Prakhar Mittal | **190070046**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 05-10-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	CBSE	Disha Delphi Public School	2019	95.20%
Matriculation	CBSE	Little Angels High School	2017	98.00%

Auxillary Degree: Pursuing **Minor** Degree in Computer Science and Engineering.

Scholastic Achievements

- Secured **All India Rank 122** (99.926% percentile) in JEE Advanced among over 0.15 million candidates *[2019]*
- Secured **All India Rank 153** (99.991% percentile) in JEE Mains among over 1.1 million candidates *[2019]*
- **Top 1%** nationwide, out of 50,000 candidates in **NSEP**, National Standard Examination in Physics *[2018]*
- **Top 1%** nationwide, out of 70,000 candidates in **NSEC**, National Standard Examination in Chemistry *[2018]*
- Recipient of the **KVPY Fellowship** by **Department of Science and Technology, Government of India** *[2018]*

Key Projects

Physicc: A Simple Physics Engine *[May '21 - July '21]*

Seasons of Code (SoC), IIT Bombay — *Web and Coding Club, IIT Bombay*

- Developed a Modular Impulse based **Physics Engine** library using **GLM** and **ImGUI** for User Interface
- Integrated a Rendering engine system based on **ECS** architecture with **OpenGL C++** API
- Implemented a **Continous Integration** system with the help of **Github Actions** & **Travis CI**
- Created multiple **unit testing** suites for **Test Driven Development** using Google Testing Framework

Quantum Computing *[May '20 - June '20]*

Qiskit Workshop — *Maths & Physics Club, IIT Bombay*

- Analysed the creation of entangled pairs and **teleportation** of information using qubits.
- Implemented the **Deutch-Jozsa algorithm** to understand the capabilities of Quantum Computations.
- Implemented the **BB84 Cryptography Protocol** for secure computations between 2 agents.
- Applied **Grover's Algorithm** to achieve a quadratic speed-up over classical search algorithms.

Image to LaTeX Converter *[Summer 2020]*

Institute Technical Summer Projects (ITSP) — *Institute Technical Council, IIT Bombay*

- Implemented a **CNN and LSTM** based model on **PyTorch** for generating LaTeX expression of the input equation
- Adapted the OpenAI problem statement and used **im2latex-100k** dataset to achieve a **BLUE-4** score of 38.82
- Deployed the model on a **Django** based interactive web application and integrated the **Django-TeX** parser

Pluto-X Hackathon *[January 2020]*

Organised by Aeromodelling Club in association with Drona Aviation — *IIT Bombay*

- Programmed a drone to maintain a constant relative distance from its immediate bottom
- Integrated a laser distance measurer with the onboard microcontroller for vertical distance measurement
- Utilized special pre-provided library functions to write microcontroller code in order to stabilize the drone
- Achieved **1st** position judged on regards of stability of the drone and efficiency of the code among 20 other teams.

Multi-Platform App Development *[July 2021]*

Self Project — *IIT Bombay*

- Developed a multi-platform app using **Flutter SDK** which shows time according to chosen location
- Fetched the time by sending network requests through **API calls** and fetching data using http package
- Parallelized data fetching by writing asynchronous code in **Dart** to fetch data efficiently behind a loading screen

Course Projects

16-Bit ALU Design *[December 2020]*

Prof. Virendra Singh, EE-224 Digital Systems — *IIT Bombay*

- Designed a 16-bit ALU capable of performing addition, subtraction, bitwise NAND and XOR operations
- Implemented Fast Adder using **Brent-Kung** technique in **structural VHDL** for optimized performance
- Tested the circuit using **Intel Quartus Prime** by carefully generating testcases checking each operation

Obstacle Avoidance Game *[April 2021]*

V. Rajbabu, EE-337 Microprocessors Lab *IIT Bombay*

- Developed an obstacle avoiding game similar to the Google Chrome dinosaur game on a **LCD screen module**
- Used **Embedded C** to write code for communication between the LCD and **8051 microcontroller**
- Used a **USB-UART module** to couple keyboard with the microcontroller through laptop for movement inputs

Music Synthesizer *[April 2021]*

Prof. M. Baghini, EE-214 Digital Circuits Lab *IIT Bombay*

- Created a program for playing a song on the **Max V Altera FPGA board** connected with a speaker
- Used Finite State Machine in **structural VHDL** architecture to play each tone of the song in a sequence.
- Generated each tone using the on-board 50MHz clock by repeating the waveform for a calculated count

Independent Source Circuit Simulator *[April 2020]*

Prof. Himanshu Bahirat, EE-114 Power Engineering-I *IIT Bombay*

- Developed a general **circuit solver in Python** which calculates the conduction matrix
- Applied **node voltage analysis** to the circuit given as input by the user using matrices to **simulate the response** of electrical circuits containing independent sources and linear elements

Positions Of Responsibility

Design Engineer | IIT Bombay Racing *[June 2021 - Present]*

*A 3-tier cross-functional team of **70+ students** to build a **electric vehicle** for **Formula Student UK** conducted by IMechE held annually at **Silverstone, UK**. First Indian team to win the Engineering Design event in the 22-year history of FSUK.*

- Working to transfer the YOLO-network onto **Tensorflow** framework for optimized utilization of GPU
- Plan to use **ROS** for running simulation and compare outputs with actual data to further optimize the model

Junior Design Engineer | IIT Bombay Racing *[July 2020 - May 2021]*

- Trained the **YOLO-architecture** for swift and accurate detection of obstacles by **real-time processing** of images supplied by the cameras which will be installed at the front of the vehicle
- Performed Data labelling for Bounding boxes and segmentation for contribution in the **FSOCO dataset**

Teaching Assistant | Chemistry Department, IIT Bombay *[Jan 2021 - March 2021]*

- Teaching Assistant for the course CH107- Quantum Chemistry handling a batch of 42 students
- Conducted doubt clearing sessions after tutorial sessions to ensure proper content understanding

Technical Skills

Programming Languages	Proficient in C++, Python | Familiar with Bash, Java, Dart, MATLAB
Software Skills	Git, Github, Doxygen, Cmake, Make, LaTeX, AutoCAD, SolidWorks
Libraries	OpenGL, GLM, ImGUI, GTest | Numpy, Pandas, Tensorflow
Development	HTML, CSS, Android Studio, Flutter, SQL, Django
Hardware Description	VHDL, 8081, 8086, C#

Key Courses Undertaken

Computer Science	Data Structures and Analysis, Logic for CS, Computer Programming and Utilization, Computer Networks*
Electrical Engineering	Analog Circuits, Digital Systems, Microprocessors, Probability and Random Processes, Foundations of VLSI CAD*, Intro to Number Theory and Cryptography*
Lab Courses	Digital Systems Lab, Microprocessors lab, Controls Lab*

* : *To be completed by December 2021*

Co-Curricular Courses

- **Machine Learning** MOOC by Stanford University on coursera.org *[Summer,2020]*
- **Neural Networks and Deep Learning** MOOC by deeplearning.ai on coursera.org *[Summer,2020]*
- **Git Course** from codecademy.com *[Summer,2020]*
- **Introduction to LaTeX** by Learner's Space, IIT Bombay *[May-June,2020]*

Extra Curricular Activities

- Engineered a **Remote Controlled bot** capable of negotiating different obstacles through a 100m long track
- Successfully completed a year long training programme in Lawn Tennis, organised by **National Sports Organisation**
- Assisted in scripting and production of a short film which stood **1st** in Freshiezza-2019 organised by **Silverscreen, IITB**
- Stood third in Physics Detective 2019, organised by **Math and Physics Club, IIT Bombay**