Sanjay Kumar Meena
Electrical Engineering
Indian Institute of Technology Bombay

22B3978
Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 03/09/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2027	
Intermediate	RBSE	SPECTRUM GLOBAL ACA SR SEC SCH,SHAHPURA(JAIPUR))	2021	95.20%
Matriculation	RBSE	IMMANUEL MISSION SEC SCHOOL,SHAHPURA(JAIPUR)	2019	78.33%

Scholastic Achievements

- Secured an **All India percentile of 94.18%** in **JEE Mains** among over **1M** candidates *(2022)*
- Secured an **All India percentile of 86.23%** in **JEE Advanced** among over **0.15M** candidates *(2022)*

Letter of Recommendation

Letter of Recommendation for Internship *(Oct 2024)*

Course Project | Prof. Madhu Belur

- Excelled in **EE302** and **EE640** with consistent performance and strong conceptual understanding
- Demonstrated **teamwork** and **individual** initiative, actively participating and maintaining regularity in class

Key Projects

IITB-RISC *(Jan 2024 - May 2024)*

Course Project | Microprocessors | Prof. Virendra Singh

- Implemented a **six-stage** pipelined architecture for a set of **26** instructions based on RISC design in VHDL
- Developed custom **adder**, **comparator**, **carry-zero flag**, pipeline registers-2 and prepared **report** for viva
- Tested each instruction in Quartus and executed an assembly program on **FPGA board** to verify the design

Control Systems Lab *(Aug 2024 - Nov 2024)*

Course Project | Control Systems Lab | Prof. Debraj Chakraborty, Prof. Dwaipayan Mukherjee

- Developed a PID Controller on Arduino Mega to precisely position the **DC motor** within specified constraints
- Stabilized an **inverted pendulum** on Arduino Mega using **LQR** control with constrained vibrations
- Designed a **PID-controlled line follower robot** using IR sensors, completing a track in under **30** seconds
- Designed an analog noise cancelation circuit with **20** dB attenuation at **100** Hz, stabilized by loop shaping

IITB-CPU *(Aug 2023 - Nov 2023)*

Course Project | Digital Systems | Prof. Virendra Singh

- Designed CPU with a multi-input/output **finite state machine** and logic blocks for data & write operations
- Developed combinational logic to understand and execute **15 distinct instructions** of assembly language
- Proficiently wrote code for essential components such as **ALU**, **sign extender**, **decoder**, and **left shifter**

Machine Learning *(May 2024 - July 2024)*

Summer of Science | Mathematics And Physics Club, IIT-Bombay

- Proficient in **Python** programming and data analysis using **NumPy**, **Pandas**, Matplotlib, and Seaborn
- Studied ML concepts such as **linear and logistic regression**, k-nearest neighbors, and k-means clustering
- Examined **Natural language processing**, recommender systems, decision trees, and random forests

Signal Processing *(May 2024 - July 2024)*

Summer of Science | Mathematics And Physics Club, IIT-Bombay

- Studied Basic **Properties** of Signals, Linear Time Invariant Systems, and **Continuous Fourier Transforms**
- Applied **Discrete Fourier Transforms**, **Laplace Transform**, and **Z Transform** in practical applications

Communication Lab *(Aug 2024 - Nov 2024)*

Course Project | Communication Lab | Prof. Aravindakshan G A, Prof. Jayakrishnan Nair

- Designed and implemented **AM**, **FM**, and digital modulation/demodulation schemes using **GNU Radio**
- Designed and analyzed RF signal generation and **non-linearity effects** with the **IQ-Modulator Board**
- Developed **pulse shaping**, **matched filtering**, and **equalization** techniques for communication systems

Electronic Devices Lab *(Aug 2024 - Nov 2024)*

Course Project | Electronic Devices Lab | Prof. Apurba Laha, Prof. Pradeep Nair

- Performed **I-V characterization** of PN diodes, PIN diodes, photodiodes, Schottky diodes, and solar cells
- Analyzed and characterized **LED band gap**, temperature dependence, and Schottky diode transients
- Analyzed **BJT**, HBT DC characteristics, **MOSCAP C-V**, and **NMOS I-V** characteristics comprehensively

Technical Exposure

ML for Data Analysis, Optimization, and Segmentation Techniques *(Aug 2024 - Nov 2024)*
Course Project | Introduction to Data Science and Machine Learning | Prof. Amit Sethi
- Performed **hypothesis testing**, data integration, and visualization with SQL and Python for **EDA**
- Developed optimization algorithms and assessed **regularization effects** on regression and classification
- Applied **clustering techniques** (k-means, DBSCAN) and **PCA** for customer segmentation and insights
- Designed **classification models**, performed **hyperparameter tuning**, and analyzed **feature importance**

Analog Circuit Design *(Jan 2024 - May 2024)*
Course Project | Analog Lab | Prof. Sandip Mondal
- Designed **MOSFET**, **Differential** and **Logarithmic amplifier**, Schmidt trigger, Differentiator, Integrator
- Developed **Multivibrator**, **Square Root Circuit**, Instrumentation Amp, Right Leg Drive and Filter Section
- Designed an **ECG signal recording system** using an **ECG amplifier**, successfully checking **heartbeats**

Digital Circuit Design *(Aug 2023 - Nov 2023)*
Course Project | Digital Circuit Lab | Prof. Siddharth Tallur
- Designed several digital circuits using **VHDL's** structural and behavioral description on **Quartus** Software
- **Circuits**: 4-bit adder and subtractor, ALU, Clock Divider, Tone Generator, Sequence Generator & Detector
- Implemented hardware design using **Scanchain** environment on the **Xen-10 board** for testing all test cases

Programming the 8051 Microcontroller *(Jan 2024 - May 2024)*
Course Project | Microprocessor Lab | Prof. Nikhil Karamchandani
- Implemented various basic algorithms in assembly language for **8051 microcontrollers** using **Keil** software
- Programmed an LCD, coded **timers**, interfaced a keypad with **Pt-51 board** using embedded C and assembly
- Established **UART communication** between Pt-51 board and computer, receiving data via **Realterm**

Multiband Image Analysis and Principal Component Visualization *(Aug 2023 - Nov 2023)*
Course Project | Principles of Satellite Image Processing | Prof. Buddhiraju K Mohan
- Employed built-in functions to generate a **correlation matrix**, compute **eigenvalues**, and find **eigenvectors**
- Developed custom code to compute the **covariance matrix**, ensuring precise analysis of **multiband images**
- Produced **principal component images** from multiband input, showcasing strong image processing skills

AI-phabet *(Dec 2023)*
Winter in Data Science | Analytics Club, IIT-Bombay
- Implemented a custom **neural network** architecture using NumPy for EMNIST dataset classification
- Trained neural network over **30 epochs** using stochastic gradient descent and mini-batch optimization

Positions Of Responsibility

SOS Mentor | Artifical Intelligence and Machine Learning *(May 2024 - July 2024)*
- Mentored a team of **4 students** on **AI/ML**, providing comprehensive guidance and valuable resources
- Addressed mentee's theoretical AI/ML queries and provided **constructive feedback** on their **reports**

CodeWars Mentor | WNCC Club, IIT-Bombay *(March 2024)*
- Mentored **two teams**, Saste Hackers and Byte Brawlers, providing resources, guidance, and strategic support
- Addressed mentees' theoretical questions and offered helpful **feedback** to improve performance in CodeWars

Technical Skills

Languages	C, C++, Python, VHDL, Assembly, Embedded-C
Libraries	NumPy, Pandas, Matplotlib, Seaborn
Tools	Quartus, LateX, JuPyter, Autodesk Fusion 360, μ-Vision Kiel, ATMEL FLIP, LTspice, Xcircuit, Github, Ngspice, Kicad, Nanohub, Matlab, GNU Radio, Arduino, Google Colab

Key Courses Undertaken

Electrical Engineering Analog Circuits, Digital Systems, Signal Processing, Probability and Random Processes, Electronic Devices & Circuits, Microprocessors, Control Systems, Communication Systems, EM Waves, Digital Signal Processing*

**Ongoing courses*

Extra Curricular Activities

- Completed the **Python for Data Science** boot camp under Learners' Space organized by UGAC *(July 2023)*
- Completed a year-long program in **Cricket** under the **National Sports Organization**, IIT-B *(2022-23)*
- Completed the **LATEX** and **Consulting** boot camp under Learners' Space organized by UGAC *(July 2023)*
- Completed **Teaching Assistant Skill Enhancement** & **Training**, gaining skills in effective teaching *(2023)*