Vedansh Bansal | **22B2239**
Mechanical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 24/05/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	CBSE	LBS	2022	90.80%
Matriculation	CBSE	Seedling Modern High School	2020	94.83%

Pursuing a Minor Degree in **Computer Science and Engineering** at IIT Bombay

Scholastic Achievements

- Secured **AIR 1162** in the **JEE Advanced** examination among **0.15 million+** candidates across India *(2022)*
- Achieved **99.31** percentile in **JEE Main** examination among **1.02 million+** candidates *(2022)*
- Qualified for Merit List and secured **AIR 3176** in **Kishore Vaigyanik Protsahan Yojana** *(2022)*

Patent Published

A Smartphone Lock Box System *(filed on May 30, 2024)*

Application No : 202421042094, *Application status - Published*

- Developed a **prototype** of a distraction-minimizing **Smartphone Lock Box** controlled by an **Android app**
- Designed and **3D printed** a lock box, engineered an **Arduino circuit** and developed corresponding **firmware**
- Created an **Android application** with integrated timer functionality and **Bluetooth** connectivity to the box
- Implemented a switchable feature in the app for **call detection** enabling the box to open upon detecting a call

Research and Professional Experience

Harmonic Drives | Guide: Prof. P. Seshu | Research Project *(May'24 - Present)*

- Studied the **Kinematic Model** governing the motion of **flexspline tooth profiles** within harmonic drives
- Designed **CAD models** for flexspline, circular spline, and wave generator in harmonic drives using **SolidWorks**
- Conducted axisymmetry analysis using **ANSYS** to evaluate the stresses and strains developed in thick cylinders due to internal **pressure** and **interference fit**, validating the results with an accuracy under **1 percent error**
- Analysed the **stresses** developed in flexsplines from wave generator insertion and **torque application dynamics**

Noble Dehydrates | Freelancing | Application Development *(May'24 - Jun'24)*

- Engineered an **Android app** for **efficient task allocation** to team members, optimizing workflow management
- Integrated **Firebase Realtime Database** for role-based task allocation, real-time updates and admin reporting
- Developed backend logic with **Java**, UI design with **XML** and used **Android Studio** for integrated development

Major Projects

Engine Force and Torque analysis | Guide: Prof. P. Seshu | Course Project *(Apr'24-May'24)*

- Designed CAD models of **Single Piston IC engine, V2 engine** and **2 Piston IC engine** using **SolidWorks**
- Simulated engine performance in **Adams software**, generating detailed **force and torque** analysis profiles
- **Validated** simulation results by analyzing and comparing them with theoretical models visualized in Desmos

Universal Testing Machine | Guide: Prof. V. Kartik | Course Project *(Jan'23 - Apr'23)*

- Developed a portable **UTM** with stepper motor and load sensor, using Arduino for control and data acquisition
- Integrated **Python Matplotlib** for real-time data plotting and **Arduino Serial** for dynamic sensor analysis
- Utilized UTM to conduct comprehensive **failure points analysis** on 3D models of **compliant mechanisms**

Summer Training in Advanced Robotics | Unmesh Mashruwala Innovation Cell | Team Project *(Mar'23 - Apr'23)*

Advisor Prof. Dhwanil Shukla

- Designed and implemented **PID (Proportional-Integral-Derivative) controller** for the **self driving** robot
- Engineered a bot capable of autonomously chasing another bot using **ROS** in Gazebo Simulator environment
- Constructed a custom **Gazebo world environment** for **autonomous robots**, incoporating realistic physics

Hexacopter drone | Exofly | Team Project *(Jun'24 - Jul'24)*

- Engineered a hexacopter in **SolidWorks**, conducted **ANSYS** simulations to identify structural failure points
- Designed a cable-based automated **Drop Mechanism** for controlled **payload release** from designated heights

Orthogonal Machining and Rolling | Guide: Prof. Soham Mujumdar | Course Project *(Apr'24)*

- Utilized **ABAQUS** for orthogonal machining simulation, predicting cutting force and temperature distribution
- Analyzed **material properties** and **rake angle** variations on machining performance through result analyses
- Developed **MATLAB** script for metal rolling simulation, analyzing effect of friction coefficient and roll diameter
- Evaluated effects on **rolling force**, **torque** and **power** through comprehensive analysis of simulation results

Other Projects

Educational App with AI-Driven Task Management | Self Project *(Dec'23 - Jan'24)*

- Developed an **Android app** featuring quizzes, **interactive lectures** and **AI-Driven Task Management**
- Implemented secure **Firebase authentication** and integrated **Firebase database** for efficient storage
- Developed captivating educational **animation videos** using the **Manim library**, implemented in **Python**
- Engineered **AI-based automated** task creation by extracting information from text using **Gemini API**

Flow Along with the Stream | Guide: Prof. Abir De | Course Project *(Mar'24 - May'24)*

- Developed a **real-time Financial Forecasting System** using **Machine Learning** on **Nifty 50** data
- Implemented **Ridge** and **ARIMA** models for stock price prediction with ARIMA achieving **0.74%** error
- Conducted detailed **Time Series analysis** enhancing model with **advanced regression** and **indicators**

Guitar chord recognition system | Guide: Prof. Shyamprasad Karagadde | Course Project *(Apr'24)*

- Developed a **Machine Learning** program for guitar chord recognition using Chroma features and classifiers
- Transformed analog sound to digital using **feature extraction** and **normalization** for machine learning
- Compared **KNN**, **SVM**, **Decision Tree** and **AdaBoost** classifiers to determine the most effective model
- Selected Support Vector Machine (**SVM**) as the optimal classifier, achieving the highest accuracy of **97.06%**

Automated Chessboard | Tinkering Bootcamp *(Jun'23 - Jul'23)*

- Created a **3D model** and a parametric design in **Solidworks** for the mechanical movement of chess pieces
- Simulated the **dynamic mechanical** movement and interactions of chess pieces using **ADAMS** software

Line Following Bot | Guide: Prof. Joseph John | Course Project *(Jan'23 - Feb'23)*

- Designed a **Line Following Bot** with automatic ground irrigation capability using a **Rack** and **Pinion** system
- Integrated **Arduino**, sensors, motor driver into the **electric circuit** and designed the bot using **SolidWorks**
- Programmed the **algorithm** to regulate the bot's **wheel speed** and its rotation direction in **Arduino IDE**
- Earned the opportunity to showcase in a prominent **exhibition**, ranking among the **top 24** bots out of **200**

Technical Skills

Programming	Java, C/C++, Python, MATLAB, Kotlin
Libraries	Numpy, Matplotlib, Scikit, Pandas, Pytorch, Retrofit, Room, Firebase, Manim
Software	Android Studio, ArduinoIDE, Git & Github, Ansys, SolidWorks, Jupyter, Abaqus, Fusion360, Adams, Excel, VS Code

Key Courses Undertaken

Computer Science and Machine Learning	Computer Programming (C and C++ basics) | Introducing to Machine Learning | Logic for Computer Science | Applied Data Science and Machine Learning
Mechanical	Structural Materials | Fluid Mechanics | Thermodynamics | Solid Mechanics | Mechanical Processing of Materials | Kinematics and Dynamics of Machine
Mathematics	Calculus | Differential Equations | Linear Algebra
Other Courses	Data Structures & Algorithms (Udemy) | Android 14 Developer Course (Udemy)

Extra Curricular Activities

Communication	• Facilitated live **mentoring sessions** for JEE aspirants on Match Now platform *(2024)* • **Anchored** at Music Event **IMF** (International Music Festival) in Mood Indigo *(2022)*
Cultural	• Achieved **First place** in a challenging **district-level singing** competition *(2016)*
Sports	• Represented Hostel 9 in Inter-hostel **Basketball** General Championship **(GC)** *(2024)* • Part of the **Winning team** in the intra-hostel sports competition at Hostel 9 *(2024)* • Completed a **Table Tennis** course under National sports organisation **(NSO)** *(2023)* • Undertook comprehensive training in **karate** and achieved the **Green Belt** level *(2018)*