Atharva Abhijit Tambat
Computer Science & Engineering
Indian Institute of Technology Bombay

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B.Tech.
Gender: Male
DOB: 26/02/2003

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2025	
Intermediate	CBSE	Ryan International School	2021	97.40%
Matriculation	ICSE	St. Mary's ICSE School	2019	98.17%

Pursuing **Minors** in **AI & Data Science** and **Honours** in **Computer Science & Engineering**

Scholastic Achievements

- Conferred **Institute Academic Prize** by IIT Bombay for securing **1st Place** among all students of First year *(2022)*
- Achieved **Department Rank 10** in CSE department due to excellent academic performance & conferred with **AP grade (Advanced Proficiency)** - highest grade in **5 courses**, given to very few **out of 1400+ students** *(2023)*
- Awarded **Change of Branch** to **Computer Science & Engineering** department among **18** out of **1000+** students
- Secured **All India Rank 1** in **Joint Entrance Examination Main** amongst 1 million+ students. *(2021)*
- Obtained **All India Rank 396** in **Joint Entrance Examination Advanced** amongst 150,000+ students *(2021)*

Olympiads & Competitions

- Secured position within **top 102** out of **8000+** students, participated in **Orientation Camp** for International Olympiad on **Astronomy and Astrophysics** *(2021)*
- Ranked among **State top 1%** in Indian Olympiad Qualifier for **Astronomy**, **Physics** and **Chemistry** *(2021)*
- Awarded the prestigious Kishor Vaigyanic Protsahan Yojana (**KVPY**) fellowship for achieving **All India Rank 119** in Stream **SX** (Class 12^{th}) and **All India Rank 386** (Class 11^{th}) in Stream **SA** from the Govt. of India *(2019, 2020)*
- Honoured as 'Balvaidyanik' with **Silver Medal** in Dr. **Homi Bhabha** Balvaidnyanik competition, conducted by The Greater Bombay Science Teachers Association based on written examination, interview and project rounds *(2017-18)*

Internships

Compressed Sensing for Terahertz Communications | *Research Internship*

Guide: Prof. Dr.-Ing. Thomas Kürner, ***Technische Universität Braunschweig, Germany*** *(May'23-Jul'23)*

- Studied formulation of **device discovery** process for Terahertz communication, as **Compressed Sensing** problem
- Proposed a **novel method**, **re-weighted Total Variance Norm Minimization**, and another **deep learning** method based on **regularized Deep Inverse Priors** for accurate reconstruction of Power Angle Profile
- Provided **numerical and simulation results**, demonstrating a **2x improvement** over known results.
- Expected to result in **journal paper** in near future crediting me as **author/coauthor**, discussing proposed methods

Geo-Mapping & Route Optimization | *Winter Internship*

IFP Petro *(December '22)*

- Created a **scoring model** for assessing used-oil suppliers, based on factors like **distance, transportation cost** among others to **prioritize transportation** of used oil from various suppliers to recyclers like IFP Petro
- Utilized **advanced vehicle routing algorithms**, such as **Capacitated Vehicle Routing**, to **optimize real-time transportation** routes for picking up used oil from suppliers, **minimizing costs** and improving overall logistics.
- Developed a web application to **streamline** & **automate** the acceptance of **pickup requests** for used oil from various suppliers, resulting in **increased operational efficiency** and a more systematized oil transportation

Research Experience

Deep Retrosynthetic Prediction | *In-Semester Undergraduate Research Programme* | *Ongoing*

Guide: Raghavan B. Sunoj, Department of Chemistry *(Jan '23 - Present)*

- Studied **Augmented NLP Transformer Models** on **SMILES representation** of substrate for reaction prediction
- Reviewed **Graph Attention Neural Networks**, leveraging **masked self-attentional** layers, for reaction classification
- Working on **creating a reaction fingerprint** to **improve reaction classification accuracy** on standard datasets

Accurate and Efficient Distillation | *Reading Project*

Guide: Prof. Ganesh Ramakrishnan, Department of Computer Science & Engineering *(Jan '23 - May '23)*

- Investigated challenges encountered in **Knowledge Distillation** - training a smaller ML model using a larger model - **huge training costs** and poor knowledge transfer **using smaller student ML** models
- Reviewed methods to **enhance accuracy** and **efficiency** in knowledge distillation like **Weighted Distillation** with unlabeled examples, **Second Split Forgetting**, and **Teacher-Guided Training** among others
- Outlined their implementation details & benefits, showcasing **enhanced model generalization** and **efficiency**

Key Projects

Deep Reinforcement Learning for Stock Trading | *Self Project* *(May'23-July'23)*

- Created an **OpenAI Gym** environment to **simulate the stock market** by using authentic stock data
- Implemented **Deep Q Learning (DQL)** to **performs trading** on custom **OpenAI Gym** trading environment

ML for Algo-Trading | *Winter in Data Science* | *Analytics Club* *(Dec '22 - Jan '22)*

- Studied **technical indicators** Commodity Channel Index, Bolinger Bands, Force Index to analyse **market trend**
- Analyzed **bullish**/**bearish** market trend using **XGBoost algorithm** & data from **BitMex** online trading platform
- Trained **Long Short-Term Memory** Neural Network for **predicting opening prices** of the indices in the future

Algorithmic Trading | *Limestone Data Challenge, Tower Research Capital* *(March '23)*

- Classified the stocks into different **sectors** based on their **movement patterns** using **Hierarchical Clustering**
- **Fit Index values** to the stocks based on **predictive correlation** with sector returns using **Lasso regression**
- Implemented **high sharpe ratio** trading strategy to **maximize daily returns**, **capping the risk** below a threshold

Inverted Residuals and Linear Bottlenecks: MobileNetV2 | *Course Project*

Guide: Prof. Biplab Banerjee, Center of Machine Intelligence & Data Science *(Aug '22 - Nov '22)*

- Implementing **MobileNetV2** Neural Network Architecture for **Semantic Segmentation** and **Object Detection**
- Used **Depthwise Separable Convolutions** to **reduce computation** compared to traditional layers by large factor
- Worked on **Inverted Residuals** for making the neural network design considerably **more memory efficient**

Quantum Machine Learning | *Seasons of Code (SoC)* | *Web & Coding Club* *(May '22 - July '22)*

- Implemented fundamental Quantum Computing concepts such as **Phase Kickback Algorithm**, **Quantum Data transfer Algorithm**, **Quantum Fourier Transform** and **Quantum Phase Estimation** in IBM **Qiskit**
- Used **sklearn** to impliment **Linear Regression**, **K-Means Clustering**, **SVM Classification** and Tensorflow library in Python to build **Neural Network** for classifying digits from MNIST dataset
- Demonstrated use of **Variational Quantum Algorithm** for **molecular geometry optimization**

Technical Activities

Trainee/ Inductee | *IITB Mars Rover Team* *('21 - '22)*

- Used **OpenCV's Canny Edge Detection** Algorithm to detect edges from the video feed of the computer
- Built a **virtual world in Gazebo**, spawned custom rover & added a camera plugin to **detect Aruco** marker tags
- Used **ROS** to create an interface between the joystick and roboclaws to **control the motors** of the Rover

Other Projects

Decentralized Blockchain App | *Course Project*

Guide: Prof. Vinay J. Ribeiro, Department of Computer Science & Engineering *(Jan '23 - May '23)*

- Built a **P2P app** which allows users to run smart contracts and **conduct crypto transactions** at lightening speed
- Created a **discrete-event simulator** for a P2P cryptocurrency network to study different **parameters** like CPU power, CPU speed , network delays, network topology etc. affect the **structure** and **efficiency** of blockchain
- Implemented features to study the effect of **Selfish & Stubborn Mining** attacks in the **BitCoin Simulator**

FastChat | *Course Project*

Guide: Prof. Kavi Arya, Department of Computer Science & Engineering *(Aug '22 - Nov '22)*

- Built **client network** ensuring **low latency**, **high throughput** & **end-to-end encryption** with **limited resources**
- Used **socket** for **authentication** and communication; **PostgreSQL**, **bash** for scripting and collecting results

Railway Planner | *Course Project*

Guide: Prof. Supratik Chakraborty, Department of Computer Science & Engineering *(Aug '22 - Nov '22)*

- Developed a **Railway Planner** using data structures such as **hash maps**, **BST**, **AVL trees**, **tries**, **graphs**
- Used **graph-based algorithms** (**BFS**, **DFS**, **Dijkstra's**, **Kruskal's**) for computing shortest train routes efficiently

Positions of Responsibility

Teaching Assistant | *Department of Mathematics, IITB*

Prof. Sanjoy Pusti & Prof. J.K.Verma *('22 - '23)*

- Selected as **Teaching Assistant** for the course Calculus I (MA109) and Linear Algebra (MA106) . Position includes responsibility for **mentoring** and **conducting weekly tutorial sessions** for a batch of **40+** first-year students

Technical Skills

Programming	C/C++, Python, Java, Bash, Awk, Sed
Development and Databases	HTML, CSS, Bootstrap, JavaScript, MySQL, Django, PostgreSQL
Data Science	PyTorch, TensorFlow, Keras, Scikit-Learn, OpenCV, NumPy, Pandas, Matplotlib
Tools and Software	Git, LaTeX, MATLAB, GDB, AutoCad, Gazebo, ROS, Doxygen, Sphinx

Extracurricular Activities

- Secured one of the **top 60** positions in the **Limestone Data Challenge** organized by **Tower Research Capital**
- Built ***Virus Wars*** game in **Python**, for **Codewars v1**, a **Bot-Programming Contest**, by Web & Coding Club