

Automatic Lane Clearance System for Emergency Vehicles

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ABSTRACT: Traffic management is the critical issue of the road. Traffic lights play an important role in the traffic management. The existing traffic lights follow the predetermined sequence. So these lights are called static traffic lights. These traffic lights are not able to count the number of vehicles on the road and they can't reflect the signal light according to emergency vehicles. As a result some vehicles have to wait even there is no traffic on the other side. The vehicles like Ambulance or any emergency vehicles like police van are also stuck in traffic and waste their valuable time. The proposed system provides quality of service for Emergency vehicles and improves the accuracy of Automatic Traffic Light Violation Detection system as well as helps to trace the stolen vehicles using RFID.

KEYWORDS: Intelligent Traffic management, Emergency Vehicle, Ambulance, Wireless Technologies.

I. INTRODUCTION

Traffic management on the road has become a biggest severe problem of today's society. Traffic congestion is a major problem in developing cities. Due to increase in urban population and the middle-class number of vehicles also increasing. Congestion on roads results in slow moving traffic, which increase the time of travel, thus stands-out as one of the major issues in cities like India. Shortage of efficient traffic control and administration has many times lead to loss of lives due to ambulances getting stuck in traffic jams. Unlike developed countries, Indian cities cannot think of having separate lanes for emergency purpose due to shortage of road planning and infrastructure. But if we implement this system one of the disadvantages is that apart from the huge cost, this lane always remains underutilised. It is a static system; static means we are not providing services every time. This lane is not useful every time and it's not an adequate system. Moreover, because of this system the width of road for general use is reduced which cause in traffic congestion and inconvenience.

There are so many examples that ambulance got stucked in the traffic load, Ambulance has to wait for some minutes to hours to clear the traffic load. Patient may die because of lack of treatment at proper time. To overcome this hazard and to save many lives, A new model proposed in this paper which provides the functionality of one path clearance i.e. the ambulance going path will be cleared. Consider a situation when there are 4 signal and all 3 signal don't have any vehicle on their road but one signal have huge congestion according to our existing system the signal work same in all situation. But our proposed system overcome this disadvantage.

A new model proposed in this paper which provides the functionality of one path clearance i.e. the ambulance going path will be cleared is Developing a Smart Traffic Management System for Ambulance Rescue, Congestion Control, Control Signal Violation and Stolen Vehicle Tracking. With this system we aim towards contributing for a better smart city. This can actually be achieved by having a good control over the city traffic by smooth flow of overall traffic density. Thus we also provide facility for congestion control by sensing the traffic density using IR Sensor. This will be reflected on the particular signal. The Stolen Vehicle Tracking System will help us to keep a track of Stolen Vehicles and report them to the authorities. Another application provided by our project is that If any vehicle violates the signal

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they will receive a warning message on their phone from the control room and if they trespass the violation limit then their licence will be terminated.

II. RELATED WORK

A. Wireless Technologies

It is Priority Based Traffic Lights Controller Using Wireless Sensor Networks by Shruthi K R and VinodhaK[2] (2012). Wireless Sensor Network (WSN) is being used as communication infrastructure in the proposed traffic light controller. System uses fuzzy logic to define the direction of the emergency vehicle. Central monitoring system collects all the information and gives the appropriate response.

Limitations: Communication in the Wireless Sensor Network (WSN) is still a research field. Data exchange in between Sensor is not reliable. And as specified before Sensors need to be robust in order to survive in Indian weather.

B. Automatic Traffic management

In order to remove the weakest link (i.e. human) in the above system, an automatic traffic management scheme is suggested. This system includes a simple three colour traffic signal, which we see every day. Generally for each lane 120 seconds of green light is on. Before green light, the yellow light flashes for 20 second, signifying to start your vehicle and be ready to go. For all the time the red light is on, ordering each vehicle to stop.

Limitations: This system cannot detect the emergency vehicle, it treats the normal car and ambulance in the same way. So there are chances of delaying the emergency services. Drivers disobeying signal rules are also headache, sometimes they causes serious accidents.

C. Image Processing

The Image Processing Based on Intelligent Traffic Controller by VikramadityaDangi, AmolParab, KshitijPawar and S.S Rathod[5] (2012). A camera is fixed on the polls or other tall structures to overlook the traffic scene. Images extracted from the video are then analysed to identify and count vehicles. Then depending on the signal cycle, time is allotted to each lane. The system also takes into consideration the emergency vehicles at the intersection. If such a vehicle is detected, then that lane is given priority over the others.

Limitations: Camera used, have to be robust. When the ambulances arrive from more than one lane the system fails, it gives green light to all lanes.

III. WORKING

The application starts with the MainForm where we get the Interface for the whole system. The user can then register his vehicle by submitting his other information in the Registration panel. This information Is then saved on the Database. Now the vehicles are identified as they pass through the signal sensors. This is done by using the IR Sensors and RFID component. If the vehicle is an Ambulance then it send the message to the signal system to allow the ambulance to pass keeping other signals on hold .the normal vehicle when identified is checked for license validity. And if the vehicle is stolen or not. If the vehicle is identified as stolen then it is reported to the authorities. The traffic density is sensed through the IR sensors and then the time distribution is done to the particular signal for efficient traffic flow.

Registration Module:

The Registration module is used for the identification of the vehicle and the owner of the vehicle. It also helps to identify the vehicle is an Emergency or a normal vehicle. This helps to keep a count of vehicles as well as identifying the stolen vehicles.

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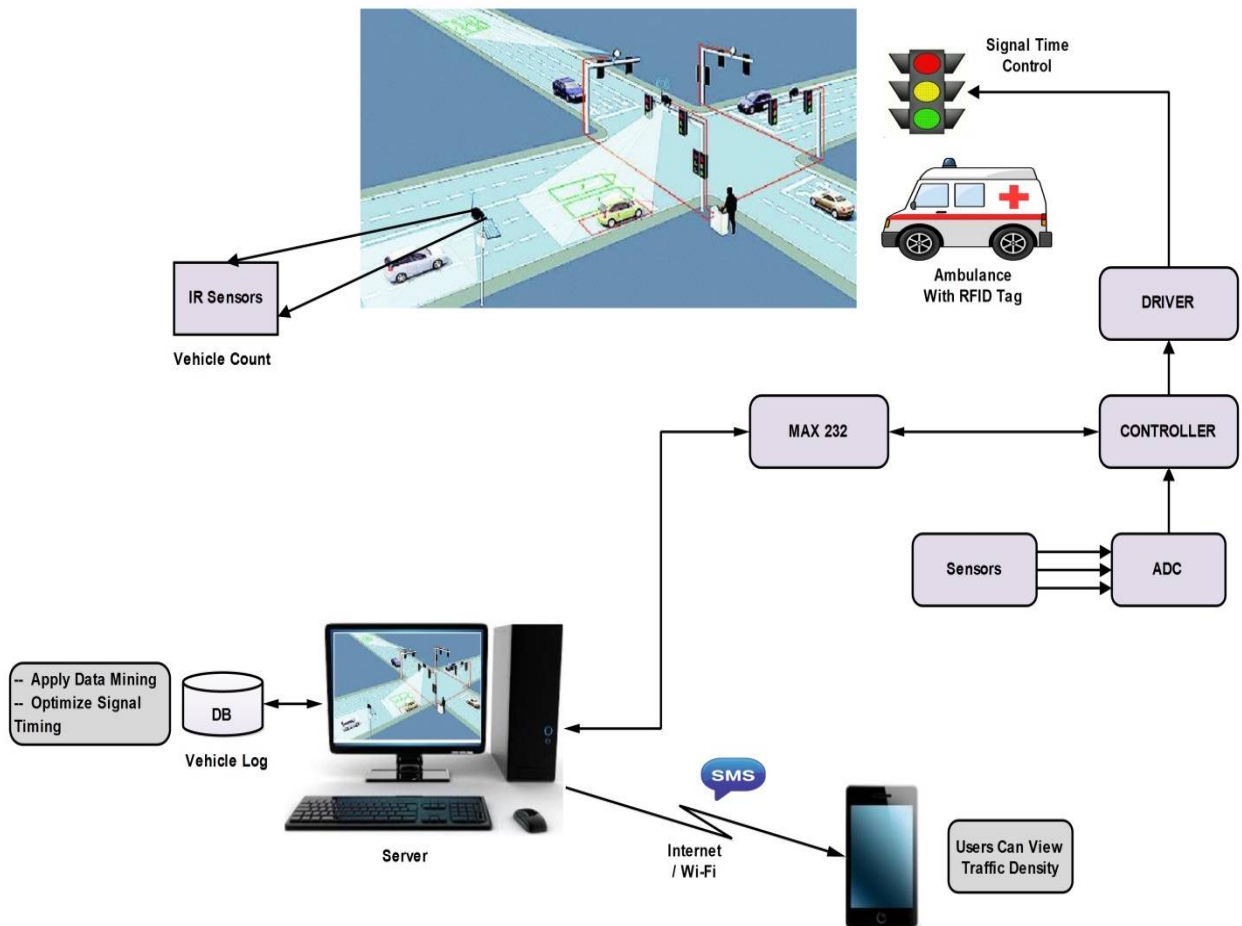
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Traffic Signal Module:

Traffic signal module is used to sense the traffic through the IR Sensors and respectively divide the signal timings for the vehicles. It's also used to change the signal when there is an Ambulance identified.

RFID Module:

The RFID module is used to identify the vehicles through the RFID tags. The RFID reader also identifies whether the vehicle is an emergency or a normal vehicle. The RFID module then sends the information to the Traffic Signal System for further operation.



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IV. EXPERIMENTAL RESULTS

Figures shows the results of our system from software perspective



Fig:- (a)

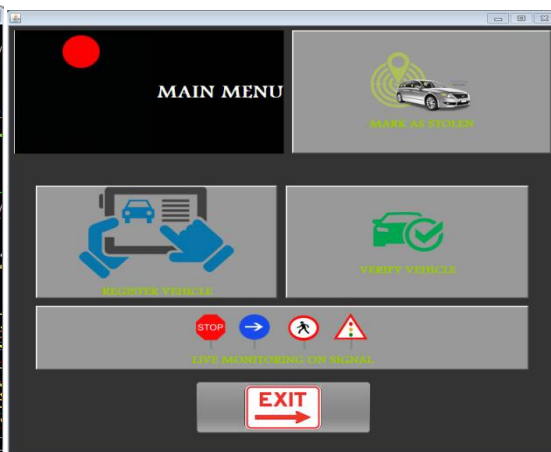


Fig:- (b)

In fig(a) , It is the startup page where we have to choose the port number for serial communication and after that the new page will open as shown in fig(b) where we have to choose action what we want to perform. First of all we have to register our vehicle so for that we have to choose REGISTER VEHICLE tab.



Fig :- (c)



Fig:- (d)

So, after clicking on register vehicle tab we will see the tab as shown in fig (c) where we have insert the RFID CARD No.,FNAME, MNAME, LNAME, ADDRESS, EMAIL ID, CAR MODEL, CAR NO, CAR COLOUR,

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AMOUNT, VEHICLE TYPE AND LICENCE STATUS. Also we can add another vehicle to register , delete any registered vehicle, or we can update any vehicle's data. And after registering when we swap RFID card on RFID reader we see the window as shown in fig(d).

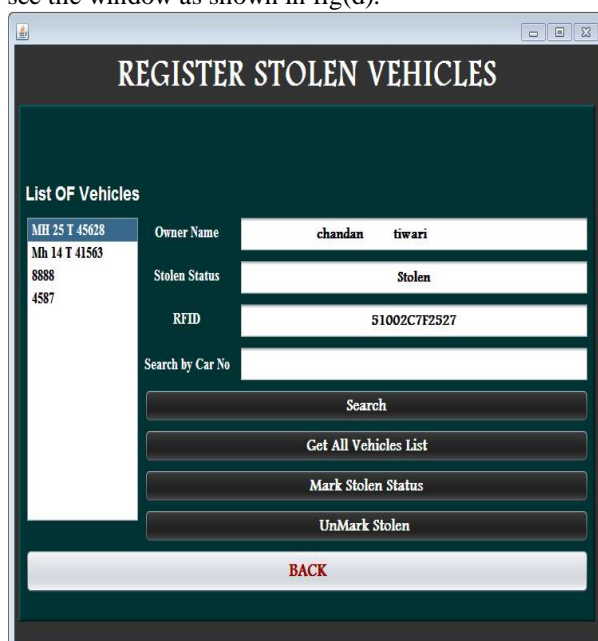


Fig:- (e)

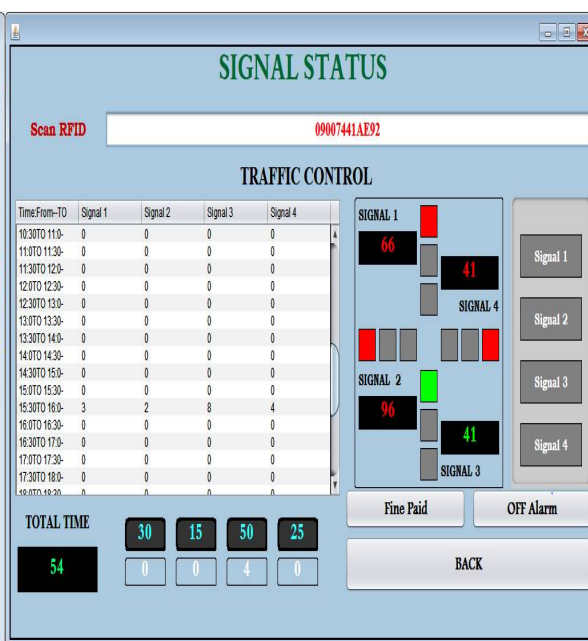
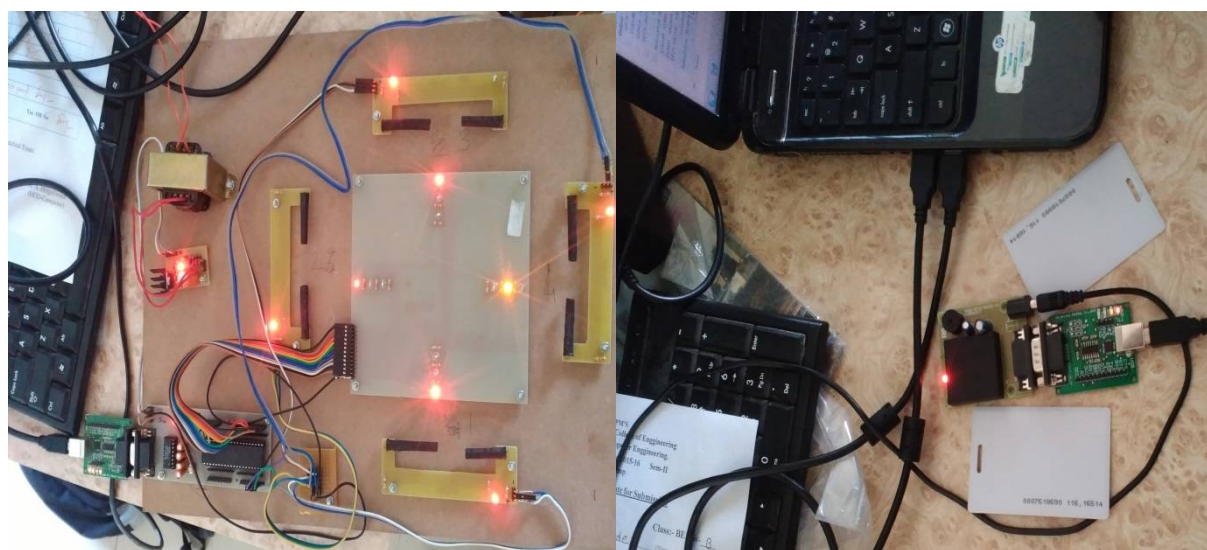


Fig:- (f)

We also have option to mark vehicle as stolen so in fig(e) we marked already registered vehicle as stolen. We can also see the list of vehicles which are register and in fig(f) we can se the live traffic management of our system.

Figure Shows the Hardware components with output.



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V. ADVANTAGES AND DISADVANTAGES

1. ADVANTAGES

1. Helps in tracking stolen vehicles.
2. Lot of time is saved at signals due to automatic analysis of congestion .
3. Violation of signal is minimized.
4. Automatic signal changes for Emergency vehicles.

2. DISADVANTAGES

1. Initial cost is high.
2. IR sensor can be affected due to environment.

VI. APPLICATIONS

1. CAN BE USED IN ALL AMBULANCES.
2. CAN BE USED FOR VIP CARS.
3. TRAFFIC MANAGEMENT AND CONTROL.
4. USED FOR ROAD SAFETY CONTROL.
5. DEFENCE VEHICLE IN EMERGENCY CASES.
6. FIRE EXTINGUISHING VEHICLE.
7. POLICE VAN IN EMERGENCY CASES.

VII. CONCLUSION

As the entire system is automated, it requires very less human intervention. With stolen vehicle detection possible junctions. Emergency vehicles need to reach their destinations at the earliest. If they spend a lot of time in traffic jams. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Currently, it is implemented system by considering one road of the traffic junction.

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