SmartFlow: Integrated Emergency Vehicle Detection and Traffic Rule Monitoring System

Objectives

- **Congestion Control:** While running a normal cycle if there are more vehicles in any lane then the lane opposite to lane with more vehicles green light will be High in order to control congestion. Consider a senior if the GREEN LED for 4th lane is High and there is more traffic density on the 1st lane. According to the normal cycle the 1st lane GREEN signal will be on but now due to high density on lane 1, the GREEN LED of 4th lane will be HIGH so that congestion on lane one will be cleared and then the normal cycle will work as before.

- **Emergency vehicle Detection:** When there is an Ambulance in lane, immediately the Green signal for Ambulance will be given so that Ambulance can be moved without interruption so patients can be reached to hospital as soon as possible.

- **Navigation Using Li-Fi:** 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.

- **Traffic rule violation monitoring system:** 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. Use of technology, sensors, and surveillance to monitor and detect violations of traffic rules. The system aims to enhance road safety, enforce traffic regulations, and contribute to the overall efficiency of traffic management.

- **Healthcare Monitoring :** 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.

Literature survey:

1. **Smart Traffic Management System using IoT Enabled Technology(2020)**

   Dr. Vikram Bali, Ms. Sonali Mathur, Dr. Vishnu Sharma, Dev Gaur published paper in 2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN)

   In this paper system is implemented based on 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.

2. **IoT-Based Smart Alert System for Drowsy Driver Detection**

   Anil Kumar Biswal,1 Debabrata Singh, Binod Kumar Pattanayak, Debabrata Samanta , and Ming-Hour Yang published paper in Correspondence should be addressed to Ming-Hour Yang; mhyang@cycu.edu.tw Received 29 December 2020; Revised 18 January 2021; Accepted 10 February 2021; Published 10 March 2021

   In this paper an 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.

3. **Automated Generation of Challan on Violation of Traffic Rules using Machine Learning**

   Shubham Kumar Chandravanshi1 , Hirva Bhagat2 , Manan Darji3 , Himani Trivedi published paper in 2019

   In this paper the proposed system works on both live video feed, recorded footage and static images. Whenever any of the street cameras catch any vehicle breaking any of the laws, the officers monitoring the feed in the monitoring centre draw a bounding box around around that vehicle and then that image is fed to our proprietary API which performs object detection, license plate detection, character segmentation, character recognition and finally returns the extracted license plate number in the GUI of our system along with a magnified image of the license plate.

4. **Dynamic Traffic Rule Violation Monitoring System Using Automatic Number Plate Recognition with SMS Feedback**

R Shreyas, Pradeep Kumar B V, Adithya H B, Padmaja B, Sunil M P published paper in 2017 2nd International Conference on Telecommunication and Networks (TEL-NET 2017)

In this paper the Traffic Management systems are installed on traffic signals to check for vehicles breaking the traffic rules. In order to automate these processes and make them more effective, a system is required to easily identify a vehicle. 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.

5. **Intelligent Traffic Violation Detection**

Roopa Ravish, Shanta Rangaswamy, Kausthub Char published paper in 2021 2nd Global Conference for Advancement in Technology (GCAT) Bangalore, India. Oct 1-3, 2021

In this paper, the proposed 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.

6. **Navigation System using Light Fidelity**

Niharika Mishra, Riya Mandal, Monika Rai, Harjeet Kaur published paper in Proceedings of the 2nd International Conference on Trends in Electronics and Informatics (ICOEI 2018) IEEE Conference Record: # 42666; IEEE Xplore ISBN:978-1-5386-3570-4

This paper describes the following

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 streets 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.

7. **Smart Healthcare Monitoring System For Healthy Driving in Public Transportation**

Pedro Maximino, Rui S. Cruz, Miguel L. Pardal published paper in 2023 18th Iberian Conference on Information Systems and Technologies (CISTI) 20 – 23 June 2023, Aveiro, Portugal ISBN: 978-989-33-4792-8

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. For that purpose, existing non-intrusive technologies present on the vehicle are leveraged, able to collect data related to physiological measurements taken in realtime. Such sensitive data will be processed, stored and shared in a secure manner, using blockchain-based technologies, so that only authenticated and authorized parties will be able to access the data, according to their clearance level, through an Application Programming Interface (API) designed for that purpose.

8. **Intelligent Traffic Control System for Smart Ambulance**

Prof. Deepali Ahir, Saurabh Bharade, Pradnya Botre, Sayali Nagane, Mihir Shah published paper in International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 06 June-2018

In this paper, we have come up with the Intelligent Traffic Control System for Smart Ambulance. The main objective of this system is to make it possible for the ambulance to reach a particular location without having it to stop anywhere until the destination is reached. This paper proposes monitoring of traffic lights and its controlling by the driver of the ambulance. 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.

9. **IOT based Smart Traffic Signal Violation Monitoring System using Edge Computing**

Meghana V, Prof. Anisha B S, Dr Ramakanth Kumar P published paper in 2021 2nd Global Conference for Advancement in Technology (GCAT) Bangalore, India. Oct 1-3, 2021

In this paper we can see description of how traffic rule violation can be controlled in developing countries such as India, traffic police department need a easy way to catch the vehicle owners who have violated the traffic signal rules. Currently, they are collecting the video near the traffic signal for 24*7 and the administrators are manually analysing to find if anyone has violated the traffic signal rules. They need to capture the license plate and then send a report. The proposed system addresses this problem. IOT based Smart traffic signal violation system make use of the features provided by edge computing. It shall surveil the signal only when it turns red and captures the video. Later it analyses the video using suitable image processing algorithm and captures the traffic rule's violator's license plate and send it to the administrators.

10. **IOT Based Automatic Vehicle Accident Alert System**

Nazia Parveen, Ashif Ali, Aleem Ali published paper in 2020 IEEE 5th International Conference on Computing Communication and Automation (ICCCA) Galgotias University, Greater Noida, UP, India. Oct 30-31, 2020

This system helps in detecting the accidents in very less period of time, basically within a few seconds, send the basic information to the first aid center in a message including the time and location

of the accident [2]. 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 [16].The message is transmitted via the GSM module, and the location of the accident is identified using the GPS module [3].With the help of the Accelerometer sensor the accident can be precisely detected [11]. The angle of the car's rolls over can also be known through the accelerometer via the message. This application provides in the most feasible way the optimal solution to the poor emergency facilities provided for road accidents

11. Cloud Computing based Smart Traffic Management System with Priority Switching for Health Care Services

X.S. Asha Shiny, D.Ravikumar, A. Chinnasamy, S. Hemavathi published paper in Proceedings of the Second International Conference on Applied Artificial Intelligence and Computing (ICAAIC 2023) IEEE Xplore Part Number: CFP23BC3-ART; ISBN: 978-1-6654-5630-2

In this system describes that how vehicle accident contraventions are identified by the traffic officers using an online service that is hierarchically carefully monitored or constrained. However, the suggested approach is generic and may be utilized in any major metropolis without losing its generality. Traffic lights linked to cameras in metropolitan areas can be upgraded by connecting to IoT. During a pandemic, this approach is precious. The police can easily regulate traffic from their homes using their cell phones and identify defaulters. The suggested technique aids in the separation of ambulance and rescue engines from ordinary traffic

12. Highway Navigation Using Light Fidelity Technology

Abhishek Patni, Bhavini Mishra, Harsh Aditya, Yogesh Kumar, Rohit Sharma published paper in IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 4, April 2015.

This paper describes about usage of Light Fidelity Technology. Light fidelity or we can say LIFI, a new WIFI is based on the very recent intelligence of light emitting diode(LED) technology as the source of lightning. LIFI is a fully networked, bidirectional high speed wireless connection system. 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.

13. Health Care Monitoring System in Internet of Things (loT) by Using RFID

Sarfraz Fayaz Khan published paper in 2017 the 6th International Conference on Industrial Technology and Management

This system describes how the usage of a cellular agent in healthcare procedure underneath wi-fi community environment gives a chance to explore improved services for patients and staffs reminiscent of medical professionals and nurses given that of its mobility. In this paper novel method to utilize it loT within the field of scientific and crafty wellness care are presented. The majority of the survey exist about the different health care approaches used in the loT, similar to, wireless well-being monitoring, U-healthcare, E-healthcare, Age-friendly healthcare techniques.