Mukund Raj
Environmental Science & Engineering
Indian Institute of Technology Bombay

23B4245
B.Tech.
Gender: Male
DOB: 12/12/2005

Examination	University	Institute	Year	CPI / % Credits
Graduation	IIT Bombay	IIT Bombay	2027	8.22 **Core:** 154 **| Total:** 160
Intermediate	CBSE	SKP VIDYA VIHAR, Bhagalpur	2023	94.20%
Matriculation	CBSE	DAV Public School, Bhagalpur	2021	98.40%

SCHOLASTIC ACHIEVEMENTS

- Qualified Stage 1 of the National Talent Search Examination **(NTSE)** conducted by NCERT [2021]
- Secured a **SPI of 9.58** in the 3rd semester, demonstrating strong academic excellence [2024]
- Scored a perfect **AA grade in CS101**, a C/C++ course offered in the 2nd semester in IIT Bombay [2024]
- Achieved a centum (100/100) in Mathematics in CBSE Class 12 Board Examination [2023]

PROFESSIONAL EXPERIENCE

Software Development & Machine Learning Intern | *Manya Fintech Pvt. Ltd.* [Oct'25 – Dec'25]

- Built real-time person detection and tracking using **YOLOv8** with **DeepSORT** for persistent identity assignment across consecutive video frames
- Integrated convolutional object detection inference with **OpenCV** for low-latency Android processing
- Implemented deployment workflows including **TFLite** conversion, quantization, and **NNAPI** inference
- Optimized mobile execution paths across **Android SDK**, **React Native**, and **TypeScript** via profiling

AI Systems & LLM Research Intern | *College of Military Engineering* [Dec'25 – Jan'26]

- Implemented **LLM-guided information retrieval** for autonomous discovery of defense knowledge
- Contributed to **incremental web crawling pipelines** with **semantic relevance filtering** and ingestion
- Integrated **context-aware document synthesis** combining **LLM reasoning** with multi-source data
- Developed **expert-in-the-loop validation workflows** enabling feedback integration and improvement

KEY PROJECTS

Agentic AI Tutor | *Winter in Data Science, Analytics Club, IIT Bombay* [Dec'25 – Jan'26]

- Designed an **agentic AI architecture** triggering periodic recall using interaction and temporal signals
- Implemented persistent conversational memory with **session-state management** to track knowledge
- Developed **adaptive MCQ assessment workflows** evaluating responses and refining questioning
- Integrated **LLM-based reasoning pipelines** using Python and Streamlit for interactive reinforcement

Hand Gesture Recognition System | *Self Project, Deep Learning* [May'25 - Jun'25]

- Developed a real-time **Hand gesture Classifier** using **OpenCV**, **MediaPipe**, and **TensorFlow**
- Extracted **21 hand landmarks** using **MediaPipe's pre-trained CNN** with video processing via **OpenCV**
- Preprocessed hand landmarks using relative **coordinates** and normalization for consistent DNN input flow
- Integrated recording mode to log labeled hand landmarks in CSV files for dataset generation pipeline
- Built a custom **DNN** with Dense and Dropout layers, achieving **93% accuracy** and **0.93 F1-score**

Multilingual NLP Model Analysis | *Analytics Club, IIT Bombay* [Nov'25]

- Fine-tuned **BERT** and **XLM-RoBERTa** models for **cross-lingual inference** on the **XNLI** benchmark
- Performed **language-specific evaluation** using **accuracy**, **macro-F1**, and comparative error patterns
- Analyzed **multilingual transfer characteristics** under limited data and accelerated training constraints

Agentic AI Trainer | *GenAI Hackathon, Web and Coding Club, IIT Bombay* [Oct'25]

- Designed a **dual-agent conversational AI system** simulating customer personas and interactions
- Implemented a **compliance evaluation engine** scoring conversations using **FDCPA/Reg F** rules
- Engineered a rule-based scoring pipeline generating structured performance reports across behavioral KPIs

Face Mask Detection Using CNN | *Self Project, Deep Learning* [Jun'25]

- Imported face mask dataset from Kaggle and efficiently converted images to arrays using **PIL**, **NumPy**
- Resized dataset images precisely to **128×128** pixels and labeled them as **1** (masked) or **0** (unmasked)
- Split dataset into train/test sets with **Scikit-learn** and then scaled the images for better model performance
- **Built** a **CNN model** using **TensorFlow**, **Keras**, and layers like **Conv2D**, **Pooling**, Dense, Dropout

Housing Price Estimation using ML | *Self Project, Machine Learning* [Mar'25]

- Utilized the **Boston Housing Dataset** with 506 samples and 13 features to predict housing prices
- Preprocessed data with **SimpleImputer** and **StandardScaler** in a **Pipeline** for efficient transformation
- Trained and compared **Linear Regression**, **Decision Tree**, and **Random Forest** using **10-fold CV**
- Selected **Random Forest** (RMSE: **3.34**) as best model and visualized results to assess performance

OTHER PROJECTS

Dynamic Music Player Web Application | *Self Project* [Jan'24 - Feb'24]
- Built a responsive music app using **HTML**, **CSS**, and **JavaScript** with dynamic album loading
- Implemented custom playback controls like **seekbar**, **volume**, **looping**, and navigation for smooth UX
- Used asynchronous **fetch** and **event listeners** for real-time song management and interaction
- Created modular functions for **time formatting**, **playlist**, and **event binding** ensuring scalable code

Universal Testing Machine | *Course Project, MS 101, Prof. Krishna N. Jonalgadda* [Aug'23 - Nov'23]
- Built a mini **Universal Testing Machine (UTM)** in a team to test tensile and compressive strength
- Integrated electrical controls with mechanical systems for precise load application and data capture
- Applied core **electro-mechanical principles** to analyze stress-strain characteristics in various materials

Brand Strategy and Market Analysis | *Management Course Project, Prof. Mayank Pareek* [Mar'24]
- Studied PepsiCo's **branding**, positioning, and market tactics using real-world marketing frameworks closely
- Analyzed consumer trends and PepsiCo's effective response strategies to shifting market demands
- Delivered key insights and strategic recommendations via a structured report and classroom presentation

Smart Safety Backpack | *Course Project, DE 250, Prof. Mandar Rane* [Mar'25]
- Designed an innovative airbag-integrated backpack to enhance **bicycle safety** using user-centric principles
- Built a fully functional prototype with **Arduino Nano**, **IMU sensors**, and **CO_2**-based inflation system
- Thoroughly tested with users and iterated design for better **comfort**, **affordability**, and usability

POSITION OF RESPONSIBILITY

Web Core Team Member | *Yogastha, IIT Bombay* [Feb'25 – Present]
- Maintained the official Yogastha website with regular content updates and backend coordination
- Developed responsive sections for International Day of Yoga, highlighting events and announcements
- Contributed to improving website performance and design in collaboration with the core tech team

Mentor, EnB Buzz (E-Cell, IIT Bombay) [Oct'24]
Startup Ideation and Pitching Competition
- Guided a student team in crafting innovative startup ideas and designing a Business Model Canvas (BMC)
- Provided consistent regular feedback and mentorship on pitching, presentation, and strategic thinking

Volunteer, National Service Scheme (NSS) [Aug'23 – Mar'24]
IIT Bombay
- Taught underprivileged children foundational literacy and basic numeracy skills in weekly sessions
- Facilitated active learning through creative activities and fostered a supportive classroom environment

TECHNICAL SKILLS

- **Programming** Python, C++, C, Java, JavaScript, TypeScript, HTML, CSS
- **Libraries/Frameworks** NumPy, Pandas, scikit-learn, TensorFlow, Keras, PyTorch, OpenCV, PIL, SciPy, Matplotlib, React.js, Tailwind CSS, React Native, Android SDK, Express.js, Node.js
- **Software & Tools** Git, GitHub, GitLab, Jupyter, VS Code, Android Studio, MongoDB, MySQL, Streamlit, LaTeX

COURSES UNDERTAKEN

- **CS and AI/ML** Computer Programming and Utilization, AI & Data Science, Theoretical Machine Learning, Computation Lab, Python for Data Science & Machine Learning (Udemy), Git GitLab and GitHub Fundamentals (Udemy)
- **Mathematics** Calculus I, Calculus II, Linear Algebra, Differential Equations, Numerical Methods
- **Environmental Engg** Environmental Systems Modelling, Mass Transfer Process in Environmental Systems, Applied Environmental Microbiology and Ecology
- **Others** Design Thinking for Innovation, Introduction to Management, Economics, Introduction to Psychology, Basic Biology

EXTRACURRICULAR ACTIVITIES

- Co-designed and tested an RC aircraft in a **team of 4** for the Aeromodelling Club competition [Oct'23]
- Led a **team of 3** in Code Wars, developing a Python script to solve complex algorithmic problems [Mar'24]
- Active Chess Player with a Chess.com rating above 1600, focused on **strategic** & **tactical** skills [Ongoing]