Keshav Maheshwari | **22B3951**
Electrical Engineering | **Dual Degree (B.Tech. + M.Tech.)**
Indian Institute of Technology Bombay | **Gender: Male**
Specialization: Microelectronics and VLSI | **DOB: 27/08/2004**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2027	
Intermediate	CBSE	Ryan International School Kandivali	2022	97.00%
Matriculation	CBSE	Ryan International School Kandivali	2020	96.80%

Pursuing a **Minor** degree in **Management** from *Shailesh J. Mehta School of Management, IIT Bombay*

Scholastic Achievements

- Secured **All India Rank 575** in *Joint Entrance Exam* ***(JEE) Advanced*** among **150k+ candidates** *('22)*
- Obtained **All India Rank 869** in ***(JEE) Mains*** with **99.91%ile** score among **1 million+** candidates *('22)*
- Achieved **AIR 122** in **KVPY** SA and was awarded the fellowship in both **SA** and **SX** categories *('21,'22)*
- Ranked among **State top 1%** in **Physics** and qualified **Astronomy** Olympiad organised by **IAPT** *('22)*
- Recipient of **National Talent Search Examination (NTSE)** scholorship of **Govt. Of India** *('20)*

Professional Experience

University Research Intern | *Technische Universität Braunschweig,* ***Germany*** *(May'24-Jul'24)*

A ***3-month on-site internship*** *under* ***Prof. Andreas Waag*** *in the field of* ***nanometrology research***

- Contributed to research by applying proficiency in **KiCAD** for **PCB designing**, leading to the successful **printing, soldering**, and **testing** of the **PCBs** used in optical neuromorphic computing (ONC) setup

Neuron Circuit PCB:

- Designed a neuron circuit for **current amplification** using two-diode array, **Darlington circuit** & BJTs
- Incorporated **photodiodes** for signal input and **digital potentiometers** for **digital resistance control**

Controller PCB:

- Engineered a **multi-layer PCB**, leveraging a 5V USB power source, **boost converter** for ±12V output, and linear regulators with **SPI-controlled** digital potentiometers and **ESP32** mounted to control the setup

Fundraising Intern | *Samagra Foundation* *(Jun'23-Jul'23)*

- Created a **pitch deck** to gather sponsors with a budget of **INR 0.5+ mill,** attended by over **500+ people**
- Reached out to **50+** companies via **Direct Marketing** & used communication skills to pitch to professionals

Consulting Intern | *Ankur Pratishthan* *(Jul'23-Aug'23)*

- Studied the learning patterns of **underprivileged kids** and suggested changes in **10+** pre-existing modules
- Incorporated **practical exercises** & new **experiments** to **curate learning modules** for school children

Key Projects

Laptop-based Portable DSO | *Self Project* *(May'23-Jul'23)*

- Designed and engineered a portable *Digital Storage Oscilloscope* **(DSO)** tailored for **on-the-go testing** on laptops, featuring a customized **isolation circuit** to safeguard input signals & printed **PCB** for the same
- Incorporated **Bluetooth technology** for isolation & a Python-based **(GUI)** for **waveform visualization**

Discrete Analog Circuit Design | *Course Project, Analog Lab* *(Jan'24-Apr'24)*

Guide: Prof. Sandip Mondal, Dept. of Electrical Engineering

Analog Electro-Cardiogram Circuit:

- Designed an ECG amplifier with a **50Hz notch filter** and amplification stages, utilizing **Low Noise** amplifiers with feedback, improving performance and captured **real-time ECG** signals on a **DSO** for analysis
- Refined ECG amplifier with **right leg drive** & **advanced filtering sections**, reducing noise & interference
- Also applied **Butterworth** filters and **Chebyshev** filters using **Sallen-Key Topology** to **reduce** the **noise**

Square root Amplifier circuit:

- Designed **square root amplifier** circuit using log and anti-log stages calibrated with **diode characteristics**
- Performed detailed **simulations in LTSpice** to **optimize performance** and validate the **circuit behavior**

State Variable Filter | *Self Project* *(Jun'24-Jul'24)*

- Engineered a **universal filter** having low-pass, high-pass, band-pass, notch-pass & all-pass output responses
- Designed a **PCB** incorporating **three distinct high-Q filters** to be used for **filter pinging** in **signal processing** to test and measure the performance of different filter types under **varying conditions**

Pipelined Processor Design | *Course Project, Microprocessors* *(Apr'24-May'24)*

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

- Prototyped and designed a **6-stage pipelined RISC processor** capable of executing **26 instructions**
- Implemented custom blocks such as **Register Files, ALU, Pipeline Registers, Memory** along with **Data Forwarding** and **Hazard Detection** functional units to handle edge cases, in **Intel Quartus** software
- Employed a **1-bit Branch Predictor** with **Least Recently Used** replacement to improve performance
- Verified designs by conducting **RTL simulations** in a **ModelSim environment**, and subsequently, **implemented** them on a **FPGA Board** by mapping inputs and outputs to physical ports using Pin Planner

Digital Signal Processing using 8051 Microcontroller | *Course Project* *(Apr'24-May'24)*

Microprocessors Lab, Prof. Nikhil karamchandani, Dept. of Electrical Engineering

- Implemented a **Low-Pass Digital FIR Filter**, determined filter coefficients using **SciPy**, captured input voltage through an **ADC** and transmitted processed data through **serial transmission** using **PySerial**
- Utilized **8051-Assembly** and **Embedded C** with **Kiel & Flip** to program and **test** on Pt-51 board.
- Configured **hardware timers, interrupts, SPI & UART protocols** and interfaced with **peripherals** like Keyboard, Analog to Digital Converters, Temperature Sensors, LCD Displays, Keypads and speakers

Combinatorial and Sequential Circuits | *Course Project, Digital Circuits Lab* *(Sep'23)*

Guide: Prof. Siddharth Tallur, Dept. of Electrical Engineering

- Learned **Structural** and **Behavioral modeling** with **VHDL**(Hardware descriptive language) on **Quartus**
- Designed a **four-bit adder subtractor**, Fibonacci number detector, **Arithmetic Logic Unit** , decoder, multiplexer, and a **BCD adder** along with the verification of the designs through **RTL simulations**

Positions of Responsibilities

Assistant Manager & Electrical Trainee | *IIT Bombay Racing* *(Jan'23-Jun'24)*

*A team of **80+** students that designs and fabricates **electric** Formula style **race car** to compete in int'l events*

- Led **research & content preparation** for Business Plan Presentation at **Formula Student Austria** '24
- **Co-presented** the Business Plan Presentation for Formula Student '23 as the **only sophomore** in the team
- Gained hands-on experience in **analog component** understanding and **circuit design**, including functional circuits like **555-IC**, while honing skills in **circuit simulation** using *LTSpice* and **PCB design** using *Eagle*

Department Academic Mentor | *Electrical Engineering & SMP, IIT Bombay* *(May'24-Present)*

*Selected among **34** students out of **176** applicants after rigorous procedure of SoP, peer reviews and interviews*

- Mentoring **12 sophomores** in their **academics** and co-curriculars & easing student-faculty **communication**
- Streamlined & improved **student-faculty communication** and wrote course reviews for junior students

Convener, Analytics Club | *Undergraduate Academic Council* *(May'23-Apr'24)*

*Selected among **200+** students after rigorous interviews, catering to over **5000+** students in Analytics domain*

- Spearheaded a **Pan-IIT** Hackathon, **raising cash sponsorships** of **INR 600k+** from **IDFC First Bank**
- Led a project series in DS, onboarding **80+ projects** with a reach of **1K+** achieving a **40% y-o-y increase**
- Raised sponsorships worth **INR 200K+** from **AlgoBulls** for a trading hackathon with **750+** registrations

Technical Skills & Key Courses

- **Languages and Libraries:** C/C++, Python, CSS, HTML, VHDL, NumPy, Pandas, MatplotLib
- **Softwares:** LaTeX, Kiel, KiCAD, Eagle, LTSpice, Quartus Prime, AutoCAD Fusion360, MS Office, Canva
- **Electrical Engineering:** Analog Circuits, Analog Lab, Microprocessors, Microprocessors Lab, Digital circuits lab, Control systems, Signal Processing, Digital Logic Design, Probability and Random Processes
- **Other Courses:** Introduction to C, Calculus I, Calculus II, Linear Algebra, Differential Equations

Extracurricular Activities

Sports	• Awarded a **Gold medal** in **IITB freshiesta** weekend in **Tennis** mixed doubles *('23)* • **Selected** among **1000+** freshers for training in **Lawn Tennis** under NSO, IITB *('22-'23)* • Part of **15-membered** Kho-Kho team competing in **inter-school** sports meet events *('17-'18)*
Academic	• Completed the LearnerSpace course in **Management, Business Dev. & Consulting** *('23)* • Cleared **stage-1** of AlgoSwarm, an **algo-trading hackathon** hosted by Quanthive *('23)* • Participated in **Bona Concilia Challenge**, a national level **strategy case** competition *('20)*
Misc.	• Participated in **Main Dramatics hostel GC** representing H2 and secured 2nd place *('23)* • Constructed a **Radio controlled Plane** & a **Joystick controlled bot** from scratch *('23)* • **Conducted** weekly English proficiency classes for **3 tutees** as an **ELIT TA** *('24)*