Utkarsh Jindal | **200070086**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 8/3/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	CBSE	DPS, Bopal	2020	
Matriculation	CBSE	DPS, Bopal	2018	

Pursuing minor in **Computer Science and Engineering** at IIT Bombay

Scholastic Achievements

- Ranked **10th** (out of 102) in the B. Tech. programme of Electrical Engineering at IIT Bombay [Present]
- Achieved All India Rank **206** in **JEE(Advanced)** 2020 out of over 1.22 lakh candidates [2020]
- Received the prestigious **KVPY** fellowship offered by Dept. of Science and Technology, Govt. of India [2019]
- **One** of the **five** students selected for ArunaLal Scholarship offered by **PRL, Ahmedabad** [2019]

Conferences

International Conference for Small Satellites [Apr 2022]

Organised by the Society for Small Satellite Systems

- Secured second position in Student Project Competition for presenting '**Sanket: Antenna Deployment System**'
- Successfully demonstrated communication between **Sanket** module and **handheld radio** during the presentation

Technical Projects

IIT Bombay Student Satellite Program [Jul 2021 - Present]

A 70+ member student team with the vision of making IIT Bombay a centre of excellence in space technology

- **Sanket** | **Communication Subsystem**
  The mission aims to develop an indigenous Antenna Deployment System for CubeSat applications, with TRL-8
  - Interfaced the **transceiver** CC1125 with **microcontroller** ATmega128 through **SPI** protocol to set the preferred values of registers, issue command strobes, and establish **half-duplex** wireless communication
  - Understood basic theory of **RF testing** and devised **component level testing** plan for the mentioned transceiver
  - Performed antenna simulation on Sanket in **Ansys HFSS**, and fine-tuned its dimensions to obtain desired properties
  - Used a **VNA** to obtain the $\mathbf{S_{11}}$ curve and **Smith chart**, and suggested corrective measures for impedance matching
  - Designed **RF PCB** for low noise amplifier MAAM-011229 in **EAGLE**, accounting for the frequency needs

Control Electronics for Portable Magnetometer | Research Project [Jul 2022 - Present]

Guide: Prof. Kasturi Saha, Dept. of Electrical Engineering, IIT Bombay

- Studied the properties of **NV centre** in diamond, and its applications in quantum sensing and metrology
- Understood the principles behind NV-**ODMR** technique used for determining magnetic field; learnt about essential components it requires and their circuits (microwave generator, optical pump and filter, photodetector)
- Read research papers on **CMOS** integration of NV-based quantum sensing to make the setup **portable**

Snake Robotics | Research Project [Jun 2022 - Present]

Guide: Prof. Dwaipayan Mukherjee, Dept. of Electrical Engineering, IIT Bombay

- Studied **kinematics** of snake robot, ground friction models, and gait patterns observed in biological snakes
- Simulated a snake employing **lateral undulation** as gait, and animated the same using **matplotlib** in Python
- Explored algorithms based on **tractrix** for making effective use of extra degrees of freedom in the robot

Ham Radio Club, IIT Bombay [Apr 2022 - Jun 2022]

The club has a vision to foster and grow the amateur radio community at IIT Bombay and beyond

- Designed and built a QFH antenna resonant at **137 MHz**, using **RG-58** coaxial cable and PVC pipes; used it to receive APT signals from **NOAA** satellites, and decoded them using **WXtoImg** to obtain weather images of Earth
- Presented in Ground Station Workshop attended by **120+** participants from **20+** colleges across India
- Received and decoded **SSTV** encoded images from ISS under the **Amateur Radio** on ISS programme
- Demonstrated the **UART** communication protocol between two **ATmega** (32 and 128) microcontrollers

fROSty Winter | Learning Project [Dec 2021]

Electronics and Robotics Club, IIT Bombay

- Learnt nomenclature, structure, and commands of **ROS**, including packages, nodes, and launch files
- Employed **Gazebo** for simulating **TurtleBot3**, and testing and debugging of ROS Python scripts
- Used **OpenCV** for basic image operations, and to read **ArUco** markers employed for guiding the bot

Course Projects

IITB-RISC-22 [Apr 2022 - May 2022]

Guide: Prof. Virendra Singh, Dept. of Electrical Engineering, IIT Bombay

- Designed an 8-register, 16-bit **multi-cycle** RISC microprocessor to implement a **17** instruction ISA
- Constructed a suitable datapath, wrote **hardware flowcharts**, and defined a control status word for each instruction
- Created components such as ALU, register bank, and memory in **VHDL** in Quartus, using behavioural modelling

ATM Simulator [Apr 2022]

Guide: Prof. Saravanan Vijayakumaran, Dept. of Electrical Engineering, IIT Bombay

- Wrote program in **Embedded C** in Keil for microcontroller **AT89C5131** to simulate the behaviour of an ATM (to dispense notes of given denominations), and also integrated a **password** based withdraw feature to enhance security
- Transferred input from keyboard to controller using **UART** protocol, and displayed output on an **LCD** display

Digital Design in VHDL [Aug 2021 - Nov 2021]

Guide: Prof. M. Shojaei Baghini, Dept. of Electrical Engineering, IIT Bombay

- Designed **FSM**-based string recognizer circuit to detect a word in sequence of letters input from development board
- Implemented a **4-bit** ALU capable of addition, concatenation, bitwise XOR, and fixed scalar multiplication using **behavioural** modelling; simulated the desing using ModelSim, and tested it on hardware using ScanChain

Cryptocurrency Analysis [Nov 2021]

Guide: Prof. Amit Sethi, Dept. of Electrical Engineering, IIT Bombay

- Cleaned a dataset of **11** cryptocurrencies using **pandas**, and visualised it using **matplotlib** in Python
- Employed an **LSTM** neural network to forecast the future prices of cryptocurrencies, and analyzed the results

Positions of Responsibility

Subsystem Head | Communication Subsystem [May 2022 - Present]

IIT Bombay Student Satellite Program

- Leading an interdisciplinary team of **15** students to develop a **quality assured** antenna deployment system
- Executed a **three-stage** recruitment process involving written test, interview, and mini-project to test the technical ability, practical approach, and teamwork of the applicants; selected **9** out of **70+** applicants
- Mentored **two** students during the recruitment phase, ensuring that they adapt well to the functioning of the team

Teaching Assistant | PH107 [Dec 2021 - Mar 2022]

Guide: Prof. S Umasankar, Dept. of Physics, IIT Bombay

- Mentored **10** first year undergraduate students, and conducted live **tutorial sessions** and quizzes
- Clarified their doubts, and focused on academically weak students to boost their understanding

Technical Skills

Programming	C/C++, Python, MATLAB, Octave, Assembly, VHDL
Software	EAGLE, Microchip Studio, Smart RF Studio, Git, ROS, Gazebo, Quartus

Key Courses Undertaken

Electrical Engineering	Signal Processing-I, Probability and Random Processes, Analog Circuits Control Systems, Digital Systems, Microprocessors, Power Engineering
Computer Science	Introduction to Machine Learning, Computer Networks‡
Miscellaneous	Linear Algebra, Differential Equations, Economics, Electromagnetism

‡ to be completed by Dec 2022

Extracurriculars

- Participated in Common Yoga Protocol and **Yogathon** on the 8th International Yoga Day [Jun 2022]
- Attended **Code the Pixels** event on image processing, and wrote code for an invisibility cloak [Jun 2022]
- Secured first position in **Jhatka GC** organised by Electronics and Robotics Club [Mar 2022]
- Completed year long course on **general fitness** and health under National Sports Ortganisation [2021]
- Part of the Plate Champion team in Under-15 SPCT Inter-School **Cricket** Tournament [2016]