# PROJECT REPORT

# Stock Price Trend Prediction with LSTM

## Introduction :

The stock market is highly dynamic and influenced by various economic, political, and psychological factors. Predicting stock prices is a challenging task due to its volatile nature. This project aims to build a predictive model using Long Short-Term Memory (LSTM), a type of Recurrent Neural Network (RNN), to forecast Tesla's stock price trend based on historical data.

## Abstract :

This project leverages an LSTM model to predict the future prices of Tesla (TSLA) stock using its historical closing prices. The dataset is preprocessed and normalized before being split into training and testing sets. A multi-layer LSTM model is built using Keras, trained on 80% of the data, and evaluated on the remaining 20%. The model's performance is visualized using actual vs. predicted graphs. Additional technical indicators like Moving Average and Relative Strength Index (RSI) are incorporated for enhanced trend analysis. The project was executed in Google Colab using Python and key machine learning libraries.

## Tools Used :

- Python
- Google Colab
- Pandas, NumPy
- Matplotlib, Seaborn
- Keras, TensorFlow
- Scikit-learn
- MinMaxScaler
- yfinance (optional for live data)
- Streamlit (optional for UI)

## Steps Involved in Building the Project :

1. **Data Collection**: Used historical stock data of Tesla (TSLA.csv).

2. **Data Preprocessing**: Filtered the 'Close' column and scaled values using MinMaxScaler.

3. **Sequence Creation**: Created time series sequences of 60 days to predict the 61st day.

4. **Model Building**: Built an LSTM model using Keras with two LSTM layers and Dense layers.

5. **Training and Validation**: Trained on 80% of the dataset and evaluated using Root Mean Squared Error (RMSE).

6. **Prediction Visualization**: Plotted graphs of actual vs predicted closing prices.

7. **Technical Indicators**: Added 50-day Moving Average and RSI for further trend understanding.

8. **(Optional)**: Streamlit dashboard for interactive input and visualization.

## Conclusion :

The LSTM model proved effective in predicting stock price trends based on historical data. Although financial markets are inherently noisy and complex, the model successfully identified overall directional trends. The addition of Moving Average and RSI indicators provided better interpretability of results. This project enhanced understanding of deep learning, time series forecasting, and its application in financial data analysis.