Avdhoot Golekar | **23B0060**
Aerospace Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 28/07/2005

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2027	8.91
Intermediate	Maharashtra State Board	Pace Junior Science College	2023	91.50%
Matriculation	Maharashtra State Board	Twinkle Star English High School	2021	96.80%

Pursuing **Dual Minor** in **Computer Science** and **Machine Intelligence and Data Science** from IIT Bombay

Scholastic Achievements

- Secured a percentile of **98.45** in **JEE Advanced** examination among **0.15 million+** aspirants nationwide ['23]
- Attained a percentile of **99.84** in **JEE Mains** examination among **1.1 million+** candidates nationwide ['23]
- Received the **KVPY fellowship** awarded by **IISc Bangalore** under SA stream by securing an **AIR 883** ['22]
- Achieved **NTSE scholarship** given to top **2000** students amongst **1 million+** candidates by NCERT ['21]
- Ranked **3rd** among **50,000+** students in the statewide **Maharashtra Talent Search Examination** ['20]
- Currently pursuing **Machine Intelligence and Data Science** minor with a **perfect 10 CPI** [Present]

Professional Experience

Summer Research Intern | IIT Hyderabad [May'25 - Jun'25]

Guide: Sumohana Channapaya | RGB Thermal Image Fusion

- Developed a novel **Transformer-based mid level fusion** architecture for RGB–thermal semantic segmentation
- Achieved a **6.3%** improvement in **mIoU** on the **MFNet dataset** over existing baseline fusion methods
- Explored **Mamba** architecture and evaluated its **long range** dependency modeling and **low-latency inference**
- Utilized a **Variational Autoencoder** to learn compact shared embeddings from aligned **RGB–thermal pairs**

ML Intern | IgrenEnergi, California [Apr'25 - Jun'25]

- Developed an **LSTM model** to predict the **SoH** of lithium ion batteries using **voltage, current**, and **capacity**
- Achieved **1.2% RMSE** on **Oxford Dataset** and evaluated SoH prediction lag using **cross correlation** analysis
- Applied **differential evolution optimization** to estimate coefficients of **sigmoid** based degradation curves
- Improved curve fitting accuracy by **7%** on noisy real world data, eliminating dependence on initial parameter guesses

Key projects

Autonomous Driving | Unmesh Mashruwala Innovation Cell, IIT Bombay [Oct'23 – Mar'25]

*An all-student team that works on **design and development** of a robust Autonomous Drones and Cars*

- **Machine Learning Subdivision**
  - Implemented state-of-the-art models such as **U-Net3+** and **Vision Transformers** for geological image segmentation
  - Modified **Focal Loss** function to handle class imbalance, achieving an **8%** improvement in minority class prediction
  - Achieved **96%** accuracy in **mineral segmentation** across **4 geological classes** using **encoder-decoder CNNs**
  - **Containerized** the model training and evaluation pipeline using **Docker** for seamless deployment and reproducibility
- **Controls Subdivision**
  - Studied the basics of **Lagrangian mechanics**, **HJB equation** and their applications in **optimal control systems**
  - Implemented **PID** and **MPC** controllers for stabilizing a **cart-pole system**, effectively improving system stability
  - Worked on **neural network** based estimation of **Pacejka tire** parameters for real-time vehicle dynamics modeling

Markov Decision Processes | Maths and Physics Club [May'25 - Jul'25]

- Built a custom **MDP framework** for a **10×10 grid-world** with **4** stochastic actions, solved using **value iteration**
- Trained off policy **Q-learning** and **SARSA agents** over **10K** episodes, achieving **92%** policy selection accuracy
- Applied the **Viterbi** and **Baum Welch** algorithms on **HMMs** for sequence decoding and parameter estimation

Financial Mathematics | Summer of Science [May'24 – Jun'24]

- Derived and implemented models such as **Black-Scholes** and **Binomial Options Pricing** to price derivatives
- Developed and evaluated strategies using **VaR** and **interest rate swaps** to optimize fixed income securities
- Applied **Modern Portfolio Theory (MPT)** to effectively optimize a **diversified portfolio** of **10+** securities
- Simulated the **Efficient Frontier** to optimize asset allocation, effectively balancing risk and maximizing return

Statistical Inference and Time Series Modeling of Commodity Prices [Mar'25 – Apr'25]

Guide: Prabhu Ramchandran | AE248: AI and Data Science

- Conducted statistical analysis on **10 years** of monthly commodity price data using **t-tests, F-tests,** and **z-tests**
- Used **Analysis of Variance** and **STL decomposition** techniques to quantify seasonal patterns in price variability
- Proved model assumptions using **Levene's test, ACF/PACF,** and **ADF** tests for stationarity and autocorrelation
- Performed **goodness of fit tests** on price distributions and conducted **Type I/II error** and **power analysis**

Other projects

Classification of Songs Using MFCC Coefficients | Course Project [Oct'24 – Nov'24]
Guide: Vinay Kulkarni | DS203: Programming for Data Science

- Explored the mathematical foundations of **MFCC coefficients** to understand their role in **audio signal processing**
- Conducted **data visualization** on MFCC-based audio datasets, identifying **spectral** and **temporal patterns**
- Trained a **Support Vector Machine (SVM)** on a large external dataset of songs, achieving high **test accuracy** of **84%** and evaluated clustering performance using a **Silhouette Score** of **0.76** in genre and artist classification

Summer of Quant | Quant Community, IIT Bombay [May'25 – Jun'25]

- Studied stochastic processes like **Markov chains** and **Martingales** and their applications in asset price modeling
- Researched on **market derivatives** and understood the usage of **stochastic calculus** in derivative pricing
- Analyzed time series using **OLS regression**, **ARIMA models**, and **Kalman filtering** for state space modeling

Airfoil Simulation via Thin Airfoil Theory | Course Project [Feb'25 – Mar'25]
Guide: Prof. Dhwanil Shukla | AE244: Aerodynamics

- Implemented **Thin Airfoil Theory** from scratch in Python to simulate **lift** and **moment** coefficient for 2D airfoils
- Achieved a **6× speedup** using **vectorized NumPy operations** for matrix assembly and circulation computation
- Achieved less than **6% error** compared to ANSYS results at low angles of attack, validating the physical accuracy

Regret Analysis of Online Algorithms | Course Project [Feb'25 – Mar'25]
Guide: Prof. Jayakrishnan Nair | EE6106: Online Learning and Optimisation

- Analyzed regret bounds for **UCB, EXP3, FTL,** and **Weighted Majority**, with results close to theoretical limits
- Simulated algorithms in Python under **adversarial** and **stochastic** settings to evaluate performance and robustness

Optimising Portfolio Performance during Recessions | Finsearch [May'24 - Jul'24]

- Worked in a team of **4** to analyze asset classes and designed a portfolio that outperformed the **S&P 500** by **8%**
- Studied the relationship between the **US Dollar Index** and **crude oil** and **gold prices** during recessionary periods
- Analyzed the **2008 Financial Crisis** focusing on **subprime mortgage crisis**, emphasizing the roles of Mortgage Backed Securities **(MBS),** Collateralized Debt Obligations **(CDOs)** and Credit Default Swaps **(CDS)**

Position of responsibility

Convenor | AI Community [Jul'24 – Apr'25]
Institute Technical Council, IIT Bombay

- Organized a series of **lectures** featuring **AI professionals**, including distinguished **alumni** from top tech companies
- Created comprehensive AI focused **blogs** and **tutorials**, actively contributing to the community's knowledge base

DAMP Mentor | Department Academic Mentorship Program [Jun'25 – Present]
Student Mentorship Program, IIT Bombay

- One among the **23** mentors, selected from **50+ applicants** on grounds of ethics, interviews and peer reviews
- Mentoring **6 sophomores** one-on-one, holistically guiding them in balancing **academics** and **extra-curriculars**

Technical Skills

Software	SolidWorks, ANSYS, MATLAB, Fusion360
Programming	C, C++, Python, HTML, CSS
Libraries	Numpy, Pandas, Matplotlib, scikit-learn, PyTorch, TensorFlow, React Native, ROS, ffmpeg, Docker, OpenCV, Casadi, Acados

Key Courses Undertaken

Mathematics	Calculus I and II | Linear Algebra | Differential Equations | Systems Theory | Discrete Structures | Optimisation
Aerospace	Control Theory | Thermodynamics | Propulsion | Solid Mechanics | Low Speed Aerodynamics | Aerospace Structural Mechanics
Data Science	Programming for Data Science | Computer Programming and Utilization | Online Learning and Optimisation | Probability and Random Processes
Miscellaneous	Economics | Introduction to Management | Biology

Extra-curricular

Sports	• Achieved **2nd prize** in the prestigious District Level **Chess** Competition among **30+** schools ['21] • Completed a year long training in **Kho-Kho** under the **National Sports Organization** ['24]
Contests	• Secured **AIR 1** for **3** years in the **Institute for Promotion of Mathematics** exam ['17-'19] • Bagged **2nd** place among **60+** teams in the **IgrenEnergi** industry-focused hackathon ['24]
Volunteer	• Volunteered in a **blood donation camps** and **Versova beach cleanup** by Abhyuday ['24] • Mentored **50+** students in **mathematics** and **physics** for JEE and international olympiads ['23]