Gokul R
Mechanical Engineering
Indian Institute of Technology Bombay

22B4517
B.Tech.
Gender: Male
DOB: 08/08/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2026	
Intermediate	CBSE	Maharishi Vidya Mandir	2022	98.20%
Matriculation	CBSE	Jawahar Vidyalay	2020	94.60%

Pursuing Dual **Minor degrees** in **AI and Data Science** and **Systems and Control Engineering**

Scholastic Achievements

- Conferred with the **Undergraduate Research Award(URA01)** for contributions in ML Research [2024]
- Scored a perfect **AA(10/10)** grade in **9 courses** completed during sophomore year [2023-24]
- Achieved a Semester Performance Index (SPI) of **9.33/10** in Semester 4 [2024]
- Ranked within the **top 1%** among **160,000+** aspirants nationwide in **JEE Advanced** [2022]
- Attained a percentile of **99.81** in **JEE Mains** among **1.02 million+** candidates across India [2022]
- Recommended for **KVPY Fellowship** for securing an **All India Rank of 639** in **KVPY SX** [2022]
- Scored a perfect **100** in **Physics** and **Computer Science** in **CBSE Class XII Examinations** [2022]

Key Projects

Agricultural Decision Software using Supervised Machine Learning [Sep '23-Nov '23]
Course Project | Course: Statistical Machine Learning and Data Mining (ME 781)
Guide: Prof. Asim Tewari, Department of Mechanical Engineering, IIT Bombay

- Developed a **ML software** for crop recommendations using **location-based** soil and climate data
- Implemented a fusion of **Random Forests**, **Gradient Boosting**, and **Extra Trees algorithms** to predict top-performing crops based on yield, and obtained a **decision accuracy of 78%**
- Built a website on **Vercel**, integrated with the software for interactive, location-based recommendations

Deep Learning Based Trajectory Tracking for Robots [Feb '24-May '24]
Course Project | Course: Applied Data Science and Machine Learning (ME 228)
Guide: Prof. Alankar Alankar, Department of Mechanical Engineering, IIT Bombay

- Developed a **deep learning** based trajectory tracking algorithm for robots using **time series** models
- Generated trajectory data of a **differential drive bot** as a time series using **MATLAB Simulink**
- Built and trained **LSTM** and **GRU** networks on the data using **TensorFlow** for next-state estimation
- Optimized **network architecture** using **KerasTuner**, achieving $\mathbf{R^2}$ value of **0.73** with a 2-layer model

Sentiment Analysis of Stock News | Self Project [Jun '24]

- Integrated **APIs** from **Alpha Vantage**, and **NewsAPI** to fetch real-time news headlines for **20+ stocks**
- Implemented **text preprocessing** methodologies to standardize and clean the textual data
- Calculated **sentiment scores** using **NLTK Vader** and **TextBlob**, providing qualitative market insights
- Correlated the results with actual stock price changes to analyze the **impact of news sentiment**

Volatility Forecasting | Self Project [Jun '24-Jul '24]

- Applied **GARCH**, **EWMA**, and range-based volatility forecasting models using **arch v.7.0.0** library
- Adapted methods from a financial study on the U.S. stock market to analyze **4** major Indian **ETFs**
- Evaluated model performance using 2 proxies and metrics like **Mean Square Error** and **Quasi-Likelihood**

Exit Strategies by Venture Capital Firms [Jun '24-Present]
Finsearch | Finance Club, IIT Bombay

- Assessed investment rationale and exit strategy for 3one4 Capital's investment in Toddle using **5+ KPIs**
- Determined effective approaches for maximizing returns by developing and assessing **3+ exit strategies**

Research Experience

Near Optimal Solutions of Linear n-Widths in Model Order Reduction [Jan '24-Present]
Research Project | *Guide: Prof. Debasish Chatterjee, C-MINDS, IIT Bombay*

- Researched **10+** academic papers and books on **Approximation Theory** and **Model Order Reduction**
- Recast the unsolved **linear width** problem into a numerically tractable **Convex Semi-Infinite Program**
- Engineered a **Simulated Annealing** based solver in Julia using **Markov Chain Monte Carlo (MCMC)** methods with **Slice Sampling** to compute near-optimal solutions of the global optimization problem
- Used the solver for **dimensionality reduction**(typically handled by **PCA**) and achieved **98.2%** accuracy

Design & Analysis of Propeller Boss Cap Fins (PBCF) for Ships [Feb '24-Present]
Indian Navy *R&D Project | Guide: Prof. Neeraj Kumbhakarna, Dept. of Mechanical Engg, IIT Bombay*
Presentation accepted at ***ICFD 2024 conference*** *to be held at Sendai,* ***Japan*** *in November 2024*

- Designed Propeller Boss Cap Fins for a ship propeller to **reduce hub vortex** losses and improve efficiency
- Achieved **9.62% increase in efficiency** post PBCF installation using a transient **SST-kω** CFD model
- Analyzed **hull interaction** effects in efficiency and optimized the design to mitigate **transverse thrust**

MATSYA, Autonomous Underwater Vehicle (Team AUV-IITB) [Feb'23 - Present]
Project Guide: Prof. Leena Vachhani, Department of Systems and Control, IIT Bombay
A ***40+*** *membered student team working on design and development of a* ***state-of-the-art AUV****, capable of performing* ***realistic naval tasks in marine conditions*** *competing internationally at* ***RoboSub, USA***
Accolades

- Among **top 6** Finalists out of **35+ teams** and **40+ vehicles** from all over the world in **RoboSub 2023**
- The team's latest iteration, **Matsya 6**, got featured in **Janes**, a highly reputed defence journal

Design Engineer [Jul'23 - Present]

- Achieved a **47% decrease** in Matsya 6 frame's mass with **Topology Optimization** using Altair Inspire
- Fabricated a waterproof **1 Gbps Ethernet connector**, offering **30x savings** over industrial alternatives
- Co-authored the **Technical Design Report** of Matsya 6D, detailing mechanical subsystem advancements

Mechanical Trainee [Feb'23 - Jul'23]

- Performed **FEA** on the ESC Hull of Matsya to evaluate its **depth rating**, ensuring a **safety factor** $\geq$ **2**
- Estimated the **drag coefficient** of Matsya's torpedo using **CFD** simulations to optimize its range

Positions of Responsibility

Teaching Assistant | Department of Computer Science and Engineering [Jan'24 - May'24]
Course: Computer Programming and Utilisation(CS 101), Instructor: Prof. Shivaram Kalyanakrishnan

- Entrusted with the responsibility of conducting weekly computer programming lab for **30+ freshmen**
- Primary responsibilities include clearing student doubts, grading, managing attendance and lab submissions

Organising Committee | 16th IIT Bombay Debate Tournament [Sept '23 - Nov '23]
Largest Parliamentary Debate Competition in India with ***300+ participants*** *and budget of* ***INR 4 Lakhs***

- Part of a **two-tier team** of **30** members organising a debate tournament with international participants
- Executed smooth registrations of **100+ debate teams** belonging to **20+ countries** across the globe

Technical Skills

- **Programming:** Python, Julia, C++ & C programming
- **Software:** SolidWorks, ANSYS (CFX, Fluent and Static Structural), Altair Inspire, MATLAB Simulink
- **Python ML Libraries:** NumPy, Pandas, Matplotlib, SciPy, Scikit learn, TensorFlow, NLTK

Extra-Curricular Activities

- Ranked among the **top 10** debaters out of **1,400+** freshmen in the Freshmen Debate Open [Jan '23]
- Adjudicated in **Christ University Parliamentary Debate** competition in Bangalore [Feb '23]
- Completed a year long training in **Football** under **National Sports Organization** [2022-23]
- Obtained **N5 and N4 certification** in the Japanese Language Proficiency Test(JLPT) by The Japan Foundation(Government of Japan) [Aug '17]
- Awarded **Grade 4** certification with merit in **Piano** performance by **Trinity College London** [Feb '16]