Dhrumil Lotiya
Electrical Engineering
Indian Institute of Technology Bombay

21D070026
Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 03/01/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	CBSE	Krishna International School	2021	97.00%
Matriculation	CBSE	Delhi Public School	2019	98.60%

Pursuing a **Minor Degree** in **System and Controls**, IIT Bombay

Scholastic Achievements

- Secured **All India Rank 687** in **JEE Advanced** examination among **0.15 million** candidates nationwide *2021*
- Secured **All India Rank 654** out of **1.48 million** candidates in **JEE Mains** examination *2021*
- Achieved **100 percentile** in **Physics** and **Maths** in JEE Mains attempt all over the country *2021*
- Scored **97 percentage** in the **All India Senior School Certificate Examination AISSCE** by CBSE *2021*
- Received **AA grade** in **Control Systems** (EE 302), **Physical Chemistry** (CH 107), **Differential Equations II** (MA 207), **Economics** (HS 101) and **Power Engineering Lab** (EE240) courses *Nov'21-Present*

Key Projects

Design Engineer | IIT Bombay Racing *[July'23 - Present]*

A cross-functional team of 100+ students which designs, fabricates and assembles an Electric Race Car for Formula Student UK, an international students' race car designing competition organized by IMechE

- Conducted thorough research to explore and develop an algorithm for the **Space Vector Pulse Width Modulation (SVPWM)** switching technique, for optimal performance and precision in an **IGBT module**
- Will be performing comprehensive **testing and validation of a gate driver board** designed to control an IGBT module for **motor power applications**, ensuring optimal performance of the power electronic system
- Planning to **implement and rigorously test** the developed algorithm on a **Control Card** to evaluate the performance and effectiveness of the SVPWM switching technique using **diverse input signals**
- Targeting to develop a **self-controlled motor** by **developing** and at the same time **testing** the code from **scratch** for **field-oriented control (FOC)** to ensure smooth functioning of the motor

Junior Design Engineer | IIT Bombay Racing *[July'22 - July'23]*

- Built a schematic for **Gate Driver** board that drives the **IGBT** module used for inverting power
- Learned how to comprehend **FOC** for motors and ran **simulations on simulink** to verify its functioning
- Implemented **PID Control** for motor using **MATLAB** and then extended it to create a **closed-loop system** for **torque control** in motor and tested it by using **Code Composer Studio** software
- Designed a comprehensive **GLV (Grounded Low Voltage) protection circuit**, a critical component for ensuring the smooth operation of an **electric automobile**, using **LTspice** simulation software
- Responsible for selecting components such as **IGBTs and Current Sensors** for the subsystem, involving detailed analysis of **datasheets** and thorough consideration of motor's **current and voltage requirements**

Inertial Stabilised Platform, IdeaForge *[June'23 - Present]*

Research Project | Prof. Debraj Chakraborty

- Derived system characteristics from **vibration data**, such as **Bode diagram** with magnitude and phase plot
- **Reviewed the research paper** on Direct vs Indirect Line of Sight Stabilisation of the **two-axis gimbal camera**
- Finding the range of frequencies affected by vibration,from **Bode Plot** and then designing a **compensator** with appropriate gain and phase margin to reject **inner gimbal disturbance spectrum**

IITB RISC *[Jan'23 - April'23]*

Course Project | Prof. Virendra Singh

- Applied **Microprocessor Design** concepts to design a basic **multi-cycle RISC** microprocessor which has an instruction set architecture of 26 instructions such as **ADD, ADC** among other basic operations
- Implemented a **Six-staged Pipeline design** and optimized the processor efficiency by incorporating the **Data Forwarding** and mitigating the Data Hazards by utilising **Stalling techniques** in **VHDL**
- Developed a scaled-down version of the **Intel 8085** microprocessor, Mini-8085, utilizing **hardware flow chart** method and a microcode-based architecture with a **control store (CS)** for storing encoded the control signals.

Simulation and Implementation of Analog Circuits *[Jan'23 - April'23]*

Course Project | Prof. Anil K. G.

- Designed and simulated **logarithmic amplifier** on **NGSpice** and implemented on TL084 Quad Op-Amp
- Implemented the designed circuits to test the results using various **ICs** and other components
- Simulated and implemented various analog circuits like instrumentation amplifier, **active and passive filters**, Schmitt trigger, astable multivibrator and monostable multivibrator using **NGSpice** software

Working with 8051-Based Microcontroller *[Jan'23 - April'23]*

Course Project | Prof. Saravanan Vijayakumaran

- Proficiently programmed the **Intel 8051** based **Pt-51** microcontroller, employing both **Assembly and Embedded C** languages to develop advanced **embedded systems** with robust functionalities
- Implemented **keyboard interfacing** and **LCD display** functionalities while also utilizing **timers** and **external interrupts** in addition, to develop components such as a **stopwatch** and **musical notes**
- Interfaced analog to digital converter MPC3008 using **SPI** and keyboard using **UART and RealTerm software**

Designing and Simulating Combinatorial and Sequential Circuits *[July'22 - Nov'22]*

Course Project | Prof. Maryam Shojaei Baghini

- Developed **String Detector** using **Mealy-type FSM** to identify sub-sequences within input letter sequences
- Designed and implemented a range of **digital circuits**, including a 4-bit Adder Subtractor, Decoder, 4-bit Multiplexer, Fibonacci sequence detector, Universal Shifter, **Sequential circuits**, and Finite State Machines
- Designed a **Moore type Finite State Machine** (FSM) which acts as a 6-bit sequence generator in **VHDL**
- Utilized the **Scanchain technique** for testing, successfully **verifying up to 1000 test cases** within seconds

Position of Responsibility

Student Mentor | Summer of Science *[May'23 - July'23]*

Summer of Science is a scientific learning project initiative | Maths and Physics Club

- Mentored **first and second year students** in their project exploring the topic of **Control Theory**
- Provided mentees with **regular assistance** and resources to learn, as well as **insights** on various topics
- Aided mentees in their project by **evaluating** their understanding and **checking** their progress periodically

Technical Skills

Programming	C++, C, Python, VHDL, Assembly, NGSpice, Java, Octave, LaTeX, MATLAB
Software Tools	Arduino IDE, Git, Quartus Prime, AutoDesk Eagle, LTSpice, Keil, GNURadio
Libraries	Matplotlib, NumPy, Pandas, PyGame, OpenCV, Seaborn, Scipy

Courses Undertaken

Core	Digital Systems, Microprocessors, Signal Processing -1, Signals and Feedback Systems, Analog Circuits, Probability and Random Processes, Power Engineering, Electronic Devices and Circuits, Control Systems, Digital Systems Lab, Analog Lab, Microprocessors Lab, EM Waves*, Communication Systems - 1*, Communications Lab*, Electronic Devices Lab*
Mathematics and Physics	Calculus, Linear Algebra, Differential Equations, Complex Analysis, Quantum Physics and Application, Basics of Electricity and Magnetism, Mathematical Structures for Control
Interdisciplinary Courses	Engineering Graphics and Drawing, Economics, Computer Programming and Utilization, Planetary Sciences : Earth & Beyond, Biology

** To be completed by Nov 2023*

Extracurriculars

- Mentored **SoS** students by aiding them with resources for understanding **Cosmology and Dark matter** *2023*
- Successfully completed the 2-semester National Sports Organization (NSO) course for **Basketball** *2022*
- Working on **Option Pricing Models and their Accuracy** project under Finsearch by Finance Club *2023*
- Engaged in the **Powai lake Cleanup & Awareness Campaign** by Abhyuday, IIT Bombay *2022*
- **Coordinated** on-ground operations and ensured seamless event execution at **Mood Indigo** *2022*
- Passed **IAIS**(International Asssessment for Indian Schools) conducted by **UNSW Global** with distinction *2018*
- Holder of **NCC A Certificate**, attesting to the successful completion of rigorous training *2017*
- Emerged victorious, securing **1st position** in **State-level** Group Dance on Skates competition *2014*