Aayush Rajesh | **200070001**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 2/5/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	9.81
Intermediate	CBSE	Delhi Public School, Navi Mumbai	2020	97.80%
Matriculation	CBSE	Delhi Public School, Navi Mumbai	2018	98.00%

Pursuing Minor in **Computer Science and Engineering**

Scholastic Achievements

- Currently ranked **4th** among **103** students enrolled in B.Tech Programme of the EE Department *(2022)*
- Among the top **20** out of **1356** students to be awarded the **Institute Academic Prize** 2020-21 for academic excellence in freshman year *(2021)*
- Secured **All India Rank 78** in **JEE Advanced** out of 150 thousand candidates *(2020)*
- Achieved **All India Rank 115** in **JEE Main** out of 1 million candidates *(2020)*
- Attained **All India Rank 677** in **Kishore Vaigyanik Protsahan Yojana (KVPY)**, Stream SX, conducted by the Department of Science and Technology, Government of India and granted fellowship *(2020)*

Research Experience

Information-Theoretic Cryptography
May 2022 - Present

Tata Institute of Fundamental Research, Mumbai — *Prof. Vinod Prabhakaran*

Worked on information-theoretic cryptography, specifically the analysis of 3-party **multi-secret sharing** schemes over binary functions, which is similar in setting to the multi-party computation problem

- Conducted a **literature review** to study the basic information-theoretic tools required in analysis
- Worked out the optimal lower bound on **randomness complexity** of secret sharing for candidate functions
- Searched for secret sharing schemes, under the constraints of **privacy** and **correctness**, with upper bounds on randomness complexity, matching the calculated lower bounds
- Analysing the complexities under modified settings of the original problem

Projects Undertaken

CISC and RISC Processor Design
January 2022 - May 2022

Course Project | EE309 - Microprocessors — *Prof. Virendra Singh*

- Developed an on-paper design of a microcoded **CISC Processor** using Hardware Flowchart Method
- Designed and implemented a 16-bit multicycle **RISC Processor** in **VHDL** with a Turing-complete instruction set architecture of 17 instructions
- Extended the design to a 6-stage **pipelined** architecture and tested both architectures on an **Altera MAX V** CPLD
- Optimized performance of pipeline by introducing **hazard mitigation** techniques such as **data forwarding**

Digital Circuit Design
July 2021 - November 2021

Course Project | EE214 - Digital Circuits Lab — *Prof. Maryam Shojaei Baghini*

- Simulated basic combinational circuits using both structural and behavioral descriptions, such as **Multiplier**, **Adder-Subtractor**, and an **Arithmetic Logic Unit** on Quartus software using VHDL
- Created a logical representation of an **ATM Machine**, capable of specifying number of smaller denomination currencies in order to comprise an amount given as input through a CPLD Board
- Built upon the concept of **finite state machines** to design a sequential **String Detector** capable of recognizing and displaying a specific string on an LCD

Microprocessor Implementations *January 2022 - May 2022*
Course Project | EE337 - Microprocessors Lab *Prof. Saravanan Vijayakumaran*

- Implemented a **reaction timer** capable of displaying the time it takes for the user to respond to a stimulus
- Interfaced LM35 sensor with the microcontroller using an ADC, through **serial peripheral interfacing** to monitor and display real-time ambient temperature
- Developed a subroutine capable of generating voltage waveforms corresponding to **music note frequencies**, which can play music when connected to an **audio driver circuit**
- Simulated a **two-party ATM** capable of taking action inputs from a keyboard using **UART**

Lasso Game *January 2021 - March 2021*
Course Project | CS101 - Computer Programming and Utilization *Prof. Bhaskaran Raman*

- Used **C++** to program a Lasso game, involving catching projected objects using a key-controlled lasso
- Introduced several features to enhance gameplay, making use of **object oriented programming**
- Displayed the game window with the lasso, all moving objects, total score, life count and level number, using **simplecpp** and its associated graphics function **initCanvas**

Key Positions Held

Department Academic Mentor *June 2022 - Present*
Department of Electrical Engineering

- Selected from among **100+ applicants** on the basis of interviews and extensive peer reviews
- Mentoring **6** sophomores in the department and guiding them in managing their academics and extracurriculars

Teaching Assistant *Autumn 2021, Spring 2022*
MA109 - Calculus I *Prof. Sourav Pal*
MA106 - Linear Algebra *Prof. Sivaramakrishnan*

- Academically mentored a batch of **40+ students** over the duration of their introductory mathematics course
- Conducted weekly **problem solving sessions** in an online format and ensured personal interactions to provide clarity in content and clear conceptual doubts

Technical Skills

Languages	C++, Python, VHDL, Assembly, MySQL
Software	Quartus, Keil μVision, MATLAB, Ngspice, LaTeX

Key Courses Undertaken

Electrical	Communication Systems*, EM Waves*, Electronic Devices and Circuits, Control Systems, Power Engineering, Microprocessors, Markov Chains and Queuing Systems, Digital Systems, Signal Processing, Analog Circuits, Probability and Random Processes
Computer Science	Data Structures and Algorithms, Logic for Computer Science, Computer Programming and Utilization
Mathematics	Calculus, Linear Algebra, Differential Equations, Complex Analysis

** To be completed by November, 2022*

Extracurriculars

- Completed one year of **Chess** training under **National Sports Organisation, IIT Bombay** *(2020-21)*
- Stood **first** in **Bazinga Physics** organized by Math and Physics Club, IIT Bombay *(2021)*
- Achieved **second place** in **Astromania** organized by Krittika - The Astronomy Club, IIT Bombay *(2021)*