Mrunal Lalwani | **200010046**
Aerospace Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 8/9/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	CBSE	Vagad Pace Global School	2020	95.40%
Matriculation	SSC	Sacred Heart School, Kalyan	2018	97.20%

Pursuing a Minor Degree in **Artificial Intelligence and Data Science** at CMInDS, IIT Bombay

Scholastic Achievements

- Currently ranked **9th** amongst **92** students in the Department of Aerospace Engineering, IIT Bombay *(Present)*
- Obtained **AA** grade in **Introduction to Machine Learning** course out of **140+** students *(2022)*
- Secured an All India Rank of **1513** in the **JEE Advanced** examination amongst **0.15 million** candidates *(2020)*
- Achieved **99.96** percentile in **JEE Main** exam conducted by NTA amongst **1 million+** students *(2020)*
- Received **Academic Excellence Scholarship** by Science Olympiad Foundation (SOF) for securing **1st place** among **300+** students for highest Cumulative Olympiad score in Maharashtra and Goa region *(2017)*

Internship Experience

Improved Indoor Localization using BLE Beacons *(May'22 - July'22)*

IoT Research intern at Lightstone Technologies Group | Indoor Locating and Sensing Services

- Part of a 5 member **agile** team to research on providing accurate position coordinates in an indoor environment
- Researched on **Kalman Filtering** techniques to improve the BLE Beacon proximity estimation and accuracy
- Prepared a real-time beacons' setup and collected **10k+** data samples for applying various ML and DL models
- Worked on devising various **ML** models like **Regression**, **Decision Trees** and **SVM** to obtain a relationship for path loss for the Received Signal Strength (**RSSI**) vs the **Distance** from the beacons
- Awarded a **Letter of Recommendation** by the Project CEO for exquisite work performance in **C++ ML utilities**

Key Projects

Sentiment Analysis of Amazon Reviews | Course Project *(July'21 - November'21)*

DS203 - Programming for Data Science | Guides: Prof. Amit Sethi and Prof. Manjesh K. Hanawal

- Used various classification algorithms such as **Logistic Regression**, **Random Forest Classifier** and **Recurrent Neural Networks**(RNN) to classify whether a review has a positive or negative sentiment
- Trained the models on a training set and identified the Long short-term Memory **(LSTM)** model as the best model
- Classified the test data as positive or negative sentiment using **LSTM** model with **94.82 %** accuracy

Topic Modelling | Course Project *(January'21 - May'21)*

DS303 - Introduction to Machine Learning | Guide: Prof. Biplab Banerjee, CMInDS

- Devised a model that can capture semantic similarities in words using **top2vec** and **BERTopic** algorithms
- Performed dimensionality reduction using **UMAP** algorithm and clustering of vectors using **HDBSCAN**
- Performed comparative analysis with **LDA** and **PLSA** algorithms to conclude an increase in accuracy

Automated Systems for Hydroponics *(April'21 - July'21)*

Institute Technical Summer Project (ITSP) | Institute Technical Council | IIT Bombay

- Collaborated in a team of 4 to setup a **self sustaining** hydroponic system to grow plants without the usage of soil
- Used **DHT11, TDS** and **pH sensors** programmed on **Arduino IDE** to measure parameters of the nutrient solution
- Shortlisted by the Technical Council as one of the **top 6** among the **40+** project submissions for ITSP 2021

Junior Design Engineer, Controls and Communication | Team Rakshak *(April'22 - Present)*

Student initiative to develop a fleet of cost-effective UAVs for Search and Rescue operations

- Understood the **ROS** architecture for controlling of a bot and completed tutorials for the same
- Got familiar with Path Planning algorithms like **A***, Breadth First Search **(BFS)** and Depth First Search **(DFS)**
- Used **pygame** to visualise an **Obstacle Avoidance algorithm** in action after specifying the number of way points

Covid Statistics | Data Analysis and Interpretation *(March'21 - June'21)*

AE102 Course Project | Guides: Prof. Amuthan A. Ramabathiran and Prof. Prabhu Ramachandran

- Studied and analysed Covid-19 data of the **5 most affected** states in the country from **Jan-June 2021**
- Used **regression analysis** to estimate average duration of recovery of individuals in different states

Helical Spring Deformation Analysis | Course Project *(July'21 - Nov'21)*

AE227 - Solid Mechanics | Guide: Prof. Krishnendu Haldar, Dept. of Aerospace Engineering

- Studied the compression analysis of a helical spring, made of **structural steel** and fixed at one end
- Used custom material assignment to the body using **Engineering Data** to add multiple materials
- Applied boundary conditions in the form of supports and loads (forces and moments) to the body and generated solution output on **Ansys 2020** by the stress and strain tensor components (normal and shear)

Technical Skills

- **Programming languages:** Python, C++, Arduino IDE, SQL, HTML
- **Softwares:** MATLAB, Ansys, AutoCAD, VSCode, OpenRocket
- **ML Framework:** Scipy, Pandas, Scikit-learn, TensorFlow, Keras, Top2Vec

Positions of Responsibility

Manager | Dark Knight Chess Club, IIT Bombay *(June'22 - Present)*

*Spearheading a two-tier team of 7, organizing all chess events in the institute catering to **10,000+** students*

- Carried out the ideation and execution of the **All India Chess League 4.0**, a two-tier pan India inter-university chess event, with **2000+** participants and sessions with titled players from the **Indian Olympiad** contingent
- Devised **marketing strategy** for the All India Chess League 4.0 to bring in sponsorships worth **INR 80K**
- Garnered a participation of **4000+** students in online chess events by collaborating with **48** universities across India

Institute Sports Convener | IIT Bombay Sports *(May'21 - April'22)*

*Among the **34** members selected from **150+** applicants through a meticulous process of SOPs and interviews*

- Administered the execution of a **Quarantine Chess Tour**, a series of 7 online Chess tournaments spanning across **50 days** and involving participants from **20+** universities across India during the Covid-19 pandemic
- Organized **Fit India Movement**'s Freedom Run 2.0, a simultaneous **nationwide marathon** with **150** participants
- Ideated and executed **Freshie La Vista**, a sendoff event catered for the **1200+** batch of freshers at IIT Bombay
- Worked as a co-ordinator in **Aavhan**, the Annual Sports Fest with events for **14+** sports catering to **10k+** students

Relevant Courses Undertaken

- **Aerospace Engineering:** Data Analysis and Interpretation, Thermodynamics, Solid Mechanics, Incompressible and Compressible Fluid Mechanics, Aircraft Propulsion, Aerospace Structural Mechanics, Spaceflight Mechanics
- **C-MInDS dept:** Programming for Data Science, Introduction to Machine Learning
- **Computer Science:** Computer Programming and Utilization(C++)
- **Mathematics:** Calculus, Linear Algebra, Differential equations
- **Others:** Machine Learning(Coursera), MATLAB Onramp, Quantum Chemistry, Quantum Physics, Economics

Extracurricular Activities

Finance	• Completed **Finance 101** course under **Learner's Space** | UGAC, IIT Bombay *(2021)* · Learnt various aspects of **trading**, **investing** and evaluating valuation of a company · Studied blockchain implementation of **cryptocurrency** and it's future in markets
Chess	• Selected for **Chess** for a year-long training in UG First year under **National Sports Organization** (NSO) curriculum, Government of India *(2020-21)* • Won **1st place** in Under-17 years age category in the **District level** Chess tournament conducted by Thane District Chess association *(2017)* • Achieved an International **FIDE Chess Rating** of **1286**
Astronomy	• Part of a team that conducted **astronomy camps** involving stargazing sessions for **100+** students at *Sacred Heart School*, Kalyan, Thane *(2014-16)* • Operated Refractor, Dobsonian Reflector and Cassegrain telescopes for observations
Miscellaneous	• Finished **8th** out of **40+** teams in the **Remote Controlled Plane** competition conducted by the Aeromodelling Club, IIT Bombay *(2021)* • Presented in Ascent **Rocketry** competition organized by Aeromodelling Club using **OpenRocket** software *(2022)* • Completed a workshop on **personality development** under the Generation Next Program by **Dale Carnegie and Associates, Inc.** *(2015)* • Volunteered for community service at Dongarpada Village, Karjat, India under **Young Leaders Build** initiative by **Habitat for Humanity** *(2016)* • Awarded **merit** in the Spoken English exam by **Trinity College, London** *(2016)* • Passed the reputed **Intermediate Graded Drawing Exam** with **Grade A** *(2017)*