



Rishabh Ravi
Electrical Engineering
Indian Institute of Technology Bombay
Specialization: Electronic Systems

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Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 26/09/2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	9.33

ACADEMIA

- **Ranked xx** in ES specialization of Electrical Engineering (DD) based on academic performance *Present*
- Currently pursuing a minor degree in the **Computer Science and Engineering** department *Present*
- Submitted research work on Secure Shared Cache Partitioning Scheme for **ASPDAC '25** *2024*

INTERESTS

Computer Architecture, Signal Processing, Cryptography, High-Performance Computing, VLSI Design

RESEARCH EXPERIENCE & INTERNSHIPS

Extending Vortex support for CUDA

Summer 2024

Research Project | Georgia Tech

Guide: Prof. Hyesoon Kim

- Added support for CUDA's **PTX ISA** instructions **VOTE** and **SHFL** to the RISC-V GPU Vortex
- Extended the **ISA** to include the instructions and **verified** the RTL implementation using the Vortex

Subsampling of Correlated Graph Signals

Spring 2024

Research Project | IIT Bombay

Guide: Prof. Satish Mulleti

- Developed an **algorithm** to subsample and reconstruct correlated graph signals by deletion of nodes
- Proved that for graph signals generated by a linear model, the reconstruction error after deleting ≥ 2 nodes was dependent on the graph and had **perfect reconstruction** for the deletion of just one node

SCAM: Secure Shared Cache Partitioning Scheme

Spring 2024

Research Project | IIT Bombay

Guide: Prof. Virendra Singh

- Designed a **secure, dynamic** multi core cache partitioning algorithm that outperformed PASS-P by **1%**
- Improved the performance by capping the **L3** partition to ensure complete **L2 utilization** and selectively transferring clean, exclusive and dead lines to minimize **writeback**, and **back invalidation** latencies

Exploring Commercial Accelerators

Autumn 2023

Reading Project | Vice President emeritus Intel

Guide: Mr. Sunil Shenoy

- Explored literature by NVIDIA, Google, Intel's Habana Labs, and Groq on **hardware accelerators**
- Performed a comparative study on latest **accelerators** and inferred that having **application-specific hardware**, implementing memory slicing, and faster interconnects were key for **high-performance**

Modem Firmware Engineer

Summer 2023

Summer Intern | Qualcomm

Guide: Mr. Dileep Lingamallu

- Revived a **GPRS-specific** modem firmware and virtual platform for applications in **smartwatches**
- Created test case scenarios, emulating L1 commands, to assess and validate functionality by maintaining signal-to-noise ratio within defined **21 dB** thresholds, affirming the accuracy of decoded data

MAJOR PROJECTS

Electrical Trainee | Electrical Subsystem

Autumn 2021

Team AUV, an IITB student-led tech team developing AUVs

Guide: Prof. Leena Vacchani

- Deployed the sixth iteration of **Matsya**, an Autonomous Underwater Vehicle (AUV), capable of **self-navigation** and performing multiple tasks as described by the International RoboSub competition
- Facilitated easy debugging by optimizing the code segments on **ATmega328P** of the electrical stack and designed space-optimized **PCBs** on the EAGLE software with the facility for compact wire routings

OTHER PROJECTS

Electrical Designer | Research & Development

Spring 2022

Team AUV

Guide: Prof. Leena Vacchani

- Migrated the logic of the electrical stack to work on **STM32G4** from the ATmega328P, enabling higher **operation speeds** and **functionality** provided by the increased I/O ports and better-suited **ISA**
- Implemented 2-Dimensional **SLAM** (Simultaneous Localization and Mapping) in Python and localized the object in a 2-Dimensional map using sensor and motion readings and an **Extend Kalman Filter**

tinyVTA: FPGA-based Accelerator for Neural Networks

Spring 2023

VLSI Design Lab | Course Project

Guide: Prof. Sachin Patkar

- Implemented an accelerator for floating point operations such as block **matrix-multiply-accumulate** and block **activation function** application operations of Deep Neural Network inference to a **FPGA**
- Verified the correctness by testing against the **MNIST dataset** using a large, fully connected model on the **Xilinx ZCU104 FPGA** and observing consistent results across all 128 test examples

Hand Held 2D Mapping System

Spring 2023

Electronic Design Lab | Course Project

Guide: Prof. Siddharth Tallur

- Created a robot that remotely and accurately mapped the trajectory traced in a **2-dimensional plane**
- Utilized an **IMU** and a **rotary encoder** to obtain position readings, and a **Bluetooth module** for real-time transmission to a computer plotting a 3-dimensional plot of path traced against light intensity

Model based Embedded System Design

Autumn 2022

Embedded Systems | Course Project

Guide: Prof. Paritosh K Pandya

- Developed an embedded system for **autonomous valet-parking** robot, involving the model-based design
- Designed algorithm for wall-hugging, line following, track color inversion, and parking-space identification

RISC Processor Design

Autumn 2022

Microprocessors & Topics in Computer Architecture | Course Project

Guide: Prof. Virendra Singh

- Developed a six-stage pipelined processor that achieved a peak performance of **1.94 cycle/instruction**, which included a hazard unit, branch predictor, and a data forwarding unit to tackle pipelining hazards
- Expanded this by developing a 16-bit, 2-way fetch superscalar processor handling out-of-order execution

POSITION OF RESPONSIBILITY

DAMP Mentor

2023 | Department of Electrical Engineering

- Selected as an academic mentor for the Department Academic Mentorship Program (DAMP) for a batch of sophomores from the Electrical Engineering department to aid them during academic hardships

Undergraduate Teaching Associate

2022 | Department of Mathematics

- Selected as the teaching associate for multiple math courses on linear algebra, and advanced differential calculus that involved mentoring 40+ sophomores by taking weekly tutorial sessions and solving doubts

AWARDS AND CERTIFICATIONS

(2024) Secured a **perfect 10** Semester Performance Index in the spring semester of **Senior Year**

(2023) Awarded **top 3** projects for 2D mapping system in the Electrical Design Lab out of 70+ projects

(2021) Awarded **Change of Branch** to Electrical Engineering for excellent performance in academics

(2020) Secured **All India Rank 878** in **JEE Advanced 2020** out of **150 thousand** candidates

(2020) Cleared **JEE Mains 2020** with **99.82 percentile** out of **1.1 million** candidates

TECHNICAL EXPERTISE

Software

Vivado, Quartus, Nvidia Nsights, GEM5, SNIPER simulator, Matlab

Languages

Verilog, VHDL, Assembly, C/C++, Python, Perl, FORTRAN

EXTRACURRICULAR

Sports: Participated in and won numerous football tournaments at both school and college levels

NSS: Engaged in public speaking and outreach activities focusing on environmental education