UNIVERSIDAD DE GUADALAJARA

Centro Universitario de los Valles

Master of Software Engineering

Intelligent Traffic Management System

Presentation

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Abstract

The project aims to develop an intelligent traffic management system for metropolitan areas with the goal of optimizing traffic flow, reducing congestion, and enhancing urban mobility. The system will collect and analyze real-time traffic data from traffic sensors to provide up-to-date information on traffic conditions, suggest alternative routes, and efficiently coordinate traffic lights.

Justification

Metropolitan areas face traffic congestion issues that lead to delays, stress, and unnecessary emissions. An intelligent traffic management system can address these issues by providing real-time information to drivers, optimizing traffic light coordination, and predicting traffic patterns. This can improve traffic flow, reduce travel time, and contribute to environmental sustainability.

Functional Requirements

1. The system must collect and process real-time traffic sensor data.
2. It should provide an intuitive user interface to display the current traffic status.
3. Drivers should receive notifications about congestion and alternative routes via a mobile application.
4. The system must predict traffic patterns based on historical data and recurring events.
5. It should adaptively coordinate traffic lights to enhance traffic flow.
6. Drivers should be able to select routes based on the provided information.
7. The system must integrate with navigation systems and map applications.
8. It should allow administrators to configure traffic management parameters.

Non-Functional Requirements

1. Latency for updating traffic information on the interface should not exceed 5 seconds.
2. The mobile application should be compatible with Android and iOS operating systems.
3. Driver data privacy must be protected through encryption measures.
4. The platform should be scalable to accommodate increased user traffic.
5. The system should be available 24/7 with a targeted availability of 99%.
6. The user interface should be intuitive and user-friendly for drivers of all ages.
7. The system must comply with traffic safety and data protection regulations.

Glossary

- **Intelligent Traffic Management System:** A software platform designed to collect, analyze, and present real-time traffic data with the goal of improving traffic flow and urban mobility.
- **Traffic Sensors:** Electronic devices installed on roads and urban streets to collect data about vehicle flow, speed, and other relevant parameters.
- **Congestion:** The state of traffic where there is a high density of vehicles on a road, resulting in reduced speed and delays.
- **Alternative Routes:** Different paths that drivers can take to avoid congestion areas and improve travel time.
- **Traffic Signal Coordination:** Synchronized adjustment of traffic signals at different intersections to improve traffic flow and reduce waiting times.
- **User Interface:** Visual and functional space through which users interact with an application or system, including elements like buttons, menus, and informational panels.
- **Traffic Pattern Prediction Algorithm:** Set of rules and mathematical calculations used to anticipate how traffic will develop based on historical data and current conditions.
- **Microservices Architecture:** Software design approach where applications are developed as a set of small, independent, and highly specialized services that communicate with each other.
- **Data Privacy:** Protection of users' personal information, including location data and other sensitive information, to prevent unauthorized access or misuse.
- **Scalability:** The ability of a system to handle an increase in workload, data, or users without degrading performance.
- **Availability:** The percentage of time a system or service is available and operational, usually expressed as a decimal value.
- **Intuitive User Interface:** Interface design that is easy to understand and use without requiring a significant learning curve for the user.
- **Traffic Safety Regulations:** Standards and laws established by local or national authorities to ensure the safety of users on public roads.
- **GDPR (General Data Protection Regulation):** European Union privacy regulation that sets rules for the protection of personal data and the privacy of European citizens.

Bibliography

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