Durgaprasad Prakash Bhat | **200070017**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 18/9/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	Maharashtra State Board	Matoshri Junior College	2020	88.31%
Matriculation	Maharashtra State Board	New Era English School	2018	95.60%

Pursuing a minor in **Artificial Intelligence and Data Science** at IIT Bombay

Scholastic Achievements

- Holding **department rank 10** in B. Tech electrical engineering among **100+ students** *(present)*
- Awarded **AP** grades in the courses on **Complex Analysis** (MA205) and **Basic Biology** (BB101) *(2021)*
- Secured **AIR 774** in **JEE Advanced** exam amongst **0.15 million** candidates *(2020)*
- Earned the prestigious **Kishore Vaigyanik Protsahan Yojana (KVPY)** fellowship (SX Stream) award by The Department of Science and Technology, Govt. of India *(2019)*

Technical Projects

Approaches to waveform synthesis | Project *(May' 2022-present)*

Guide: Prof. Maryam Shojaei Baghini, Department of Electrical Engineering IIT Bombay

- Studied different approaches used for waveform synthesis such as **DDS, LUT, DSP libraries** etc.
- Developed firmware for **C5515 eZDSP** development kit to generate sine, square, triangular and sawtooth waves with a **resolution of 16Hz**
- Analysed various functional blocks in a **Digital Direct Synthesis** based waveform generator system
- Currently upgrading the firmware for a **custom-designed development board** for generating square, triangular and sawtooth waveforms with the **precise tuning of amplitude and frequency**

IIT Bombay Student Satellite Program *(Jun' 2021-present)*

A 70+ member student team dedicated to the vision of making IITB a centre of excellence in space technology

Star Tracker Based Attitude Determination System (STADS) | Electrical Subsystem

A CubeSat-compatible Star Tracker-based Attitude Determination System to be tested on-board the PS4-OP

- Researched on schematic and circuit designing for **high-speed circuits** and **multi-layer PCBs**
- Worked on designing various **development boards** for breakout and interfacing of ZYNQ 7000 **FPGA, Python 480 and OV 7670 optical sensors** and other ICs for component evaluation and integrated testing
- Analysed the feasibility of incorporating **Rigid-flex PCBs** in the system architecture to solve space constraints
- Implemented and tested the C code of the **attitude estimation** block of a 3-stage image processing pipeline on **AJIT**, one of India's **first indigenously developed microprocessor** onboard the Star Tracker System
- Working on interfacing the **Python480** Image sensor with **AJIT** for **Hardware-In-Loop Simulation**

Analog Circuit Design and Simulation using Cadence *(May'-Jun' 2022)*

Guide: Prof.Rajesh Zele, Dept. of Electrical Engineering IIT-B | Curriculum Oriented Research Experience 2022

- Worked on different aspects of Analog VLSI design process such as **schematic design**, DC, AC, transient, noise, PVT variation analysis, **layout**, parasitic extraction and post-extraction simulations in **Cadence**
- Designed the schematics of common source, common gate, common drain amplifiers and **differential amplifier**
- Designed the schematics and layout of a **ring oscillator** and compared its performance before and after layout

IITB-RISC-22, 16 Bit Microprocessor | Course Project *(Apr'-May' 2022)*

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

- Designed a **multicycle 16-bit**, 8-register microprocessor with a given **RISC-type** instruction set architecture
- Mapped out hardware flowcharts for each instruction and a suitable **datapath** along with an **FSM based controller**, memories, register file, ALU etc. and co-ordinated in a team of **four** to implement it in VHDL
- Devised the design for the 16-bit **6-stage, pipelined** RISC processor with branch prediction, **control and data hazard mitigation unit**, implementing 15 instructions and described it in VHDL in a team of 4

Microprocessors Lab | Course Project *(Aug'-Nov' 2021)*

Guide: Prof. Saravanan Vijayakumaran | Microprocessors Lab

- Interfaced a speaker with the **AT89C5131** development board and devised a algorithm in **assembly** using Keil uVision to generate music by exploiting its **timers and interrupts**
- Programmed the development board in embedded C to make a **interactive ATM emulator** taking inputs from a computer terminal using **UART** and displaying outputs and instructions using an **onboard LCD**

Digital design using VHDL | Course Project *(Aug'-Nov' 2021)*
Guide: Prof. M. Shojaei Baghini | Digital Circuits Lab

- Implemented an **FSM** based string recognizer to detect a specific word in input alphabet stream on Complex programmable logic device **CPLD** development board and displayed the detected result on **LCD display**
- Implemented **4-bit ALU** capable of computing **addition, concatenation, bit-wise XOR and multiply by 2** operations, simulated the design using ModelSim and tested the design on hardware using scan-chain

Winter in Data Science | Analytics Club *(Dec' 2021)*
Undergraduate Academic Council | IIT Bombay

- Studied **exploratory data analysis, data preprocessing, data visualization** and explored classification and regression ML models including **ensemble learning models**
- Explored **image classification** and **semantic segmentation** using convolutional neural networks

Traffic Signal Classification | Project *(Dec' 2021)*

- Implemented **LeNet-5** CNN architecture in **TensorFlow** to classify images of **43** different traffic signals
- Modified the architecture to reduce over-fitting by adding **batch regularization** and **dropout layers**

Computer Vision | Learners Space *(Jul' 2021)*
Institute Technical Council | IIT Bombay

- Developed the front end of a video-chat app to play webcam feed over a pre-recorded video, along with applying filters like **gray scale and blurred RGB Mode** using **OpenCV**
- Implemented **linear** and **convolutional neural network** followed by training and testing it using MNIST data-set to identify handwritten numbers from images using **PyTorch**
- Extracted **Sudoku puzzles** and its individual cells from images using open source libraries

IoT Irrigation system | DIY Projects *(Nov' 2021)*
Tinkerers' Laboratory | IIT Bombay

- Developed the set-up code for a remotely controlled irrigation system that uses **DHT11** humidity and temperature sensor in the **Arduino** environment, and implemented it on **ESP32 module**
- Integrated the code for **Blynk IoT platform**, for connecting the hardware to the cloud, designed a dashboard to control the hardware and analyze telemetry data obtained from the hardware

Positions of Responsibility

Subsystem Head | Electrical Subsystem *(Jun' 2021 - Present)*
IIT Bombay Student Satellite Program

- Executed a **three-stage** recruitment process to shortlist **six** students for the subsystem from **45+** applicants evaluating their **technical skills, practical approach and teamwork**
- Presented in a day-long workshop for equipping **120 participants** from 20+ colleges to set up a **ground station**
- Ensured implementation of the **Quality Assurance** practices in the subsystem to maintain reliability
- Secured **third position** in the Student design competition at **International Conference on Small Satellites** for presenting **Star Tracker Based Attitude Determination System (STADS)**

Technical Skills

Programming Languages	C++,Embedded C, Python, VHDL, Assembly, LaTeX,
Software	Quartus, Cadence, EAGLE, Keil uVision, Microchip Studios, Code Composer -Studio, LTspice, NGspice, Git, ROS, Gazebo, Android Studio
Hardware	Circuit designing, C5515 eZDSP, ATMega128, ESP32, 8051 uC
Frameworks	PyTorch, TensorFlow, Pandas, Seaborn, OpenCV

Key Courses

- **Electrical Engineering**: Analog Electronics (theory and lab), Microprocessors (theory and lab), Signal Processing I, Control Systems , Electronic Devices and Circuits, Digital systems, Power Engineering I and II
- **Data Science** : Introduction to ML, Computer programming in C++, Mathematical structures for Control

Extra-Curricular Activities

Satellite Tracking *(Aug' 2021)*

- Awarded multiple diplomas for successfully decoding **SSTV images** from **ISS** using **WebSDR**
- Successfully received **APT weather images** from **NOAA satellite** by online tracking

Competitions

- **National Stock Exchange FUNancial Quest season 6**: Finished **first in Nashik city** and competed **national semifinals** representing New Era English School among **14 teams** selected nationwide *(2017)*
- **Competition Promotion Society Olympiads**: Secured **Olympiad rank 8** in **General Knowledge Maestro Olympiad** and **Olympiad rank 18** in **Science Supremo Olympiad** *(2016)*

Sports

- Completed year long course on **general fitness** under **National Sports Organization** *(2020-21)*