



Ashwin Goyal
Computer Science & Engineering
Indian Institute of Technology Bombay

210050024
B.Tech.
Gender: Male
DOB: 30/08/2003

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

Pursuing a Minor in Physics

SCHOLASTIC ACHIEVEMENTS

- **Department Rank of 8** among **190+** students in the **Computer Science and Engineering Department** (2023)
- Secured **All India Rank 34** in **Joint Entrance Examination (Advanced)** among 1,41,000+ shortlisted students (2021)
- Selected among the national **top 60** for the **Orientation Camp** twice through the **Indian National Astronomy Olympiad** and once through the **Indian National Physics Olympiad** (2020, 2021)
- Among India's **top 300** students to qualify for the **Indian National Mathematical Olympiad** (2019, 2020)

INTERNSHIPS AND KEY PROJECTS

Research Internship - Quantum Computing and Cryptography

Summer 2023

Guide: Prof. Rahul Jain | Summer Internship

National University of Singapore

- Interpreted and presented multiple publications in the domains of **Quantum Computing** and **Quantum Cryptography**
- Understood the implications of applying **Classical Machine-Learning Algorithms** to **Quantum Many-Body Problems** with an attempt to improve Computational Complexity, studying classes like **BPP, BQP and P/Poly**

Analysis of Atmospheric High Energy Electromagnetic Flashes

Spring 2023 - Ongoing

Guide: Prof. Varun Bhalerao, Prof. Vishal Dixit | Supervised Learning Project

IIT Bombay

- Analyzed and processed data from the **Cadmium-Zinc-Telluride Imager** aboard India's **X-ray** satellite **ASTROSAT**
- Determined frequencies of **High-Intensity, Milli-second Binned X-ray Events** during periods of **Earth Occultation** of the detector to make a **Statistical Prediction** on CZTI's ability to detect **High-Energy Atmospheric Flashes**

Cache Hierarchy Optimisation for SAT Solvers

Spring 2023

Guide: Prof. Biswabandan Panda | Course Project: Computer Architecture and Digital Logic

IIT Bombay

- Utilised the **Champsim Simulator** to improve upon the **IPC** values for the **Cadical** and **Kissat SAT Solver Traces**
- Implemented and investigated various **LLC (Last Level Cache)** Replacement Policies, including **MRU, LRU, Random, and Re-Reference Interval Prediction**, to optimize **Cache Performance** and minimise **Cache Misses**
- Evaluated the effect of **Block Size** on cache performance by modifying the number of sets and ways while keeping the **Ratio, Product, or Associativity Constant**, effectively managing memory utilisation and maximising cache efficiency

Automatic Identification of Solar Flares in X-ray light curves

Summer 2022 - Ongoing

Indian Space Research Organisation

- Developed a robust pipeline to analyse and process X-Ray lightcurves (**1.55 to 12.4 KeV**) from the state-of-the-art solar observation payloads on **Chandrayaan-2 Orbiter (XSM)** and the upcoming **Aditya-L1 Satellite (SoLEXS)**
- Formulated an algorithm for estimation of the **Solar Background Intensity**, separating out regions with flares allowing for improved detection and analysis, especially for **Sub-A Class Solar Flares** (Low Intensity)
- Generated a catalog of **6266** solar flares between **2019 September 12 & 2022 November 4**, achieving an order of magnitude improvement over the current state-of-the-art for **Sub-A Class Solar Flares** - **manuscript in progress**

FastChat

Autumn 2022

Guide: Prof. Kavi Arya | Course Project : Software Systems Lab

IIT Bombay

- Obtained **high throughput** of texts with **limited server resources** while ensuring **low latency** of individual message deliveries and **end-to-end encryption** in a network of (~1000) clients interacting with each other
- Used **PostgreSQL** database to store information along with the 'ssl' and 'socket' Python libraries for communication
- Optimized **load balancing strategies** and **communication protocols** to minimize CPU and server memory usage

POSITIONS OF RESPONSIBILITY

- **Institute Astronomy Secretary | Institute Technical Council, IIT Bombay** (Summer 2023 - Ongoing)
 - Leading a team of **8 Institute Conveners** to cater to the astronomy-based interests of **12000+ Students**
 - Ideating the development of the **IIT Bombay Astronomical Observatory** with an initial funding of **INR 1800K**
- **Teaching Assistant** - Conducted weekly tutorials for **30+** students for **PH111(Classical Physics)** (Spring 2023)

TECHNICAL SKILLS

Programming Languages

Libraries and other software

Development

C++, C#, Python, MATLAB, Java, Prolog, Haskell, Bash, SQL, MIPS Assembly

Pandas, Numpy, Scipy, Sed, GDB, Jupyter Notebooks, Docker, Blender, Unity

HTML, CSS, Bootstrap, Javascript, Git, Latex, Doxygen, Sphinx, Markdown

EXTRACURRICULAR ACTIVITIES

- **Open Winner** of the **IIM Indore Inter-Varsity Debate Tournament** with a total participation of **33 two-member teams** from around the nation (Autumn 2022)
- Completed 6 years of **French Education** with **100%** in the French Board Exam and **2 gold medals** in the **International French Language Olympiad** conducted by Silverzone (2014-2019)