Detection of Stolen Vehicle with Traffic Control System and Ambulance Clearance

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Abstract:- Traffic congestion is one of the major problem in major cities due to increase in number of vehicles. This can be controlled by many methods and by implementing the modern technology. Ambulance clearance is also very important and stolen vehicle detection. In this paper the survey is done on many methods and technologies used to perform the objectives. The literature focuses on the technologies which are being used presently to control the congestion, easy passage of ambulance through the traffic and to detect the stolen vehicle. The technologies like ZigBee, green wave, IR sensor , Bluetooth, ultrasonic sensor, Internet of Things(IoT) are some the technologies on which the paper focuses.

Keywords:- Traffic Congestion Control, Ambulance, Stolen Vehicles.

I. INTRODUCTION

The existing traffic control signal has a huge disadvantage because of its fixed time method used. The traffic signal will not change based on the real time traffic on road near the intersection of two or more roads. Due to this the traffic congestion cannot be handled efficiently and the road utilization cannot be done to its maximum capacity [4]. In country like India, the no of vehicles on road is increasing day by day, due to which congestion is a major problem. Traffic congestion leads to long waiting time, fuel loss and also the wastage of money. Congestion results in high pollution levels which affect the living. Indian traffic is non-lane based and chaotic, so better congestion control should be provided. Due to this congestion it is difficult for the emergency vehicles like ambulance and fire brigade to reach its destination on time which may cost the precious lives of people. To overcome these problems traffic control system are made efficient by the use new technologies like ZigBee, RFID and GSM [2]. Over the other technologies RFID has advantage because it is cost efficient system an there will be no interruption in communication even in bad weather conditions [3]. RFID is an acronym for Radio Frequency Identification which is a wireless technology. This uses RFID tags and reader to calculate the density of vehicles on road, to improve the congestion control, for easy passage of ambulance through the traffic and also to detect the stolen vehicle. This technology makes use of electromagnetic energy [2].

II. CONGESTION CONTROL

In paper [4], ultrasonic sensors have been used to control the traffic. The sensors can work all day and has high accuracy. These sensors are situated at the junction to measure the density of vehicles as shown in Fig.1. Here ultrasonic sensors send out a signal of high frequency and the receiver is going to receive it and it is known as piezoelectric effect.
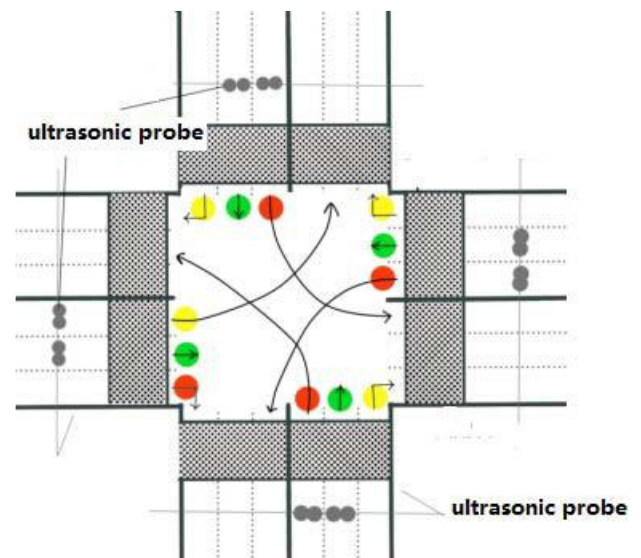

Fig 1:- Schematic Diagram of Ultrasonic Probe Installation

Here there are 3 lanes straight lane, left-turn lane and right-turn lane. Here the ultrasonic sensor is going to measure the amount of vehicles in each lane to do that there is a need of 2 or 3 groups of sensors. The signal is controlled by a single chip microcontroller which will measure the number of vehicles in straight lane which is done every 5 seconds in north and south direction before the traffic signal goes red and also it will determine the green light time in east and west directions. But in India, the traffic is not lane based hence it is difficult for this method to be implemented because it is going to measure the vehicle density based on the lanes. In paper [5],by optimizing the congestion control the delay can be equally distributed among all the vehicles at the intersection of roads. This paper has introduced 3 topic *Split* refers to the total time allocated to each phase in a cycle, right of way refers to the lanes with green signal during a specific phase and *offset* is the time lag between the start of greentime for successive intersection, this is required to make sure the easy flowing of the traffic with minimum delay. The breakdown of the three phase cycle at an intersection is

shown in Fig.2. to explain the terms Split, Phase, cycle length and right of way.
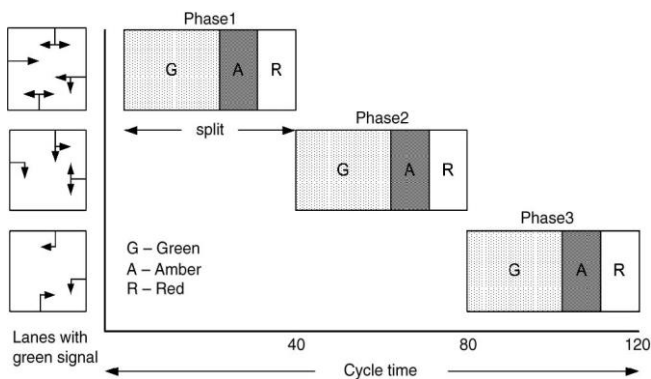

Fig 2:- Breakdown of a Three-Phase Cycle at an Intersection.

In particular, it is difficult in large scale traffic management system to predict the change of traffic state due to a specific traffic signal control parameter variation. The main objective of this paper is multi agent architecture is to attain a co ordinate signal control to reduce the network wide congestion by predicting future demand. The signal is controlled by agent the problem reduces to infinite approximation the infinite horizon approximation would make the distributed architecture infeasible because there should be a record of the entire history of traffic states.

III. AMBULANCE CLEARANCE

Paper [6] uses Zigbee module to control the traffic signal for ambulance clearance. RF transmitter and receiver is also used to detect if there are 2 ambulance in a particular path. The transmitter has Zigbee module, microcontroller, transmitter and LCD display and a switch. The LCD screen displays the condition of the patient if the switch is activated. The Zigbee module holds all the necessary information required to control the traffic signal path clearance. The arrival of the ambulance in a particular path is sensed by the RF transmitter and the control signals are sent to the receiver unit of the traffic control system. The ambulance unit consists of sensors to monitor the patient's condition. The LCD displays this value and the RF transmitter send the data to the receiver, which receives the data and controls the traffic signal at the junction by the help of the Zigbee module. The path in which the ambulance travels the traffic signal is turned to GREEN and rest of the lanes is displayed with the RED signal. In paper [ref], as the ambulance approaches the traffic signal it will send a infrared (IR) signal through the IR module. The IR module is connected to the microcontroller which controls the time and switching mode. The IR-LED is used because it gives better range and wider directivity. But by using IR sensor the communication can get interrupted. Paper [7] aims at ambulance clearance by the use of IOT. The ambulance driver will send the request to the signal using GPS location and the cloud by the help of GSM technology. When he signal is sent to the signal the ambulance will get an acknowledgement. The ambulance is shown in Fig.3.
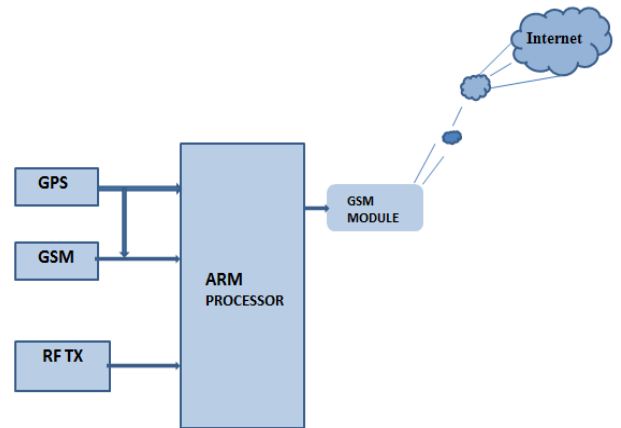

Fig 3:- Block Diagram of Ambulance Part

From the cloud the traffic signal fetches the message through signal control gate. The opto-coupler provides the isolation between input and output. This protects the output devices from surge voltage and then the traffic light are given inputs to switch according to the message sent by the ambulance. Fig.4. shows the traffic management system.
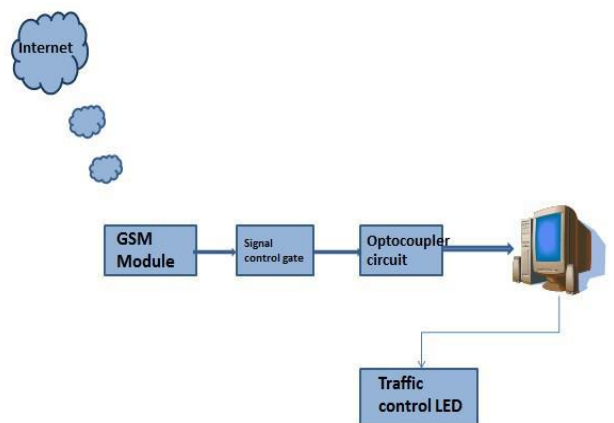

Fig 4:- Block Diagram of Traffic Control Management Side

In [3], the "green wave" method is used where the path of the ambulance is cleared through out. The "green wave" means the synchronization of the green signal on the path that ambulance travels. The problem with "green wave" is that when the synchronization is tampered then the problem can be worse.

IV. STOLEN VEHICLE DETECTION.

In paper [8], Bluetooth is used to detect the theft of the vehicles and to monitor the vehicle. The Bluetooth application on mobile is used to send the message on vehicle intrusion. Passive infrared (PIR) is used to send the message if there is any intrusion to get into the car through Bluetooth to PIC microcontroller. In [9], the focus is on using the multimedia message service MMS and database technology. The picture of the intruder will be sent vial local GPS to the owner or police. This system can send SMS and MMS while the vehicle is nearby its original location. This system cannot be implemented in rural places or in the regions without network. In paper [10], skin color detection is implemented. The system used the

Morphological operation that gives a previous knowledge for face detection. A specific face can be recognized by matching the principle components if known person to build a database. In paper [11], a link has been created between the driver's key and the ignition system. This method uses radio based frequency technology which improves a new level of the protection to vehicle security system.

V. CONCLUSION

All the different methods that are used to control the congestion, easy passage of ambulance through traffic and stolen vehicle detection is given above. Further there are many other technology used in congestion control like RFID which is much more cost efficient. But the above mentioned technologies are being implemented. There are trade-off made between cost for implementation for better quality of working. According to Indian government report the number of road accidents is increased to 16 deaths per hour on major cities. So better technologies are being implemented to reduce the number of accidents on road.

REFERENCES

[1]. TejasNaik, Roopalakshmi R, Divya Ravi N, Pawdhan Jain, Sowmya B H and Manichandra: "RFID-Based Smart Traffic Control Framework for Emergency Vehicles"

[2]. RajeshwariSundar, SanthoshsHebbar, and VaraprasadGolla: "Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection"

[3]. Ayush Kr. Mittal and DeepikaBhandari: "A Novel Approach to Implement Green Wave systemand Detection of Stolen Vehicles"

[4]. Zhijun Li, Chunxiao Li, Yanan Zhang and XuelongHu: "Intelligent Traffic Light Control System Based on Real Time Traffic Flows"

[5]. BalajiParasumannaGokulan, *Student Member, IEEE*, and DiptiSrinivasan, *Senior Member, IEEE* : "Distributed Geometric Fuzzy Multiagent Urban Traffic Signal Control"

[6]. S.Naveena, C.Chitra :" A Smart Prioritized Ambulance Service Using Mobile Zigbee in a Traffic Control System"

[7]. Venkatesh H, Shrivatsa D Perur, Jagadish M C : " An Approach to Make Way for Intelligent Ambulance Using IoT"

[8]. Rashidi, F. R. (2011)." Car monitoring using Bluetooth security system".International Conference on Electrical, Control and Computer Engineering 2011 (InECCE), 424-428.

[9]. [9] Hameed, S. a. (2010). "Car monitoring, alerting and tracking model": Enhancement with mobility and database facilities. International Conference on Computer and Communication Engineering (ICCCE'10), 1-5.

[10]. S.Padmapriya& Esther AnnlinKalaJames. (2012). "Real Time Smart Car Lock Security System Using Face Detection and Recognition".International Conference on Computer Communication and Informatics.

[11]. K S Khangura, N V Middleton and M MOlliivier, (1993). "Vehicle Anti-Theft System Uses Radio Frequency Identification".IEE. Savoy Place, London, WC2R OBL, UK.