Project Design Phase

Date	23-06-2025
Team ID	LTVIP2025TMID40978
Project Name	Traffic intelligence
Maximum Marks	4 marks

The Design Phase involves translating the problem requirements and objectives into a clear system architecture and workflow. It defines how the components of the traffic prediction system interact, how data flows through the system, and how user interaction is facilitated. This phase ensures that the project is built with a strong, scalable, and efficient structure.

1. System Architecture:

The project is designed using a modular architecture, consisting of the following key components:

Data Processing Module

Responsible for cleaning, transforming, and preparing the dataset for training. This includes handling missing values, feature scaling, and encoding categorical variables.

Model Training Module

Trains the machine learning model using historical traffic and weather data. Several models were evaluated, and the best-performing one was selected based on performance metrics.

Prediction Engine

Accepts user inputs (hour, weather features, holiday status) and generates real-time predictions using the trained model.

User Interface (Streamlit)

A simple and interactive front-end built using Streamlit, allowing users to enter input data and view predicted traffic volume.

2. User Interface Design:

The front-end was designed with simplicity and usability in mind. Key UI elements include:

Input sliders and text fields for:

Hour of the day

Temperature

Rain and snow level

Cloud coverage

Holiday indicator

A "Predict" button that triggers the prediction

A clear display of the predicted traffic volume

3. Model Selection and Design:

Various machine learning models were tested during the design process, including:

Linear Regression

Decision Tree Regressor

Random Forest Regressor

XGBoost Regressor

After evaluation, Random Forest Regressor was chosen for its balance between performance and interpretability.

4. Deployment Design:

The final model and application were packaged and deployed using Streamlit Cloud, making the tool accessible through a web browser without requiring installation.

Conclusion:

The project design ensures that the system is modular, user-friendly, and capable of accurate real-time predictions.

Each component was thoughtfully designed to achieve project goals while maintaining clarity, simplicity, and performance.