**Project Design Phase-II**

**Solution Requirements (Functional & Non-functional)**

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| Date | 31 January 2025 |
| Team ID | LTVIP2025TMID59638 |
| Project Name | TrafficTelligence: Advanced Traffic Volume Estimation using Machine Learning |
| Maximum Marks | 4 Marks |

**Functional Requirements:**

Following are the functional requirements of the proposed solution.

| **FR No.** | **Functional Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| --- | --- | --- |
| FR-1 | Real-Time Traffic Estimation | - Process live video feed or sensor data - Update vehicle counts every 5 minutes - Display volume with timestamps |
| FR-2 | Congestion Detection & Route Analysis | - Detect congestion using ML models - Color-coded congestion levels - Suggest alternate routes |
| FR-3 | Data Visualization Dashboard | - Display traffic heatmaps - Graphs for peak/off-peak hours - Location-based filtering |
| FR-4 | Model Training & Optimization | - Implement data augmentation (rotation, flipping) - Train model with historical and live data - Hyperparameter tuning |
| FR-5 | System Integration for Developers | - Provide RESTful API for traffic data - Model integration guide - Real-time data stream support |
| FR-6 | Customizable Traffic Strategy Interface | - Allow city-based customization - Strategy templates for metro/rural areas - Admin control panel |
| FR-7 | Testing & Quality Assurance | - Perform automated and manual testing - Web interface bug tracking - Model accuracy validation |
| FR-8 | Stakeholder-Specific Reporting | - PDF/CSV export of traffic data - Report customization by date/location - Scheduled email reports |
| FR-9 | Educational and Research Utility | - Public dataset access for training - Documentation for model use - Student/researcher user roles |

**Non-functional Requirements:**

Following are the non-functional requirements of the proposed solution.

| **NFR No.** | **Non-Functional Requirement** | **Description** |
| --- | --- | --- |
| NFR-1 | Usability | The system should offer an intuitive and user-friendly interface for all stakeholders (e.g., traffic managers, analysts, drivers). |
| NFR-2 | Security | Data must be protected using secure protocols. Only authorized users can access traffic data and model endpoints. |
| NFR-3 | Reliability | The system should provide consistent traffic estimations and visualizations with minimal errors or downtime. |
| NFR-4 | Performance | The platform must process traffic data and respond within 3 seconds for all critical functionalities. |
| NFR-5 | Availability | The system should be available 24/7 with at least 99.5% uptime to support continuous monitoring. |
| NFR-6 | Scalability | The system should support an increasing number of locations, data sources, and users without degradation in performance. |