Ravi kishore | **22B0959**
Computer Science & Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 28/11/2005

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	BIE AP	Sri Chaitanya Boys junior college	2022	96.10%
Matriculation	BSE AP	Sri Chaitanya school	2020	99.50%

Pursuing a **Minor** in **Management**.

Scholastic Achievements

- Secured **All India Rank 14** in **Joint Entrance Examination Advanced** among *150,000+* candidates (2022)
- Ranked **All India Rank 6** with a **perfect score 300/300** in ***JEE Mains*** among *750,000+* candidates (2022)
- Received the prestigious **KVPY Fellowship** for securing **All India Rank 726** among 50,000+ candidates (2020)
- Bagged **Rank 8** in **EAMCET** conducted by Telangana State council among **120,000**+ candidates (2022)
- Secured **State Rank 15** in **Andhra Pradesh EAPCET** among **250,000**+ qualified candidates (2022)
- Awarded **Certificate of Merit** for being among **Top 1% of 21,397** candidates in **IoQP Part-1** (2021-2022)

Work Experience

Large Language Model Researcher | Attentions.ai (Summer Internship 2024)

- Worked on the project to develop an LLM specific for **Visual Question Answering** from multiple type of charts
- Concluded that **two-stage** models, Chart to table and TableQA exhibit **better accuracy** than end to end models
- Researched about Google's **DePlot**, SoTA Chart to table model and **inferred** it on charts from ChartQA dataset
- Developed and implemented code for **fine-tuning** the DePlot model based on **Pix2Struct** finetuning notebook

Key Projects

Spam classifier | Self Project (Summer 2024)

- Constructed a **GPT** like **LLM** with 124M parameters built upon transformer encoder-decoder architecture using Pytorch, tiktoken libraries and loaded the pre-trained weights of OpenAI's **GPT-2 124M** variant into the model
- Implemented transformer blocks featuring **Multi head attention** layer, Feed forward layer with **GeLU** activation
- Applied **top-k sampling**, **temperature scaling** on probabilities to generate more coherent and less diverse text.
- **Finetuned** the model over SMS Spam Collection dataset including **last transformer block** for improved accuracy

Exploring Operating Systems | Operating Systems (Spring 2023-24)

Instructor: Prof. Mythili Vutukuru (Course Project)

- Designed and implemented **mmap** system call in xv6 to allocate physical **memory on demand**, **copy-on-write-fork** system call to use the **same memory image** for parent and child until it encounters a modification request
- Performed **IPC** using Unix **Domain Sockets**, POSIX shared memory, **pipes** for data exchange between processes.
- Implemented a **thread safe producer-consumer** model with synchronization based on the state of shared buffer

Algorithmic Trader | Data Structures and Algorithms (Autumn 2023-24)

Instructor: Prof. Ashutosh Kumar Gupta (Course Project)

- Designed algorithms for **detecting profitable trades** and **risk free** opportunities through backtracking orderbook
- Detected best possible trade with **buy-low: sell-high** strategy, accommodating multiple quantities and cancellations
- Implemented **recursive calls** over the orderbook to find **arbitrages** resulting in profit for every new order and enhanced time complexity by using **hash maps**, customized **priority queue** for past prices of buy and sell orders

Digit Recognition and Autocompletion | AI/ML (Spring 2023-24)

Instructor: Prof. Swaprava Nath (Course Project)

- Constructed a model with **CNN**, ReLU, MaxPool, **Softmax** as sequential layers to recognise handwritten digits
- Achieved an asymptotic **accuracy of 85-90%** after training over 10,000 images of MNIST dataset for one epoch
- Built a model with **RNN** and trained it using **AdamW optimizer** on dinos.txt to complete the dinosaurs name

Cache optimization | Computer Architecture (Autumn 2023-24)

Instructor: Prof. Biswanandan Panda (Course Project)

- Performed comprehensive simulation and comparative evaluation of **cache replacement policies**, including LRU, LFU, FIFO and BIP, within the ChampSim environment across a wide array of benchmarks using various trace files
- Designed a **stream prefetcher** to analyze memory access patterns and implement effective prefetching strategies
- Enhanced performance compared to IP stride through optimization of **prefetch distance and degree** parameters

Cryptography | Cryptography and Network Security (Spring 2023-24)

Instructor: Prof. Manoj Prabhakaran (Course Project)

- Utilized the vulnerability of **CBC-MAC** to **length-extension attacks** to find the MAC of an appended message
- Studied about building blocks of encryption schemes **Stream, Block cipher** and their security over **CCA, CPA**
- Explored **Shor's Algorithm** for quantum computers which finds the factors of l-bit number in $O(l^2 \log l \log\log l)$

Other Projects

Game development | Seasons of Code (Summer 2024)

Web and Coding Club, IIT Bombay (Ongoing Project)

- Developed a simple **2D game** similar to **Mario** using **Unity UI Editor**, **C#** with Unity library for game logic
- Animated the character using **Spritesheets**, Land with **Tilemapping**, incremented positioning for realistic motion
- Implemented the character controller to sync the animation with keyboard inputs and **collision** with game objects

Kernel Density Estimation | Data Analysis and Interpretation (Autumn 2023-24)

Instructor: Prof. Ajit Rajwade (Course Project)

- Implemented **KDE** using Cross Validation for predicting the Probability density function of unknown distribution
- Determined optimal parameters by evaluating **LL** over validation split, based on the KD Estimate of training split

Minesweeper | Software Systems Lab (Spring 2022-23)

Instructor: Prof. Kameswari (Course Project)

- Designed a **game** inspired by Minesweeper with dynamic interface utilizing **HTML, CSS** and **Javascript**
- Implemented **data transfer** between dependent pages using **local storage** as well as a **query** through **URL**

Fun with Assembly | Computer Architecture (Autumn 2023-24)

Instructor: Prof. Biswanandan Panda (Course Project)

- Traced back the **unknown** function and sequences by **disassembling** the given executable into **x86 instructions**
- Constructed a query processing program in MIPS language using **Merge sort and Binary Search**, memory allocation for frame variables in **stack** and input data in **heap** memory for optimum time and space complexity.

Hierarchical Planning | Operations Management (Spring 2023-24)

Instructor: Prof. Rahul Jagannath Patil (Course Project)

- Researched about production-distribution model involving transportation, production decisions in a central factory and its warehouses using **Hierarchical** approach to satisfy weekly fluctuating demands with a group of 8 members.
- Studied about the **Aggregate** and **Disaggregate** levels of the model, construction of their objective functions, solving the inequality by taking **Production capacity**, demand **fluctuations**, **back orders** into consideration

Position of Responsibility

Teaching Assistant | PH110 (Spring 2023-24)

Instructor: Prof. Kantimay Das Gupta

- Enhanced Management skills by mentoring **39 students**, showcasing effective **leadership, communication**
- Conducted regular problem solving sessions, ensuring clarification of conceptual doubts and conducted crib sessions

Courses Undertaken

Computer Science

- Data Structures and Algorithms†, Design and Analysis of Algorithms
- Artificial Intelligence and Machine Learning†
- Operating Systems†, Discrete Structures, Cryptography
- Digital Logic Design and Computer Architecture†
- Software Systems Lab, Computer Programming and Utilization†
- Data Analysis and Interpretation, Automata Theory and Logic
- *Computer Networks†, *Programming Paradigms†

Others

- Calculus, Linear Algebra
- Differential Equations
- Quantum Physics
- Marketing Management
- Operations Management
- Introduction to Electrical and Electronic Circuits (Maker space)

†*Course has corresponding lab* **to be completed by November 2024*

Technical Skills

Languages	C++, Python, Bash, C#, MIPS, x86
Software Tools	Git, LaTeX, Markdown, MATLAB, Unity, GDB
Data Science Libraries	NumPy, MatPlotLib, Pytorch
Development skills	CSS, HTML, Javascript

Extracurricular Activities

- Represented Hostel 5 as part **Carroms Team** for General Championship 2023-2024 conducted in IIT Bombay
- Contributed to **Old cloth collection** campaign conducted by **NSS** club by covering 2-apartments of residential area in IIT Bombay, and succesfully completed 10 months of social service under SSD in NSS IIT Bombay
- Researched about the **Waste management** as part of NSS to propose sustainable ways for developing the campus