# RAHUL BHAGAT | 20PH20032

PHYSICS (M.Sc. 5Y)

MICRO SPL. in ENTREPRENEURSHIP AND INNOVATION, ARTIFICIAL INTELLIGENCE AND APPLICATIONS


## EDUCATION

| Year | Degree/Exam | Institute | CGPA/Marks |
|---|---|---|---|
| 2025 | M.SC(5YR) | IIT Kharagpur | 8.26 / 10 |
| 2019 | ISC | Loyola School Taldanga | 96% |
| 2017 | ICSE | Loyola School Taldanga | 92% |

## INTERNSHIPS

**Intern - AI Practices | Affine Analytics (Received Pre-Placement Offer)** **[Feb 2024- November 2024]**

- Engineered a Coupon Extractor using **GPT Vision** models API to retrieve information regarding coupons and offers in a given coupon.
- Experimented with the finetuning capabilities and potential of the **MPT-7B** model for making Customer-end chatbots for businesses.
- Enhanced LLM latency and performance using Prompt Compression utilizing Microsoft's LLMLingua 2 and achieved improved latencies.
- Leveraged the **Azure AI Cloud services** to integrate AI search on Microsoft Sharepoint for **RAG** utilizing the Sharepoint Indexer.
- Built an end-to-end **Marketing Strategizer Graph** using **LangGraph's Multi-agent** workflow and delivered a **Streamlit** application.

**AI/ML Student Researcher | GenVR Research** **[May 2023- Jan 2024]**

- Developed a **Multimodal Chatbot** leveraging **LangChain** and **Huggingface's** Transformers libraries on a Jupyter VAST.AI server.
- Experimented and finalized an image captioning model for the Multimodal Chatbot from HuggingFace Hub for **Image to Text generation**.
- Integrated the **Chat from PDF** functionality for better domain knowledge, less hallucinations and faster query responses using RAG .
- Worked on creating **Personalised Personas** from user uploaded PDFs for personalised Chatbots and talking with famous personalities.
- Developed a **Chatroom feature** that facilitated the interaction of multiple Chat-Personas(Agents) for Debates and other such tasks.
- Fine-tuned the **Llama-2 7B** model on a private Insurance dataset to make a Question-Answer chatbot for their customer-relations team.

## PROJECTS

**Bachelor's Thesis Project | Prof. P K Datta, IIT Kharagpur** **[March2023]**

- Cleaned and preprocessed data from synthetic Transient Absorption Spectroscopy (TAS) experiment for further analysis using Python.
- Implemented a paper by *Nikola et al*. and applied the techniques of Machine Learning to an actual TAS data for a sample of $WS_2$.
- Determined the decay rate distribution of both synthetic and real TAS data using machine learning algorithms at the IIT Kharagpur Lab.
- Utilized the **Lasso Regression** model with a tweaked loss function to analyze real data by preprocessing it using **Origin** and **Python.**

**PyTorch MNIST Digit Recognition using CNN | Self-Project** **[March2023]**

- Downloaded the **MNIST** Dataset from *torchvision.datasets*, and created train and test Dataloaders utilising Pytorch's **DataLoader** Class.
- Implemented a **Convolutional Neural Network** Class using the *torch.nn.Module* with 3 Convolutional,3 Pooling and 2 Linear layers.
- Trained the model with a learning rate of 0.001, for 3 epochs and a batch size of 64, with the final linear layer having 10 nodes.
- Used **ADAM** optimizer and **Cross Entropy Loss function** and achieved an accuracy of *98.48%* and *98.40%* on the train and test data.

**Gold-Price Prediction using Machine Learning | Self-Project** **[Feb 2023- Mar 2023]**

- Downloaded, cleaned and normalized historical gold price data and relevant economic indicators from Kaggle and used Pandas to load it.
- Identified key features using heatmaps, influencing gold prices, including economic variables like currency exchange rates, silver rates,etc.
- Implemented multiple machine learning models (e.g., Linear **Regression**, **SVR**, **KNN** ) to predict future gold prices and calculated scores.
- Evaluated model performance using metrics such as **RMSE** and **R-squared** to selected the best performing model(Poly Regression).

**English Stock News Sentiment Analyzer | Self-Project** **[Jan 2023- Feb 2023]**

- Compiled and scraped raw stock news data on NIFTY 50 from *https://in.investing.com/* manually using the BeautifulSoup Library in Python.
- Utilized the **Tensorflow** Library to build a **Bi-GRU + Bi-LSTM** model stacked with a **Fully connected** layer and an output Linear Layer.
- Minimised to a MSE loss of 0.17 versus a MSL loss of *0.0124* on the training set. *link - https://github.com/therahulbhagat19/MLProjects*
- Uploaded the dataset collected to Kaggle and utilized the sentiment scores for stock price prediction using Time series analysis.

## SKILLS AND EXPERTISE

**Expertise**: NLP | Deep Learning | Machine Learning | Large Language Models | Parallel Computing | Computer Vision | Big Data | MLOps | Agents
**Programming Language / Tools:** C | C++ | CUDA | Python | SQL | GitHub | MS Office | PowerBI | OpenAI | AzureAI | Huggingface | Figma
**Libraries / Frameworks :** Scikit-learn | Pytorch | Tensorflow | Langchain | Autogen | Transformers | Streamlit | NLTK | OpenCV | Pandas | Numpy

## AWARDS AND ACHIEVEMENTS

- Announced as **Top Performer of the Month** for May 2023 at GenVR Labs for the very first month of working for the Multimodal GPT team.
- Devised a product to close exhausted borewells as part of the **GOLD** winning team in the **Open IIT Product Design Competition 2022**.
- Selected for a Foreign Internship at Bar-Ilan University, Tel Aviv, in Quantum Computing through the International Relations Cell IITKGP.

## POSITIONS OF RESPONSIBILITY

**Secretary Music and Literary Cup | Meghnad Saha Hall of Residence** **[Dec 2021 - Apr 2022]**

- Managed the practice sessions and Participation in all the Inter-Hall events in the Music Cup and the Literary Cup for the Academic Session 2021-2022.
- Responsible for the procurement and maintenance of all the music instruments for a successful participation in the Music cup events for MS Hall.

## COURSEWORK INFORMATION

**Academic Courses:** Programming and Data Structures, Artificial Intelligence for Economics , Design and Analysis of Algorithms Lab , Computational Physics, Linear Algebra, Mathematical Methods 1 and 2 , Probability and Statistics , Small Business Develpoment
**ML Courses:** Machine Learning Specialization - Coursera - Stanford University, Machine Learning A-Z - Udemy , Stanford University - CS229
**DL Courses:** Deep Learning Specialization - Coursera, Deep Learning with PyTorch: Zero to GANs - Jovian.ai , Stanford University CS230

!Self declared by the student, CDC could not verify the relevant documents