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A proposal for efficient 8 two way traffic signal system for pedestrian and ambulance along with violation detection

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Abstract: ***In modern life we have to face many problems because of traffic congestion. It is said that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are main reasons for increasing traffic jam. The major reason for traffic congestion is the high number of vehicle which was caused by the increase in population and the development of economy. Traffic congestion is a condition that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. Here in my proposed work I am depending on 8 different roads that meet at a single junction. In that i will consider pedestrian, vehicles, and ambulance and red light violation detection persons too. The use of RFID and GPS will help to make the lane clear for ambulance. Using the RFID we can detect the red light violators and we can assign fine to them. Lastlly for pedestrian I am providing one subway and one overbridged.***

Keywords: RFID, Pedestrian, Ambulance, GPS, GSM.

1. Introduction

In modern life we have to face with many problems one of which is traffic congestion becoming more serious day after day. It is said that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are main reasons for increasing traffic jam. The major cause leading to traffic congestion is the high number of vehicle which was caused by the population and the development of economy Traffic congestion is a condition on road networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. When traffic demand is great enough that the interaction between vehicles slows the speed of the traffic stream , these results in some congestion.

Traffic signs provide the driver various information for safe and efficient navigation. However, identification of traffic signs with respect to various natural background viewing conditions still remains challenging tasks. Real time automatic vision based traffic light control has been recently the interest of many researchers, due to the frequent traffic jams at major junctions and its resulting wastage of time. Instead of depending on information generated by costly sensors, economic situation calls for using available video cameras in an efficient way for effective traffic congestion estimation.

Now days we know that many people lost their life due to traffic jam. Even the patients in the ambulance are suffering a lot due to traffic; even this can lead them to lose their life. Now days we used RFID and GPS based vehicles which can help the patients to arrive the hospital very safely by clearing the road before the ambulance reaches the traffic signal post. And red light violators are increasing day to day, to make control on this we have detected those people and provide fine to them. Pedestrian are also taken into consideration in my proposed work.

2. System design

Existing system

Existing system deals with only 4 roads which are of 2 ways meeting at a single junction. In existing traffic signal system signals are fixed that means no consideration is given to people, ambulance and so on. And also traffic system won't automatically change after detecting ambulance. There is no special way for people to cross the road.

Proposed system

Due to exponential growth of the metropolitan cities of the country traffic jam is increasing day to day life. Lack of efficient traffic control and management has many a times lead to loss of lives due to ambulances getting stuck in traffic jams, due to high rush on the roads people lost their life while crossing. Today red light violation is one of the most common and serious problem which leads to the collision of vehicles at the traffic light signals every year. A red light violation occurs when a vehicle try to cross the intersection at the red traffic light. So we must give punishment to the drivers of these vehicles who violate these. We must identify the vehicle that violates the traffic light signals and automatic fine bill will be generated and information related to fine will be send to the person who violates the rule. By this we can solve problem like corruption that happened in the road .Once an ambulance reaches the traffic signal automatically traffic signal should turn to green so that we can save the life of people. For pedestrian a one overbridged and one subway is created.

3. Diagram of 8 roads going to implement

Each road will have their own traffic signal post to control each road.

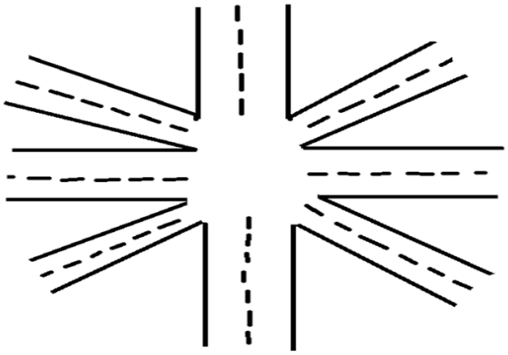

Figure 1: 8 Road interesting at a junction

4. Over all algorithm for the design

Here I have come with a project which mainly focuses on 8 two way roads which meet at a single junction, in which I mainly consider ambulance, pedestrian and violators. The working of system is as follows:

We have 8 different road which are 2 way.8 roads have their own traffic signal system. Suppose 1st road is shown green light, timer starts counting, then the vehicles in that way starts moving, at the same time red light will show in the traffic signals of other 7 roads. As a result vehicles of 1st road can make move in any direction (to all other road).When the timer become 0 then red light will be shown to the 1st road as well as to all other 7 roads expect the 2nd one in which green light will be shown to 2nd one. For the safety of pedestrian I will introduce one over bridge and one subway so that people can move without bothering vehicles. In Next case I consider ambulance in road. For that RFID and GPS based Automatic Lane Clearance System for Ambulance is been used. To reduce the delay in arrival of the ambulance to the hospital by automatically clearing the lane in which ambulance is travelling, before it reaches the traffic signal. This can be achieved by turning the traffic signal, in the path of the ambulance, to green when the ambulance is at a certain distance from the traffic junction. The use of RFID distinguishes between the emergency and non-emergency vehicles. The communication between the ambulance and the traffic signal post is done through transceivers and GPS. The system is fully automated and thus, requires no human intervention at the traffic junctions.

5. Algorithm for ambulance unit and junction unit

The Ambulance Unit[2], is to be installed in the ambulance, consists of an RFID reader, GPS receiver and a transceiver interfaced with a microcontroller. The GPS receiver receives the GPS co-ordinates of the ambulance by calculating its position using the timing signals from the GPS satellites. When an ambulance leaves the hospital for an emergency case, a RFID card is swiped in RFID reader, after authentication it activates the transmission of GPS co-ordinates through the transceiver. In Junction Unit, it is implemented in traffic signal post, which consists of a transceiver interfaced with a microcontroller. The GPS co-ordinates transmitted by the Ambulance Unit will be received by the transceiver of junction unit. A particular distance are specified in the Junction Unit's microcontroller program (around 300 m), which when crossed by the ambulance turns the traffic signal green. At the same time, a LED screen displays the message that an ambulance is approaching, indicating the other vehicle to give way. When the ambulance comes through any of the road expect that road all other road will be shown red so that ambulance can move in any direction. In case of presence of ambulance at more than one lane of the junction, the ambulance which arrives first is given priority. Once the ambulance passed then automatically previous working of signal system will continue.

Next I focus on how to solve this traffic light violation detection by using RFID[1].

We can integrate RFID tag on every vehicle which can be read by RFID reader. RFID reader is integrated on signal. This RFID reader always check for red light violation, if any vehicle violate the rule of traffic signal then RFID reader read the RFID tag number of that vehicle and send all information related to that car to the office computer. After that automatic fine bill will be generated and information related to fine will be send to the person who violate the rule. This system also focuses on reduction in the corruption in traffic system. Sometime people get caught by traffic police and get demand some money. This system also uses to eliminate such type of problem.

6. Conclusion

The proposed Intelligent Traffic Light Controller is more efficient than the conventional controller in respect of less waiting time. I am going to implement my project for 8 different roads which meet at a single junction. The proposed system has simple architecture, fast response time, user friendliness and scope for further expansion.

In this project, the basic concepts of RFID technology are used which is then used for identifying the signal violators and punishing them. The main objective of the project is to identify the violators and improving the security in communication between RFID tag and RFID reader. By implementing this project, I am able to manage the traffic related problems efficiently and identify violators. After identifying the violators, we send a notification to him/her according to notification a fine amount will be paid by violator and if he do not pay fine, further actions will be taken on violator.

Special consideration is given to pedestrian for crossing. I will implement 1overbrige and 1 subway which help pedestrian to cross the road. For easy movement of ambulance in road is also considered in this project. This system can be effectively implemented for an entire city or countries with large population like India for better results.

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