

Project title: Traffic management system(TMS)

Project objectives:

A Traffic Management System (TMS) that utilizes the Internet of Things (IoT) makes use of devices and data analytics to efficiently handle and enhance the flow of traffic, in both suburban regions. The main objective of such a system is it uses Internet of Things (IoT) devices and data analysis to monitor the flow of traffic and identify congestion in time. It then offers commuters access, to this information, through a platform or mobile applications.

Using appropriate IOT devices for monitoring traffic various methods can be utilized, such as the use of traffic cameras GPS trackers, traffic sensors and environmental sensors. These devices have the ability to gather information such, as the number of vehicles their speeds, the density of traffic, weather conditions and other pertinent data.

The data can be collected by deploying IoT devices, at traffic locations such, as intersections, highways and major roads. Setting up the devices to securely and consistently gather data and send it to a data repository. The received data can be stored by creating an infrastructure, for storing data that can effectively manage the influx of data streams.

Developing certain algorithms and models for analyzing the real-time traffic data such as identifying traffic congestion, calculating travel time and for generating the congestion alerts. The real time traffic data analysis and visualization can be done by utilizing python.

Developing a user platform or mobile application that allows commuters to easily access information, about traffic conditions and creating interfaces that display up to date data, on traffic congestion provide alternative route suggestions and estimate travel times. Additionally establishing a server to distribute traffic data to the platform or application. Integrating Internet of Things (IoT) devices, with the traffic information platform to ensure uninterrupted communication. Using other IoT communication protocols along, with Python for integration.

A well-implemented IoT-based Traffic Management System can significantly improve traffic conditions, reduce congestion, enhance road safety, and provide commuters with valuable real-time information to make informed decisions about their routes. It also contributes to more efficient urban planning and transportation management.

IOT devices designs:

To achieve real-time traffic monitoring, a strategically planned deployment of IoT sensors is essential. Few sensors and components which are used include:

Serial Peripheral Interface (SPI):- It allows us to communicate with the peripheral devices quickly over short distances.

RFID: - A library for interfacing RFID readers with Arduino board UART.

Servo: - This library allows an Arduino board to control rotation of Servo motors.

Software Serial: - This library allows serial communication on other digital pins of the Arduino using software to replicate the functionality.

MFRC 522:- Read and write different types of Radio Frequency Identification cards on the Arduino board.

Arduino design:

Arduino UNO which is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins. These two arduino boards are combined to form the central controller of the entire system which is configured by python. The sensors and components are then properly connected to the configured arduino which make up the entire system. This IoT system offers good traffic flow and congestion control.

Data sharing platform and integration approach:

The real-time data is then uploaded to web-based platform for the use of public. The users can be notified about the significant traffic incidents or route changes by implementing this system. Developing data processing pipelines to analyse, and visualize traffic data collected from IoT sensors in real-time data can help the public to get a well understanding of the traffic conditions. With a well-structured plan, the project is poised to address traffic congestion and provide commuters with a more efficient and pleasant commuting experience.