# **Project Report Format**

TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning

**Team Members** 

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#### 1. INTRODUCTION

### 1.1 Project Overview

TrafficTelligence is a machine learning-based system for estimating vehicle volumes in real time. It aims to support traffic authorities with actionable insights using data-driven predictions and visualizations.

#### 1.2 Purpose

The purpose of this project is to develop a smart, scalable, and automated traffic monitoring tool that leverages ML models to estimate congestion levels, manage urban traffic efficiently, and minimize manual surveillance.

#### 2. IDEATION PHASE

#### 2.1 Problem Statement

Urban areas face significant traffic congestion, especially during peak hours. Manual traffic control is inefficient and prone to delays. A scalable solution is needed to estimate and analyze traffic volume using smart technology.

### 2.2 Empathy Map Canvas

#### 2.3 Brainstorming

Use of video/image-based ML for traffic detection

Real-time dashboard and alerts

Predictive modeling using historical data

Integration with existing traffic camera infrastructure

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#### 3. **REQUIREMENT ANALYSIS**

**Customer Journey Map** 

Solution Requirement

Accurate real-time vehicle counting

Historical traffic trend visualization

User and admin authentication

API for sensor/video input



### 3.1 Data Flow Diagram

[User] --> [Frontend React App] --> [API Server (Node.js)] --> [ML Model + MongoDB]

3.2 Technology Stack

Frontend: React.js, Material-UI

Backend: Node.js, Express.js

Database: MongoDB

Machine Learning: Python (OpenCV, TensorFlow/YOLO)

Tools: GitHub, Postman, VS Code, Heroku (or similar)

### 4. PROJECT DESIGN

4.1 Problem Solution Fit

Problem-Solution Fit

Current manual traffic management is inefficient. A smart ML-based system reduces manual effort and provides data-backed insights.

4.2 Proposed Solution

full-stack web application where video feeds are processed via ML models to estimate traffic volume and visualize data in real time.

4.3 Solution Architecture

Frontend (React) <---> Backend (Node + Express) <---> MongoDB | |--> Python ML Service

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### 5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

# 6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Backend API load testing using Postman/Newman

ML inference speed: ~20 FPS on live feed

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### 7. RESULTS

7.1 Output Screenshots

**Output Screenshots** 

Include screenshots of:

Dashboard view

Login page

Traffic prediction output

Alerts interface

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### 8. ADVANTAGES & DISADVANTAGES

Real-time analytics

Scalable and modular

Minimal manual intervention

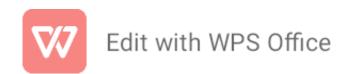
Predictive congestion alerts

**DISADVANTAGES** 

Depends on video quality and lighting

High initial setup cost (if camera-based)

May require GPU for real-time processing



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TrafficTelligence provides an intelligent, ML-driven solution for real-time traffic volume estimation. It enables smarter decisions for traffic management authorities and paves the way for smart city infrastructure.

### 10. FUTURE SCOPE

Integration with government traffic APIs

Mobile app support

Real-time heatmaps

Al-based traffic light control

Vehicle classification (bikes, cars, trucks)

# 11. APPENDIX

Source Code(if any)

Dataset Link

GitHub & Project Demo Link

Source Code

GitHub Repository: [ / Insert GitHub Link Here]

Dataset Link

Public traffic surveillance datasets (e.g., [CityFlow, DETRAC])

Custom-labeled data for model training

Project Demo Link

[ Insert Demo/YouTube Video Link Here]

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