Quiz on Global Environment Governance held in May, 2019 *(2019)*
- Bagged the first position in the Talent Search Examination organized by Shiksha Prasar Samiti in Oct,2018 *(2018)*
- Awarded the **Best Speaker** Award in Inter-House Hindi Declamation Competition organized at school level *(2018)*