Atharva Raut | **190070050**
Electrical Engineering | **UG Third Year**
Indian Institute of Technology, Bombay | **Gender: Male**
Specialization: Integrated Circuits and Systems | **DOB: 14-10-2001**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	Maharashtra State Board	Shri T P Bhatia College of Science	2019	91.08%
Matriculation	Maharashtra State Board	John XXIII High School	2017	98.00%

Pursing **Minor** in **Computer Science and Engineering**

SCHOLASTIC ACHIEVEMENTS

- Achieved an All India Rank of **296** in **JEE Advanced** among 200,000 candidates *('19)*
- Achieved an All India Rank of **105** in **JEE Main** among 1 million candidates *('19)*
- Achieved an All India Rank of **81** and received the prestigious **KVPY fellowship** (SX Stream), held by the **Department of Science and Technology, Government of India** *('19)*
- Successfully cleared National Standard Examinations in Physics, Chemistry and Astronomy and qualified for **Indian National Olympiads (INPhO, INChO and INAO)** *('19)*
- Recipient of the **National Talent Search Examination (NTSE)** Scholarship held by the **National Council of Educational Research and Training** *('17)*

TECHNICAL EXPERIENCE

IIT Bombay Racing

*A cross functional team of **80+ students** which designs, fabricates and assembles an Electric Race Car and represents the institute in **Formula Student UK**, an international students' race car designing competition organized by IMechE*

Design Engineer (May '21 - Present)

- Constructed and simulated **Simulink** model for Field Oriented Control of Permanent Magnet Synchronous Motors **(PMSM)** as a part of the Design Team aimed at building a custom 2-wheel drive **Motor Controller**
- Represented the team in **FSEV Concept Challenge 2021** and worked on the Software Integration Report
- Working in the Controls subsystem towards designing PCB and code for the Motor Controller

Junior Design Engineer (Sep '20 - Apr '21)

- Worked in the **High Voltage Safety** (HVS) subsystem to implement and improve circuits to safely supply maximum **200A at 400V** to motors, while ensuring safety of personnel and compliance with standardized guidelines
- Formulated circuit design tasks for training and mentored **6** trainees in learning the basics of the subsystem
- Improvised design of Precharge board by implementing a **compact and power efficient** circuit for 60V Indicator
- Designed schematic and PCB for filtering circuit to **mitigate switching noise** from DC/DC Converter using **common-mode and differential LC filters** attaining more than **70dB** attenuation at switching frequency

Arithmentic and Logical Unit Design | Digital Design (Autumn '20)

Guide: Prof. Virendra Singh, Course Project: Digital Systems

- Designed an Arithmetic and Logical Unit (ALU) to carry out Addition, Subtraction and bitwise logical operations on 16-bit signed integers with **Structural Description in VHDL**, using Quartus Prime software
- Implemented a **Kogge-Stone Fast Adder**, improving performance and speed by **4x** over basic Ripple-Carry Adder
- Tested design with a generic testbench in **ModelSim**, over random inputs generated using a C++ code

Tetris | Microcontroller Programming (Spring '21)

Guide: Prof. Rajbabu Velmurugan, Course Project: Microprocessors Laboratory

- Designed and tested C code for implementation of the game Tetris on an **8051** microcontroller based development board interfaced with a 16x2 7-segment LED display and controlled through PC via UART module
- Utilized **Interrupts and Timers** for block movement, **Linear-Shift Feedback Register** for psuedo-random block generation, serial communication using UART for commands and interfacing with LED for display

CMOS Folded Cascode Amplifier | Analog Design (July '21)

Self-learning Project, CMOS Schematic and Layout Design

- Designed the schematic and layout for a Fully Differential, Rail-to-rail, High Swing, Folded Cascode **Operational Transconductance Amplifier**, in **0.6μm MOSIS CMOS technology** using **Electric VLSI Design System**
- Incorporated proper design practices to minimize mismatches including Unit Cell Design, Common Centroid Layout, Current Mirrors and verified layout using basic simulations in **LTspice**, attaining a differential gain of **50dB**

Scaling Law in ONNs for solving TSP | Neuromorphic Systems (Autumn '21)

Guide: Prof. Udayan Ganguly, Course Project: Meuromorphic Engineering

- Reviewed and simulated the implementation of an N-oscillator energy function for solving the NP-hard Travelling Salesman Problem using an Oscillatory Neural Network, based on Neuromorphic hardware
- Observed the scaling in time over increasing problem size using MATLAB simulations

Comparative Analysis of Face Recognition Techniques | ML (Spring '21)

Guide: Prof. Abir De, Course Project: Introduction to Machine Learning

- Conducted a comparative study of Machine Learning models and techniques for facial recognition on a subset of **Yale Extended B Dataset**, with **2470** grayscale images of 39 subjects under varying lighting conditions
- Tested different ML models including **Logistic Regression**, **SVM**, **Feed-forward Neural Network** and **CNN**, along with feature extraction through dimensionality reduction using **Principle Component Analysis(PCA)**
- Achieved a maximum classification accuracy of **98%**, as compared to the global best of 99.2%

Lab Projects | Introduction to Electrical Engineering Practice (Autumn '19)

Guide: Prof. Joseph John

- ***Regulated DC Power Supply***: Assembled a 5V and 12V Supply from 230V_{AC} on a PCB and Prototype Box using Bridge Rectifier with Capacitive Filter and output regulation using LM7805 and Zener Regulator Circuit
- ***Digital Counter for Object Sensing***: Implemented circuit for interfacing Flip-flop based **BCD Counter** to 7-segment decoder and 7-segment display and integrated with LED-IR detector pair for **Object sensing**
- ***Power Inverter***: Designed and tested circuit for **High Voltage AC generation** from a Low Voltage DC power supply, with a 50 Hz Power Supply Inverter implemented using 555 Timer, BJT and step-up transformer

POSITIONS OF RESPONSIBILITY

Convener | Web and Coding Club (Apr '20 - Apr '21)

Institute Technical Council, IIT Bombay

- Selected among **8 out of 100+** applicants for a team organizing and coordinating events for one of the **largest programming clubs** in India, aimed at promoting programming culture among aspiring students
- Contributed towards compilation of an exhaustive resource repository for initiatives like **Code in Quarantine** and **Algorithms Simplified** by writing articles on **jQuery** and **Shortest Path Algorithms**
- Prepared course content and graded assignments on HTML, CSS, JavaScript and Django, for the Web Development Course in Learners' Space '20 and mentored **300+ students**, in building a Personal Website

Teaching Assistant | Computer Programming and Utilization (Autumn '20, Autumn '21)

CSE Department, IIT Bombay

- Mentored and guided first-year undergraduate students, in an introductory course to programming in C++
- Responsible for grading projects, lab assignments and helping students learn the fundamentals of programming
- Volunteered for ExCeL sessions to conduct lectures and doubt discussions in regional languages

KEY COURSES TAKEN

Analog and Digital	Analog Circuits, Electronic Devices and Circuits, Digital Systems, Microprocessors, RF Microelectronic Chip Design*, Neuromorphic Engineering, Nanoelectronics*, Processor Design*
Signals and Controls	Signal Processing I, Control Systems, Communication Systems, Electromagnetic Waves, Controls Lab, Digital Signal Processing*
Computer Science	Discrete Structures, Introduction to Machine Learning, Computer Networks, Logic for CS, Data Structures and Algorithms*
Statistics and Mathematics	Probability and Random Processes, Differential Equations, Complex Analysis, Multi-variable Calculus, Linear Algebra

** to be completed by April '22*

MISCELLANEOUS

- Secured **1st position** in an in-class **Kaggle Competition**, among **80** students, for predicting prices of pre-owned automobiles, using **Feature Engineering** and **Linear Regression** *('21)*
- Secured a position in **top 10** in **RC Plane competition** organised by Aeromodelling Club, IITB *('19)*
- Designed a **Bluetooth Controlled bot** and competed in **XLR8** by ERC Club, IITB *('19)*
- Worked as **Organizer** for **Techfest**, Asia's largest Science and Technology Festival organized by IITB *('19-'20)*
- Completed a rigorous course on **Financial Modelling**, covering **DCF and LBO analysis**, conducted by Finance Club, IITB under Learners' Space by Undergraduate Academic Council *('20)*
- Completed a two semester course for **Aquatics** under **National Sports Organisation (NSO)** *('19-'20)*