Intelligent Road Traffic Control (IRTC)

Cities across India are growing rapidly, thousands of vehicles are being added to the road everyday and the need of the hour is a technology for managing the road traffic. Providing citizens with accurate information on traffic conditions can encourage journeys at times of low congestion, and uptake of public transport.

The main issue with road traffic is congestion. It gives rise to various other related problems.

The Idea :

The idea, basically is to develop an application that will analyse and estimate the demands of road traffic users and calculate the timings of the traffic lights grid.
A mobile app will be made using the AWS Lambda : Mobile Backend. The user will be sending GPS location anonymously to the AWS DynamoDB (Low Latency DB) in real-time. The near-realtime data will give us the number of vehicles in a street section and the distance between them, that will help us to analyse the traffic demands and calculate the timings of traffic lights. The Traffic flow routes can be analysed at peak hours (office discharge, etc). This can help us to channelize the traffic according to its regular flow.

The mobile app will have three different classes of users -
1) Emergency Vehicles (Ambulance, Fire Fighters, Police, etc)
2) Public Transport (Buses,Trams, etc.)
3) Regular User.

The users, their features and functionalities -

1) Emergency Vehicle : The app will take input for a path from the Emergency vehicle user, when in emergency, the Traffic lights in that path will be optimised for smooth movement of the emergency vehicle. The nearby users in the traffic will be notified about an emergency vehicle arriving near them and ask them to give way for the same.

2) Public Transport : The app will analyse this class of vehicle with its daily route, using Amazon machine learning and optimise the traffic light timings for them. For instance, If a Bus is running late on its regular route, the bus will have less waiting time on the traffic signals.

3) Regular User : The regular user will provide the traffic data. Which will help our system to analyse the traffic density and congestions in realtime. The user can also

send images of congestions and defects in road (eg. potholes) at several locations. The media generated will be Stored in Amazon S3. The user can also notify about the accident spots on their nearby locations. The authorities will be informed with this data in order to take proper action. The waiting time of the user will decrease on the traffic signals. According to the traffic density.

The regular user's driving behaviour will be analysed and based on that the user will be rated. For instance, If the user drives above the speed limit in a street segment, then the user will have less rating (points). Rash driving users can also be identified by their acceleration and other parameters. The ratings will help the drivers evaluate themselves and improve themselves as a good driver.

The system will also make use of the Traffic Cameras at various spots to analyse number of vehicles and vehicle density. This can be done using Amazon Rekognition.

The data generated by this system will also help the government to analyse the traffic flow and identify the need of infrastructure and various features on the road. Also to identify the users who break traffic rules.

Overall, this system will help us in

1) Reducing traffic jams.
2) Optimising peak hour demands.
3) Optimise Public Transport Timings.
4) Facilitate emergency vehicles.
5) Help Identify Accident spots.
6) Understand user driving behaviour.
7) Reduce Economic loss.
8) Evaluate congestion spots and help in taking decisions to build new infrastructure.

Road network features and description : With the use of OpenStreetMap to obtain information about the road network and some of its infrastructure, including locations of junctions and traffic lights, and for visualisations.