Vinayak Jauhari
Systems & Control Engineering
Indian Institute of Technology, Bombay

203230002
M.Tech.
Gender: Male
DOB: 10-12-1997

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

Deep Learning | Computer Vision | NLP | Machine Learning | Data Science | Control Systems

SCHOLASTIC ACHIEVEMENTS

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

MAJOR PROJECTS 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.

- **Tweet Emotion Recognition with Natural Language Processing**
  Guide: Prof. Biplab Banerjee, CSRE, IIT Bombay *(Jul'21 - Jul'21)*
  - **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 Images using CNN**
  Guide: Prof. Biplab Banerjee, CSRE, IIT Bombay *(May'21 - Jun'21)*
  - Preprocessed the data in **GTSRB** dataset and built the network architecture in **tensorflow, Keras** framework.
  - Used **Adam** optimizer for the classification purpose and accuracy of **94.3%** was achieved.

- **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.

- **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

- **Semantic Image Segmentation with CNN**
  Guide: Prof. Biplab Banerjee, CSRE, IIT Bombay *(Jun'21 - Jul'21)*
  - Performed Semantic segmentation using End to End **U-Net** architecture on **Cityscape Image Paris Dataset.**
  - Used **K-Means** Clustering Algorithm to give colored labels to **10** different classes of an image.
  - Evaluated the model using **Mean Squared Error** and **Adam** optimizer with learning rate (lr=0.00001).

- **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%.**

- **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 the **MIMO ARMAX** model from the PRBS test data using System Identification Toolbox.
    ○ Estimated the states using **Kalman Filter** through Innovation and State augmentation approach.
    ○ Implemented multi-variable **LQG** and **MPC** on a 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 **ARMAX** model using Systems Identification Toolbox.
    ○ Designed **multi-loop PI** and **decentralized PI** controllers for the servo and regulatory problem.

- **Generating Handwritten Digits using Generative Adversarial Network** (Self Project)   *(July'21)*
    ○ Implemented **DC GAN** on **MNIST handwritten dataset** to generate handwritten digits using PyTorch.
    ○ Created **loss function** for discriminator and generator & optimized the parameters using **Adam** optimizer.

- **EK'15 - Elite Karting | Elite Racing India**
  Guide: Prof. Kapil Dev Sharma, Mechanical Engineering, GKV   *(Mar'16 - Feb'17)*
    ○ 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

- Machine Learning for Remote Sensing II (Transfer learning, R-CNN family, YOLO)
- Applied Predictive Analytics (Data Analytics, Machine Learning, Deep Learning, Predictive Maintenance)
- Introduction to Probability and Random Processes (Axiomatic Probability, Distributions, MMSE, Basics of MCMC)
- Optimization (Linear Programming, Constrained Optimization, Convex and Non-Convex Optimization)
- Intelligent Feedback & Control (Feedback Systems, PID Control, Multivariable Control, Data-driven PID Control)

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 - April'21)*
    Descriptive and Inferential statistics, Probability theory, Hypothesis testing
- **Google Data Analytics | Google (Coursera)**   *(July'21 - present)*
    Data Preprocessing, Data Visualization, SQL, R, Tableau, Spreadsheet

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.