SmartFlow: Integrated Emergency Vehicle Detection and Traffic Rule Monitoring System

Introduction:

The proposed system utilizes the sensor data, communication and automated algorithms is to be developed to keep traffic flowing more smoothly. The aim is to optimally control the duration of green or red light for a specific traffic light at an intersection. When traffic is heavy in one direction, the green lights should stay on longer. The traffic light system has also been given an emergency mode, which gives ambulances priority to pass through traffic lights. And it is impotent to implement the Traffic Rule Violation Monitoring System because Road accidents are the ninth leading cause of death globally with over 12 lakh people dying on the roads each year across the globe. One of the major reasons for this would be traffic rule violations. And sending emergency alert through voice control system when driver is not well or facing some health issue in order to save the life of driver.

Literature survey:

The proposed system smart flow enables to control the traffic based on density of the traffic. And also enables the ambulance to avoid the delay due to road congestions. The Infrared Technology, visual sensing, RFIDs/radar system. All these together can help in controlling the traffic in more efficient manner whenever any ambulance or some emergency vehicle comes closer. The STMS eliminates the delay time faced by the emergency response vehicles on to the vehicle by displaying the arrival message of vehicle on LCD screen to the vehicles moving ahead and indicates them to shift to other lanes on the road [1]. Basic information of the patient is taken along with the status of the patient such as critical or non-critical. This information is further used to send it to the hospital. Depending upon the emergency, the driver sends the direction towards which it wants to travel [8].

Li-Fi technology, where streetlights transmit area maps to vehicles, aiding navigation without relying on mobile data or Wi-Fi. The received map is displayed on the vehicle's screen, offering a novel road navigation helps ambulance driver to take shortest path and avoid the traffic so reach the hospital as soon as possible. Li-Fi for highway navigation offers avenue for improving communication, navigation, and overall driving experience on highways. It has the potential to enhance safety, reduce congestion, and provide drivers with timely and relevant information. The street lights available on the road are at an average distance of 40 m from each other. The spectrum used for Li-Fi is eco-friendly. Each of the street light will transmit the road map of the area before the current location at a distance of 10 to 20 m. The system does not require the users to pay for the Li-Fi connection unlike the internet connection [6]. Unlike wireless networks, LIFI networks do not rely on any fixed frequency spectrum which is very limited. Instead, LIFI is based on visible light spectrum which provide the spectrum which is more than 10,000 times to radio wave to deliver desired data.

These unique characteristics of LIFI pose a number of challenges for the implementation of capacity, efficiency, availability and security in the wireless network system [12].

Not only the traffic management but also following the traffic rules is also important. The proposed monitor that, if the vehicle passed through a red-light signal, record the offence, notify it to the police control room, and send a message to the violator with necessary details such as date, time, location, image (if taken), and the penalty levied. The important question here is how to identify a particular vehicle? The obvious answer to this question is by using the vehicle's number plate as every vehicle has a unique number through which it is easily differentiated from other vehicles. Vehicles in each country have a unique license number, which is written on its license plate. This number distinguishes one vehicle from the other, which is useful especially when both are of same make and model [4]. The YOLOv3 algorithm is used to detect the traffic violation. The violations detected are vehicles jumping red signals, vehicle riding without helmets and vehicle drivers without seat belts. This technique identifies multiple objects in a single frame. The important factor of this algorithm is object detection which is identified by drawing boundaries around the object [5].

Public transport operators consequently need to provide reliable services in order to minimize disruption events that can affect the vehicles and their drivers, such as breakdowns, accidents or illnesses. The project here described focuses on the type of events and approaches related with the vehicle drivers and the identification of both their performance profiles and health condition while in operation. IoT-based system is designed to avoid countless mishaps due to drowsy drivers' behavioural and psychological changes by focusing on driver's eye movements. In addition to monitoring the intensity of the collisions impacts during road accidents, it is also records of the location for taking supportive action by using following technologies and algorithms Face and Eye Detection by Machine Learning (ML) and Deep Learning (DL) Algorithms, FPGA-Based Drowsiness Detection System and Eye Recognition System Based on Wavelet Network Algorithm [2][7]. The alert message helps in locating the location so that the medical services can be provided on time and this way the precious lives can be saved. If in case there is no casualty and assistance is not required then you can terminate the message sending process using the switch provided in the device. The message is transmitted via the GSM module, and the location of the accident is identified using the GPS module. With the help of the Accelerometer sensor the accident can be precisely detected [10].

Gapes Identified:

Dealing with traffic is common among all the papers mentioned. Along with this we are going implement a model which will provide less congestion, and high priority for the emergency vehicles (Ambulance) which will allow to reach the destination on time and using Li-Fi navigation which helps driver to reach the hospital as soon as possible. And also implementing the technology to detect the vehicle violating the traffic rules.

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