Project Design Phase
Solution Architecture

Date	27 June 2025
Team ID	LTVIP2025TMID42078
Project Name	TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning
Maximum Marks	4 Marks

Solution Architecture – TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning

Overview:
TrafficTelligence is an advanced ML-driven platform that estimates and predicts traffic volume. It combines real-time data, weather patterns, historical traffic flow, and other contextual information to deliver accurate forecasts via a map-based interactive interface.

Architecture Components:

Frontend (User Interface Layer:

- **Tech:** HTML, CSS, JavaScript, Leaflet.js
- **Role:**
- Accepts user input (time, weather, etc.)
- Displays interactive traffic map with predicted volumes
- Shows live location and nearby congestion zones

Backend (Application Logic Layer)

- **Tech:** Python Flask
- **Role:**
- Receives requests from frontend
- Applies pre-trained ML model for prediction
- Handles map logic, location-based queries, and response rendering

Model Layer (AI/ML Engine)

- **Tech:** Scikit-learn (RandomForestRegressor), Pandas, NumPy
- **Role**
- Trained on weather + time + location features
- Predicts traffic volume
- Model serialized via `joblib` or `pickl`

Deployment & Usage:

- **Local Deployment:** Flask + HTML/CSS + Leaflet + model.pkl on Python server
- **Cloud Deployment (Future):** Dockerized containers, scalable API, hosted platforms like AWS or GCP
- **System Requirements:** Python 3.x, Pandas, Scikit-learn, Leaflet.js, Flask

Data Flow Summary:

```
[User Enters Holidays/Temparature etc]
       ↓
[Frontend Form → Flask API]
       ↓
[Model Predicts Volume]
       ↓
[Flask Returns Volume]
       ↓
[Leaflet Displays Map + Circles]
```