



**Kunal Randad**  
**Electrical Engineering**  
**Indian Institute of Technology Bombay**

**20D070049**  
**Dual Degree (B.Tech. + M.Tech.)**  
**Gender: Male**  
**DOB: 18/5/2002**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	
Intermediate	CBSE	Ryan International School Kandivali East	2020	94.40%
Matriculation	CBSE	Ryan International School Kandivali East	2018	96.60%

## SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 629** out of 0.15 million candidates in **JEE ADVANCED**. **2020**
- Awarded fellowship under **KVPY** by securing **All India Rank 61**. **2020**
- Awarded **Scholarship** under **Middle School Scholarship exam (Maharashtra Govt.)** **2012**
- Achieved **99.967 percentile** in **JEE MAINS 2020** amongst 1.02 million+ students. **2020**
- Secured **National Rank 18** in National Level Talent Search Examination (**NSTSE**). **2019**
- Awarded **Certificate of merit** and **National Top 1%** in **National Standard Exam** in **Astronomy (NSEA), Chemistry (NSEC)** as well as **Physics (NSEP)**. **2019**
- Qualified and appeared for **INChO** (Indian National Chemistry Olympiad), **INPhO** (Indian National Physics Olympiad), and **INAO** (Indian National Astronomy Olympiad). **2020**
- Pursuing a minor in **System and Controls**. **Ongoing**

## KEY PROJECTS

### Propulsion Subsystem Head

**October 2021 - Ongoing**

*Hyperloop Tech Team | IIT Bombay*

- Read multiple documentation and research papers on Linear Induction Motor for Hyperloop.
- Designing a **Linear Induction Motor** system that produces lift as well as thrust at a large range of speeds and simulating the **LIM** in **COMSOL** to get maximum thrust at given speed.

## COURSE PROJECTS:

### EE 337: Microprocessor Laboratory

**Jan 2022 - April 2022**

*Prof. S Vijayakumaran, IIT Bombay | Course project*

- Simulated and debugged Assembly and C-language programs using Keil  $\mu$ vision IDE.
- Used **Keil uVision5** for programming **Pt-51 board** based on **Atmel AT89C51** microcontroller.
- Interfaced **LM35** using **ADC MCP3008** and SPI with Pt 51 board to **obtain real time temperature** readings via a **16x2 LCD Display** on the Pt 51 board.
- Generated **musical notes** as **square waveforms** of given frequencies and played it on speaker interfaced with Pt-51 board.

### EE 23O: Analog Laboratory

**Jan 2022 - April 2022**

*Prof. Anil K.G, IIT Bombay | Course project*

- Simulated the designs of various types of **integrators, differentiators, band-pass filters, thermistors** and **Schmidt triggers** and plotted their characteristics using **Ngspice** and **Python**.
- Built an **instrumentation amplifier** using **TL084 IC** as well as **implemented** the instrumentation amplifier using **INA128 IC**. Used both the amplifier to **amplify output from load cell sensor**.

### Digital Logic design in VHDL

**July 2021 - Nov 2021**

*Prof. Maryam Baghini, IIT Bombay | Course project*

- **Optimised combinational circuits** and **programmed** them using **structural VHDL**.
- Designed **structural architecture** for **Adder-Subtractor, Vowel detector, Multiplexers** by using basic logic gates and performed simulations on **Quartus** and **CPLD board**.
- Wrote structural and behavioural description of **3-bit** and **4-bit sequence generator** using behavioural description of **D Flip Flop** and verified design by using **RTL, Gate level simulations** and **CPLD board** using **scanchains**.

## Multi-cycle processor IITB-Proc

April 2022

Prof. Virendra Singh, IIT Bombay | Course project

- Designed a **16-bit RISC microprocessor** with 17-instruction ISA and 8 registers in VHDL.
- Developed the flowcharts and data-path for **single** and **multicycle models** from scratch.
- Implemented the design on Quartus and utilised data forwarding and stalling techniques in **six staged pipelined microprocessor** for obtaining perfect cycles per instruction ratio as near to unity as possible and to prevent data hazards.

## SELF LEARNING PROJECTS FOR ML:

### Image Segmentation *Self project*

June 2022

- Implemented configured **U-Net** in using **keras** to perform **semantic segmentation** and trained it on drone image dataset from Kaggle.com for **pixel-wise labelling** of image into 23 classes.
- Achieved a **Jaccard Index** of **0.5538** as an accuracy measure on the training dataset.

### Melody Generation Using RNN *Self project*

July 2022

- Modelled a **LSTM** network using **keras** and **music21**, trained it on different types of Western music and **generated melodies**.

### Deep Learning Bootcamp – Graded Challenge *by DPHI and Analytics Club, IIT Bombay*

June 2022

- Developed a CNN to classify images as per weather in it with **88% accuracy** on test data.
- Performed **data augmentation** in-order to increase size of training set and increase accuracy.

## KEY COURSES UNDERTAKEN AND OTHER TECHNICAL SKILLS

<b>ELECTRICAL ENGINEERING</b>	Power Electronics, Probability and Random Processes, Analog Circuits, Signal Processing-1, Digital Systems, Electric Devices and Circuits, Analog lab, Power Engineering 2, Power Engineering Lab, Control Systems, Microprocessors, Microprocessors Lab, Matrix Computations, Communication Systems-1*, Communication System Lab*, EM Waves*, Control System lab*, Electronic Devices lab*
<b>MATHEMATICS</b>	Calculus-1,2, Complex Analysis, Linear Algebra, Differential Equation-1,2
<b>PHYSICS</b>	Quantum Physics and Applications, Electricity and Magnetism
<b>SYSTEM AND CONTROL</b>	Mathematical Structures for Control, Signals and Feedback Systems, Linear and Nonlinear Systems*
<b>OTHER COURSES</b>	Economics, Engineering Graphics and Drawing, Organic and Inorganic Chemistry, Physical Chemistry and Biology
<b>PROGRAMMING LANGUAGE, SOFTWARES AND LIBRARIES</b>	C++, Python, MATLAB, VHDL Quartus, NG Spice, COMSOL Multiphysics, GNU Radio, Simulink Open CV, Tensorflow.keras, music21, sklearn

*Courses marked \* would be completed in 5th semester in Autumn 2022*

## EXTRA CURRICULAR ACTIVITIES

- Achieved 2<sup>nd</sup> rank in inter hostel SciComp Blitz GC (competitive coding competition).
- Loves physical activity in form of gym or sports including football, volleyball and swimming.
- Gold medal in Second in-house Tournament organised by The Chess Academy.
- Participated in **4 days TEEN CAMP** by Ryan International School held at **The Deltin, Daman** where competitions were held in dance, sports, etc for all round personality development.
- Completed 80+ hours of mandatory volunteering service in the Green Campus Department of NSS, IIT Bombay.