# TRAFFIC VOLUME ESTIMATION USING MACHINE LEARNING

**Project Title**: Traffic Volume Estimation Using Machine Learning
**Team Name:** TEAM TRAFFIC
**Team Members:**
- Bhimasingu Revathi (S200282)
- Annapareddy Keerthi (S200776)
- Anchi Jagan Yadav (22091A0468)

# Phase 1: Brainstorming & Ideation

**Objective:**

To explore potential real-world problems related to traffic congestion and identify an efficient solution using
machine learning techniques.

**Key Points:**

- Discussed real-time issues of increasing vehicle congestion.
- Selected the problem of estimating traffic volume to help in better planning and management.
- Considered the use of machine learning due to its ability to detect patterns and forecast trends.
- Identified relevant datasets and defined the scope of our solution.

# Phase 2: Requirement Analysis

**Objective:**

To gather and analyze the necessary technical and functional requirements for the successful execution of
the project.

**Key Points:**

- Identified the need for a dataset containing traffic data (e.g., vehicle counts, time, weather conditions).
- Decided to use Python along with libraries like Pandas, NumPy, Scikit-learn, and Matplotlib.
- Functional requirements: Load dataset, clean data, train ML model, evaluate and predict.
- Non-functional requirements: Accuracy, scalability, and speed.

# Phase 3: Project Design

**Objective:**

To design a solution framework that clearly defines how data flows and how different modules of the system
interact.

**Key Points:**

- Designed architecture with modules: Data Collection, Preprocessing, Model Training, Prediction,
Evaluation.
- Used flowcharts to visualize data input, processing, and output stages.
- Chose regression models suitable for numeric traffic volume prediction (e.g., Linear Regression, Decision
Tree Regressor).
- Emphasized modular coding to enable easier debugging and testing.

# Phase 4: Project Planning (Agile methodologies)

**Objective:**

To plan the execution of the project in sprints using Agile principles to ensure timely delivery and continuous
improvement.

**Key Points:**

- Divided the work into 5 sprints: Data Collection, Preprocessing, Model Training, Evaluation, and Final
Report.
- Held daily stand-up meetings to track progress and solve blockers.
- Used tools like Trello for task assignment and sprint tracking.
- Regularly reviewed and adapted plans based on progress and feedback.

# Phase 5: Project Development

**Objective:**

To develop and implement the machine learning model and integrate all modules into a working system.

**Key Points:**

- Collected and cleaned dataset to handle missing and inconsistent values.
- Performed data analysis and visualization to understand features.
- Trained multiple models and selected the one with best performance.
- Developed prediction module to estimate future traffic volumes based on input features.

# Phase 6: Functional and Performance Testing

**Objective:**

To ensure that the developed solution performs well under different scenarios and meets the expected
accuracy levels.

**Key Points:**

- Conducted unit testing for each module.
- Evaluated model performance using metrics like Mean Absolute Error (MAE) and R² Score.
- Tested the model with different test sets to check generalization.
- Verified that the system gives reliable predictions under normal and edge conditions.

# Conclusion:

The project "Traffic Volume Estimation Using Machine Learning" successfully demonstrates how intelligent systems can assist in solving real-world urban problems like traffic congestion. By utilizing machine learning models, we were able to analyze historical traffic data and develop a predictive model that estimates future traffic volumes accurately.

This system has the potential to assist traffic management authorities in better planning, reduce congestion, and improve overall transportation efficiency. Through each phase of the project — from ideation to development and testing — we followed a structured approach and applied Agile methodologies to stay on track.

This project not only strengthened our technical and analytical skills but also helped us understand the practical applications of machine learning in societal development.