AREAS OF INTEREST

- Deep learning | Computer Vision | Natural Language Processing | Machine Learning | Data Science

MAJOR PROJECT :

- **Objective** :**Visual Question Answering:** (Jun'21-Till date)
  Guide:Prof Biplab Baneerjee,CSRE Dept,IIT Bombay |Guide:Prof Vachhani,SYSCON Dept,IIT Bombay
  - **Objective:**Develop a deep learning based model capable of extracting **Semantic** discriminative features for image and question and combine **Visual** and **textual** image features to guide answer prediction
  - **OngoingWork:** Training a deep learning model using **CNN(VGG-NET)** model to get semantic features of significant image region and using **RNN(LSTM)** for extracting textual features and concatenating this models for answer prediction using **MS-COCO Dataset**
  - **Future work:** Introduce feature wise attention mechanism to learn cross feature wise attention between image and question modalities

KEY ACADEMIC PROJECTS

- **Car Object Detection -** (Jun'21-Jul'21)
  Guide:Prof Biplab Baneerjee,CSRE Dept,IIT Bombay | ComputerVision
  - Objective:To locate car in the surrounding using bounding box.
    - Implemented Car object detection using pretrained **MobileNet Architecture** with additional Convolutional layer.
    - Achieved an accuracy of 99.8 with **MAE** of 2.72 and **loss** of 0.02.
- **Semantic Image Segmentation for CityScape Image Paris Kaggle Dataset-** (Jun'21-Jul'21)
  Guide:Prof Biplab Baneerjee,CSRE Dept,IIT Bombay | ComputerVision
  - Objective: Performed Semantic segmentation using End to End **UNet** Model
    - Implemented K-means Clustering Algorithm to give colored labels to 10 different classes of an image.
    - Evaluated the model using **"mean-square Error"** and **"Adam"** optimizer with learning rate(lr=0.00001).
- **Stock Price Prediction** (Jul'21-Aug'21)
  Guide:Prof Biplab Baneerjee,CSRE Dept,IIT Bombay | Computer Vision
  - Objective: Implemented RNN and LSTM Models on Google Stock Price Prediction Kaggle dataset.
    - 'tanh' activations and 'Adam' Optimizer was used in the design with 'METRICS' accuracy
    - Applying LSTM and RNN model to improve the accuracy of training
- **LSTM Text Generation-** (Jul'21-Aug'21)
  Guide:Prof Biplab Baneerjee,CSRE Dept,IIT Bombay | Computer Vision
  - Objective: Designed and trained LSTM RNN on Newyork Times Comments and headlines dataset to train a text generation language model which can be used to generate news headlines.
    - Performed tokenization of every text document in the dataset to create sequence of tokens for prediction of sequence of words
    - Applied **LSTM** Model which includes '**softmax**' activations with **categorical crossentropy loss** and '**adam**' optimizer.

- **Control law and Path Control Algorithm for reference tracking in Differential Drive Robots** (Jan'21-May'21)
  Guide:Prof Arpita Sinha,SYSCON Dept,IIT Bombay | System and Control Engineering lab
  - Analyzed Unicycle Modelling of Differential Drive robot and Implemented open loop control and P,PI and PID for locating its desired position.
  - Implemented Aseem vivek Borkar Phd Thesis(IIT BOMBAY) named Surveillance and Motoring Algorithm for for tracking linear and angular velocities of Robot(**Gazebo,ROS Interface**) for more accuracy.
  - Implemented Non linear Controller(Springer Handbook of Robotics,Bruno Siciliano,Oussama Khatib(Eds) for **Asymptotically** stabilizing the reference trajectory path(Cardiod Curve) and achieved **MSE** to **0.175 units**
- **Homogenity Based Sliding Mode Control** (Oct'20-Nov'20)
  Guide: Prof Bijnan Bandyopadhyay,SYSCON Dept,IIT Bombay | Seminar
  - Conducted a literature review on Homogenity based sliding Mode controller and their **Super-Twisting Algorithms**(Levant-1993)
  - Studied 1st order and 2nd order Sliding mode Continous and discontinous controller and observed their effects on **finite time convergence** and **Sensitivity** .

SELF PROJECTS :

- **Human Activity Recognition-** (Machine Learning) (May'21-Jun'21)
  - Objective: Detect Human Activities like Walking Walking Upstairs Walking Downstairs Sitting Standing Laying on **Human ActivityRecognition with smartphones Kaggle dataset**.
  - Implemented Machine learning Algorithms **Linear Regression**,**SVM**,**RandomForest**,**Decision Tree**,**XGBoost** and **CNN** to predict classification accuracy.
- **Adult Income Census-** (Machine Learning) (Jun'21-Jul'21)
  - Objective: Determine no. of individual greater then income 50K a year in **Adult Census Income** Kaggle Dataset.
  - Implemented Classifier **Decision Tree** and **RandomForest** and compared their performance using **Accuracy**,**Recall** and **F1-Score**.
- **Credit Card Fraud Detection-** (Machine Learning) (Jul'21-Aug'21)
  - Objective: Detect Fault Credit Card Transaction using **Random Forest Classifier**.
  - Used **AUC**(Area Under the Curve) and **ROC** as an **Evaluation-Metric** to evaluate the performance of Machine learning classifier

RELEVANT COURSES

- Machine Learning for Remote Sensing-I
- Applied Predictive Analytics
- Intelligent Feedback Control
- Introduction to Probability and Random Processes
- Optimization

ONLINE COURSES

- **Deep learning Specialisation | Deeplearning.ai(Coursera)**
  Neural Networks,Hyperparameter Tuning,Regularization,CNNs,Sequence Models
- **Machine Learning | Standford University(Coursera)**
  Classification,Linear Regression,Decision Trees,KNN,SVM
- **Google Data Analytics | Google(Coursera)**
  Foundations | Ask Questions | Prepare Data for Exploration | Process Data | Data Analysis with R Programming | Share data through visualization | SQL | Tableau

TECHNICAL SKILLS

- **Tools:** MATLAB, Simulink,Version, ROS, LaTeX
- **Languages:** Python,R,SQL,Tableau

POSITION OF RESPONSIBILITY

- **Department General Secretary, SysCon Department, IIT Bombay**
  - Mentored 17 Freshmen MTech Students from Department of System and Control Engineering and guided them to ensure their smooth transistion to academics at IITB.

SCHOLASTIC ACHIEVEMENTS

- Secured **96.24** percentile in **GATE-EE 2019** (Engineering PG entrance exam).

HOBBIES

- Hobbies: Playing Badminton,swimming drawing and travelling.