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M.Tech.  
Gender: Male  
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Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2022	6.52
Graduation	Gurukula Kangri Vishwavidyalaya	Faculty of Engineering and Technology	2018	69.98%
Graduation Specialization: Mechanical Engineering				
Intermediate	UP	S B R Inter College	2013	86.00%
Matriculation	UP	RC Gupta Higher Secondary School	2011	71.67%

#### AREAS OF INTEREST

Control Systems | Machine Learning | Deep Learning | Data Science | Natural Language Processing

#### SCHOLASTIC ACHIEVEMENTS

- Secured **99.7** percentile in **GATE - Mechanical Engineering** among 1.37lakh+ candidates. (2020)

#### MAJOR PROJECT AND SEMINAR

- M.Tech Project: Image Captioning using Deep Learning**  
*Guide: Prof. Biplab Banerjee & Prof. Debasish Chatterjee, IIT Bombay* (Jun'21 - present)
  - Objective:** To develop a **multi-model** neural network which **provides caption** for the image.
  - Extracted image features using a deep **CNN** with a pre-trained **Xception** model using **Transfer Learning**.
  - Designed **encoder-decoder RNN** model based on **LSTM** for sentences generation using **Flicker\_8K** dataset.
  - Implementing **attention mechanism** to **align** each word of description to different objects of input image.
- M.Tech Seminar: Posture stabilization of Unicycle type Mobile Robots**  
*Guide: Prof. Leena Vachhani, Systems and Control Engineering, IIT Bombay* (Sept'20 - Dec'20)
  - Conducted literature review of paper & analyzed linear structure of **chained form** for the unicycle like WMR.
  - Studied the implementation of **Homogeneous Finite Time Controller** and **Super Twisting algorithm** for bringing a robot to a **desired posture** starting from an arbitrary initial position.

#### KEY PROJECTS

- Implementing LQG and Model Predictive Control on SBMHS | SysCon Lab**  
*Guide: Prof. Leena Vachhani, Systems and Control Engineering, IIT Bombay* (Jan'21 - May'21)
  - Identified **MIMO ARMAX** model from the PRBS test data using MATLAB's System Identification Toolbox.
  - Estimated the states using **Kalman Filter** through Innovation Bias and State Augmentation approach.
  - Implemented multi-variable **LQG** and **MPC** on the given system for servo and Regulatory problem.
- Modelling and Control of a MIMO System | SysCon Lab**  
*Guide: Prof. Leena Vachhani, Systems and Control Engineering, IIT Bombay* (Jan'21 - May'21)
  - Model identification and design of **multi-loop controller** for a single board multiple heater system.
  - Preprocessed the **time-series data** and generated **AR, ARMAX** model using Systems Identification Toolbox.
  - Obtained pairings using **RGA, CN** and **NI** and designed **multi-loop PI** and **decentralized PI** controllers.
- Heart Disease Prediction with Machine Learning**  
*Guide: Prof. Biplab Banerjee, CSRE, IIT Bombay* (May'21 - Jun'21)
  - Performed **Exploratory Data Analysis** and visualized the data using **pandas & matplotlib** libraries.
  - Trained ML algorithms such as **Logistic Regression, KNN, Support Vector Machine, Decision Tree, Random Forest** and **XG Boost** for classification using **Scikit-learn** python libraries and compared their performances.
  - Deployed **GridSearchCV** algorithm for hyper-parameter tuning & achieved best accuracy of **87%** in KNN.
- Trajectory Tracking and Control of Wheeled Mobile Robots | SysCon Lab**  
*Guide: Prof. Arpita Sinha, Systems and Control engineering, IIT Bombay* (Jan'21 - May'21)
  - Applied **Proportional** and **PI** controller to make the robot follow a Lissajous curve by comparing position and heading coordinates using **Bicycle Kinematic Model**.
  - Designed a controller for reference tracking and heading control of **Ackermann Kinematic Model** by asymptotically stabilizing leading vehicle trajectory.

- **Anomaly Detection and Forecasting using Time-Series Data** (Self Project) (Mar'21 - Apr'21)
  - Analysed **Smart Home dataset with weather information**, preprocessed and visualized the data.
  - Formed **Moving Average** model and plotted anomalies in the data using **Scikit-learn** libraries.
  - Improved the forecasted values using **Exponential Smoothing & ARIMA** model with the accuracy of **99%**.
- **Tweet Emotion Recognition with Natural Language Processing** (Jun'21 - Jul'21)
 

*Guide: Prof. Biplab Banerjee, CSRE, IIT Bombay*

  - **Tokenized** the tweets to sequences then **padded** and **truncated** the sequence to **30** words.
  - Developed a **Bidirectional RNN** model with **LSTM** and trained it on **tweet emotion dataset**.
  - Deployed the **Adam** optimizer to recognize emotions in tweets with **87%** accuracy on test dataset.
- **Classification of Traffic Sign Image using CNN** (May'21 - Jun'21)
 

*Guide: Prof. Biplab Banerjee, CSRE, IIT Bombay*

  - Preprocessed the data in **GTSRB** dataset and built the network architecture in **tensorflow, Keras** framework.
  - Used **Adam** optimizer for the classification purpose and achieved the accuracy of **94.3%**.
- **EK'15 - Elite Karting | Elite Racing India** (Mar'16 - Feb'17)
 

*Guide: Prof. Kapil Dev Sharma, Mechanical Engineering, GKV*

  - Led the team of **20** people in a national level **Go-Kart design, fabrication** and **racing** competition.
  - Designed a Go-Kart and performed the simulation for impact test in **SolidWorks**.
  - Secured **19th** rank out of **180+** participating teams in virtual round.
  - Fabricated the Go-Kart from scratch and **qualified** for the final racing event in Bhopal.

## RELEVANT COURSES

- Intelligent Feedback and Control
- Introduction to Probability and Random Processes
- Mathematical Structure for Control
- Modelling and Identification of Dynamical Systems
- Machine Learning for Remote Sensing II
- Applied Predictive Analytics
- Systems Theory
- Optimization

## ONLINE COURSES

- **Deep Learning Specialization | DeepLearning.ai (Coursera)** (Jun'21 - Aug'21)  
Neural Networks, Hyperparameter Tuning, Regularization, CNNs, Sequence Models
- **Machine Learning | Stanford University (Coursera)** (May'21 - Jun'21)  
Classification, Linear Regression, Decision Trees, KNN, SVM, K-Means Clustering
- **Foundations of Data Science | IIT Madras (Guvi)** (Feb'21 - Apr'21)  
Descriptive Statistics, Inferential Statistics, Probability Theory, Hypothesis Testing

## POSITIONS OF RESPONSIBILITY

- **Interview Coordinator | Institute Placement Team, IIT Bombay** (Oct'20 - May'21)
  - Coordinated with a team of **250+** members for interviews of **1700+** students.
  - Assisted in conducting Tests for **15+** firms and handed student queries.
- **Public Relations and Services Coordinator | PG Cult, IIT Bombay** (Sept'20 - May'21)
  - Worked with a team of **15+** people for the successful completion of first ever online PG Cult.
  - Coordinated with multiple clubs for various cultural events in virtual mode.
- **Teaching Assistant | Systems and Control Engineering Department, IIT Bombay** (Aug'20 - present)

## TECHNICAL SKILLS

- **Tools:** MATLAB, Simulink, Git, SolidWorks,  $\LaTeX$
- **Languages:** Python, SQL, R, C++
- **Libraries & Frameworks:** TensorFlow, Keras, Pytorch, Scikit-Learn, SciPy, Matplotlib, Pandas, NumPy

## EXTRA CURRICULAR

- Won **1st Prize** in Street Play Competition, Jnanagni, Gurukul Kangri Vishwavidyalaya. (2015)
- **Hobbies:** Playing Cricket, Football, Trekking and watching Anime.