Avaneesh Sai Subramanyam | **210070015**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 28/05/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	8.06
Intermediate	CBSE	The Indian High School	2021	97.60%
Matriculation	CBSE	The Indian High School	2019	96.60%

Pursuing a minor in **Computer Science** and honours in **Electrical Engineering**

Scholastic Achievements

- Secured **a percentile of 99.37** in **JEE Advanced** among 0.26 million candidates *2021*
- Achieved **a percentile of 99.60** in **JEE Main** out of 1.2 million candidates *2021*
- Recipient of the Kishore Vaigyanik Protsahan Yojana **(KVPY) Fellowship** *2021*
  granted by the **Department of Science and Technology, Government of India**
- Awarded Certificate of Merit by the CBSE for being among the **Top 0.1%** *2019*
  of successful candidates in **Mathematics** in the matriculation level board examination

Research Experience

Adding a custom peripheral to QEMU RISC-V machine emulation *June 2023 - Present*
KTH Royal Institute of Technology | Guide: Prof. Ahmed Hemani

- Emulated **RISC V**, an open source ISA, on **QEMU**, an open source full system emulator and virtualizer, with a compiled **GNU toolchain** with 32 and 64-bit support
- Scrutinizing the **libfemto** code flow, a lightweight bare-metal C library which is a part of riscv-probe to generate a stripped out version to interact with the machine
- Writing **bare metal C code** to interact with the QEMU RISC V machine and then creating a **complete simulation environment** with an input and output buffer image file

Key Projects

Cache Replacement Policies *July 2023 - Present*
Research Project | Guide: Prof. Virendra Singh

- Reviewed literature on various cache replacement policies such as **SRRIP**, **LRU** and **DRRIP**
- Analyzed the source code of **ChampSim**, a trace-based simulator for microarchitecture study, and understood how **LRU** is implemented as a cache replacement policy
- Implementing SRRIP and DRRIP as replacement policies and evaluating their **performance**

IITB-RISC-23 *May 2023*
Course Project | Guide: Prof. Virendra Singh

- Designed an advanced 8-register, 16-bit computer system with **byte-addressable addresses and instructions** using point-to-point communication infrastructure on **VHDL**
- Optimized performance by implementing a **six stage pipeline** with **full bypassing** using forwarding logic, a static **branch predictor**, flusher and staller to improve performance
- Performed software testing using Quartus **RTL Simulations** and **FPGA** implementation

Digital Logic Design *August 2022 - November 2022*
Course Project | Guide: Prof. Maryam Shojaei Baghini

- Analysed the working of **Finite-State Machines** and the methodology for implementing them using **D-Flipflops**, and created FSM and state table for the same.
- Implemented a 6-Bit **Sequence Generator** with **Data FlipFlops** having set and reset switches, using **structural** and **dataflow modelling** in **VHDL**
- Performed software testing using Quartus **RTL Simulations** and hardware testing using **Scanchain on Xen 10 board**, using vj_tag, UR_jtag and Python

Microprocessor Laboratory *January 2023 - May 2023*
Course Project | Guide: Prof. Saravanan Vijayakumaran

- Programmed Pt-51, a board based on **8051**, using **embedded C and Assembly** to simulate with an interfaced LCD display, using Keil μVision for simulating and debugging
- Established serial communication using a **USB-UART** module to interface **ADC** MCP3008 with the 8051 micro-controller to measure the input given from a **potentiometer**
- Implemented keyboard interfacing while also utilizing timers, counters and interrupts

Analog Circuit Design *January 2023 - May 2023*
Course Project | Guide: Prof. Anil Kottantharayil

- Simulated **analog circuits** like logarithmic amplifier, instrumentation amplifier, active and passive filters, Schmitt trigger, astable multivibrator using **ngSpice**
- Implemented the designed circuits using various ICs and other components on a **breadboard**
- Utilized Digital Multi-meter, **Digital Storage Oscilloscope**, and **Arbitrary Function Generator** to emulate these circuits on the breadboard and measure results

Computer Architecture *May 2023 - Present*
Summer of Science | Maths and Physics Club

- Analysed the various advantages of employing **superscalar** techniques using **advanced caches** and **branch prediction** techniques to supersede scalar processors' performance
- Performed a case study on **VLIW** processors and scrutinized the advantages and disadvantages of **static scheduling**, and understanding the compiler's work in scheduling
- Making inroads into **advanced computer architecture**, such as **Multi-threading**, **Vector Processors** and **GPUs**, **Parallel Programming**, and **Multiprocessors**

Position Of Responsibility

Sports and Journalism Secretary | Electrical Engineering Students' Association *2022-23*
*Part of a **8** member council, representing **1600+** students of the EE department*

- Conducted **EE sports tournament** , a tournament with over **500+** participants in **8+** sports
- Collaborated with the **current fourth year students of EE** and compiled a collection of **intern blogs**, in order to aid the **200+** third year students participating in the intern season
- Conducted **Impulse**, the department fest for **1600+** students as a **Core Group Member**

Technical Skills

Languages and HDL	C++, Python, VHDL, Assembly, Embedded C
Libraries and Packages	NumPy, matplotlib, Pandas, Pytorch, Seaborn, TensorFlow, statsmodels formula, NetworkX, PyGeometric, spaCy, NLTK
Tools	LaTeX, MS Office, Quartus, NgSpice, Bash, QEMU, ChampSim

Key Courses Undertaken

Electrical	Power Engineering-I & II, Analog Circuits, Digital Systems, Signal Processing-I, Probability and Random Processes, Control Systems, Microprocessors, Electronic devices, Testing and Verification of VLSI circuits, Electromagnetic Waves*, Communication Systems*
Computer Science	Logic in Computer Science, Computer programming and Utilization, Introduction to Machine Learning

**To be completed by December 2023*

Extracurricular Activities

- Completed **Grade 1 grading certification** in **UCMAS Abacus**
- Won gold in the **EE Basketball Tournament**, a tournament with over **50+** participants
- Completed the two-semester **National Sports Organisation** course on **Football**
- Finished third place in the **EE Football tournament**, a tournament with **100+** participants
- Represented Hostel 5 in **Football General Championship**, an inter-hostel event