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Department: Energy Science and Engineering, IIT Bombay

ACADEMIC DETAILS

Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2026	7.73
Intermediate	BSER	Navjeevan Science School, Sikar	2021	96.20%

Pursuing Minor in Machine Intelligence and Data Science

SCHOLASTIC ACHIEVEMENTS

- Consolidated a **top 5%** rank in **IIT JEE Advanced** examination among **0.16 million** candidates (2022)

KEY PROJECTS

Data Science and Machine Learning

ReinFLY: AI Learns to Play Flappy Bird (Jun'24-Present)
Summer Project: Seasons of Code | Web and Coding Club, IIT Bombay

- Created a fully functional Flappy Bird game from scratch using **Pygame** library to understand game mechanics
- Implemented a **Deep Q-Network** model to train an AI agent to play Flappy Bird autonomously and more efficiently
- Utilized **reinforcement learning** techniques to **optimize** the agent's performance and improve game play strategies
- Fine-tuned hyper parameters to improve the agent's learning process, achieving significantly higher scores and stability

Computer Vision (Jun'24-Present)
Summer Project: Summer of Science | Institute Technical Council, IIT Bombay

- Gained expertise in implementing and troubleshooting **deep learning** models, focusing on practical applications
- Learned advanced architectures: **VGG16, RCNN, Faster RCNN, Mask RCNN, UNet, R2Attention UNet**
- Implemented VGG16 for **image classification** and Mask R-CNN for **object detection**, achieving improvements
- Developed and deployed **UNet** and **R2Attention UNet** for **image segmentation**, achieving accuracy enhancements.

T20 Score Prediction (Dec'23-Jan'24)
Winter Project: Winter in Data Science | Analytics Club, IIT Bombay

- Performed extensive **EDA** Analysis and feature engineering on T20 Match datasets to enhance predictive accuracy
- Preprocessed data using **ColumnTransformer** and **Pipeline**, incorporating **one-hot encoding** and **scaling**
- Implemented and evaluated **Linear Regressor, Random Forest, KNN, Decision Tree, and XGBoost** models
- Achieved **88.74%** accuracy with **RF**, selecting the best model, and deployed the predictive model using **Streamlit**.

Emotion Detection Using Deep Learning | Self Project (Dec'23-Jan'24)

- Utilized a dataset of about **35,000+** images from **Kaggle's fer2013** for the training and testing of this detector
- The input data was **augmented** using **Tensorflow** and **Keras** functions and then fed directly to the Model
- The training model had **Convolutional Neural Networks (CNN)** followed by batch Normalization and **Max pooling**

Other Projects

Battery v/s Hydrogen | Course Project: Hydrogen Energy (Feb'24 - Apr'24)
Guide: Prof. Pratibha Sharma | Energy Science and Engineering IIT Bombay

- Researched **battery** evolution or gathered **EV** sales data, and investigated **FCEV** as part of a three-person team
- Investigated **hydrogen** economies and compared future trends of hydrogen versus EV tecno in Germany and Japan
- Assessed **H-CNG** based engine feasibility and estimated **0.06 MT hydrogen** allocation for H-CNG applications
- Implemented **ARIMA** to forecast EV sales, renewable and nonrenewable energy production and costs,identify correlations

The Role Of ESG Metrics In Investment Strategies | FinSearch (July'24 - Present)

- Analysis of ESG reports to evaluate company performance, focusing on **sustainability, ethics, and transparency**
- Developed ESG investment strategies, integrating **environmental**, social, and governance factors for optimal returns
- Researched **ESG frameworks** and standards, ensuring alignment with best practices and **regulatory requirements**
- Assessed transparency in ESG reporting, addressing **criticisms** and enhancing investment **decision-making** processes

Line Follower and Mountain Cargo Carrier | Course Project: Makerspace (July'23)
Guide: Prof. Ankit Jain | Mechanical Engineering, Prof. Joseph John | Electrical Engineering IIT Bombay

- Designed and built a pre-programmed **line-following bot** capable of climbing slopes up to 30° with a 500g payload
- Crafted the cargo bot's mechanical parts using AutoCAD **Fusion 360**, **3D printing**, and **laser cutting** technologies
- Implemented the **electrical** architecture using **Arduino board**, **motor drivers**, intricate connections and assembly
- Created a gravitational load-dumping mechanism that activates automatically upon reaching its designated destination

Space Solutions for Dual Occupancy in Older Hostels | Design Thinking (Feb'24 - Apr'24)
Guide: Prof. Nishant Sharma | Industrial Design Centre IIT Bombay

- Created a mobile app interface using **Figma** that shows the real-time occupancies of hostel & college study facilities
- Utilized the product design methodologies like user persona creation empathy mapping for user-centric solutions
- Applied the **SCAMPER** framework for product ideation and iterative **prototyping**, effectively using various creative techniques like brainstorming, mind mapping, and affinity mapping to refine and further enhance critical product concepts

Design and Development of power- electronics | iSURP (July'24 - Present)
Guide: Prof. S Ravi Prakash Reddy | Energy Science and Engineering IIT Bombay

- Evaluated and simulated a **boost converter** in PLECS, focusing on its DC-DC power conversion for electric vehicles
- Designed and simulated a **boost PFC converter** in PLECS, investigating methods to achieve unity power factor by controlling the duty ratio of the switch, essential for efficient AC-DC conversion in **EV** charging systems.

Otto Cycle | Course Project: Thermodynamics and Energy Conversion (Sept'23)
Guide: Prof. Ashish Kumar Sarangi | Energy Science and Engineering IIT Bombay

- Studied and evaluated a real **Otto Cycle**, calculating its **performance** parameters using practical data collected
- Used **Python** to effectively sort data, plot graphs, and compare theoretical and practical work done by Otto Cycle

Carbon Capture Technologies | Learners' Space (July'24 - Present)

- Researched carbon capture technologies and their role in **climate change** analysis, including IAMs and SSP scenarios
- Analyzed global and Indian strategies for integrating **carbon capture** to combat **climate change** more effectively.
- Evaluated carbon capture **policies** and their impact on **sustainable development** and climate mitigation efforts

POSITIONS OF RESPONSIBILITY

Web Activity Associate | NSS, IIT Bombay (Jun'23 - Apr'24)
Part of a team of 4 people responsible for maintaining and updating the websites of NSS, IIT Bombay

- Contributed to the previous **webpages** of NSS, making changes and updating the existing codebase on **PHP**
- Collaboratively developed a **digital attendance** portal on the NSS website for AA to take attendance of volunteers
- Collaborated with the team develop the new **NSS website**, including the Home page and department pages
- Contributed to the creation and ground implementation of the **website** for **Flair**, the **Annual event of NSS**

TECHNICAL SKILLS

Programming	C++, Python, HTML, CSS, JavaScript, SQL
Data Science	Tensorflow, Keras, Pytorch, Numpy, Pandas, Matplotlib, Seaborn
Tools	L ^A T _E X, Git, GitHub, Figma, Excel, Office Suite

KEY COURSES UNDERTAKEN

Mathematics: Calculus, Linear Algebra, Differential Equations

ML and Computer Science: Computer Programming and Utilization, AI and Data Science, Introduction to Machine Learning, Supervised Machine Learning, Advanced Learning Algorithms

Energy Science: Fundamentals of Energy Science and Engineering, Hydrogen Energy, Reactions for Energy, Fluid Mechanics and Heat Transfer, Thermodynamics and Energy Conversion, Material Science for Energy Applications, Power Electronics, Electrical Networks and Machines, Electrical Networks and Machines Lab, Energy Conversion Lab, Environmental Studies

EXTRA-CURRICULAR ACTIVITIES

- Volunteered as substitute teacher for 50+ students at Dhruva VRIKSH, preparing for JEE (Aug '22 - Nov '22)
- Participated in Muskaan and Neem School initiatives, instilling values in children aged 3-10 (Feb'24 - July'24)
- Achieved honorable mention in Innovate-a-thon '24 by Blix for outstanding innovative solutions (2024)
- Represented Hostel 6 in Crossy GC, completing a 5.5 km marathon across campus (2024)