Automatic Road Surveillance To Implement Vehicle Traffic Rule

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***Abstract*—In fast developing country, there are many trauma happened of losing its people for unwanted cause. The vehicle speed is the main factor for accidents in four way lanes. In order to monitor the traffic violations we have proposed a novel automated road surveillance in which the speed of a vehicle can be calculated using the time to cross the particular area. The violation of vehicle speed is informed to the driver and vehicle owner through message. If the speed of vehicle is greater than the limited at the second level then a geared DC motor with an automatic speed breaker is activated. To identify the exact vehicle a fixed RFID reader is used in elevated speed breaker to read the RFID tag fixed in vehicle bottom by the time of crossing the breaker. Then using this ID the details of vehicle are taken from the server and the information is provided to traffic control room to impose vehicle fine. A separate path clearance is provided for ambulance vehicle by enabling the upcoming traffic light control line. This method of implementing traffic rule will eliminate the human corruption and violation of traffic rule.**

Keywords:- **CC3200 Controller, IOT, GSM communication, RFID reader**

I. I.INTRODUCTION

The rapid growth of city populations directly affects the ability of countries to reduce road traffic in order to improve the quality of life of their citizens. Caring for the needs of a rapidly growing urban population is a major challenge for countries trying to create more sustainable cities. According to worldwide estimates published in 2014, there were a total of approximately 1.1 billion cars on the planet, since some estimates predict that by 2035 the number of cars will reach close 2 billion. The excessive use of road vehicles not only harms both the environment but also affects the quality of life and the economy of the population. The phenomenon of traffic congestion is present in most developed cities. The loss of prolonged time commuting and working hours also has a strong impact on the productivity of businesses and the overall economy. Annually, the traffic-generated economic losses amounts to over 1.5 billion dollars, or 1% Mexico City's contribution to the country's GDP, a very significant figure for a developing country.By 2020, it is estimated there will be more than 20 billion devices involved in the Internet of Things, in large part due to the expansion of the world's telecommunications infrastructure, a figure 30% higher than the items/devices that currently exist. When IOT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes and smart cities. India is the second most populous Country in the World is a fast growing economy. It is seeing increased no of road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Some time it will be not provide sufficient time to pass vehicles because traffic signal time is pre define. Nowadays traffic problem are increasing because of the increasing number of vehicles and the limited resources provided by the current infrastructures. Due to this, there is a need to wait more time in front of the signals.

The developing and developed countries are striving to improve the standard and efficiency of transportation system. Because of the traffic jams, and lack of proper traffic management system, time and money of the public is being wasted. Goods transportation, machinery and human transportation are the key factors which influence the development of industries. The development of traffic monitoring and controlling system is a very important requirement in all the countries. Therefore, there is an urgent need to improve traffic management. The appearance of the Internet of Things (IoT) provides a new trend for intelligent traffic development. The Arduino interfacing with senors and motor control units mention in automatic crack detection are utilized in this work[14] The rest of the paper is organized as section-II reviews the previous methodology utilized. Section-III elaborates the proposed methodology. section –IV concludes the methodology used.

II. LITERATURE SURVEY

Néstor Cárdenas-Benítez, has proposed a traffic congestion detection system that communicates connected vehicles and big data, to improve traffic flow and reduce CO2 emissions in the city, representing a potentially valuable tool to help drivers detect and avoid vehicular congestion. All the vehicles cant be connected with each other all the times

and the number of vehicles connected with each other is limited and the accessing time may get collapsed.

Reshma R Nayak described a method to solve the problem of invisibility of traffic signal caused by huge vehicles blocking the view, prevent traffic congestion at toll gates and give advanced collision warning to the drivers. This system comprising of a microcontroller with a RF module is to be installed at major traffic junctions and toll gates and is programmed to connect to each automobile passing by. There might be excessive traffic on the RF module installed at the toll gate exit as it has to receive identity information from many vehicles passing by.

Sheela. S, Raspberry pi camera module can be used to take high definition video, as well as stills photographs of the vehicles infront of the signal. Problem lies in real time image processing, size of the image or video.

Bharath Kumar Perumalla introduced additional vehicle spotting feature makes this system different from the other implementation. The incorporation of IoT into the system makes this as a blend of standard and advanced technologies. Vehicle owners can track their vehicle from anywhere in the world. The system developed proves to be reliable and cost-effective.

J.Sherly, developed a real time traffic monitoring system to solve the problem of real time traffic controlling and monitoring. The proposed system provides a new way of traffic control by the better utilization of resources like RFID and IoT. The traffic administration department can use this real time traffic monitoring information to detect the dangerous situations on the road and thereby react by imposing immediate actions. On the whole IoT will play an important role in traffic monitoring by improving the efficiency of traffic safety and travelling costs.

Yashashree Joshi proposed system is user friendly and easy to handle. This system is simple & gives fast response to the user in need. Also the features of early warning of traffic status few meters ahead which helps user to take decision to choose another route. Our system also provides an alternate route to his destination which will help user to reach his destination as early as possible. The user has to simply visit our web application and get the traffic status in his route to his destination and this doesn't make any change in the traffic signal.

Chandana K K has proposed system, it is feasible and preference is given to the emergency vehicle such as an ambulance. During an emergency, if an ambulance happens to get struck on a particular road due to high traffic, then the driver can raise a request by using the RF transmitter fixed in the ambulance. The signal is then passed to the RF receiver mounted on the traffic signal and the signal of that road is turned green.

III. PROPOSED METHODOLOGY

The vehicles violating traffic rules can be easily monitored and a fine amount is automatically imposed on the violators in our proposed methodology also a separate signal clearance for ambulance vehicle is provided. To implement this work a separate lane for four different types of vehicles is considered. In each lane a three step vehicle monitoring scheme is chosen. The first monitoring step involves an IR sensor set in which the speed of vehicle with respect to distance is calculated and it is verified by the microcontroller unit. If the vehicle speed is beyond the threshold limit then the second monitoring set is activated, which has an IR sensor unit. If the vehicle is violating the second monitoring set then the Arduino controller will send a signal to activate the relay which controls automatic speed breaker and also a RFID reader module using EM-18 reader module. The elevated speed breaker has an RFID reader which reads the RFID tag which is fixed in vehicle bottom. The RFID number is communicated to the microcontroller which searches the vehicle details from the server interfaced with CC3200 controller.

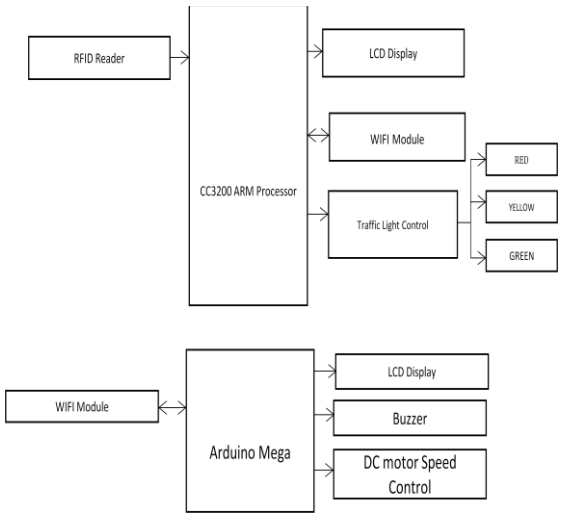

Fig.3.1 Block diagram of controller unit

Two conditions are verified at this step i.e) if the vehicle is an ambulance then microcontroller will ignore the traffic rule on that vehicle. Other than the ambulance a warning message is send to the vehicle owner. If the same vehicle is identified for over speeding then the vehicle information is send to traffic control room and a fine amount is deduced from vehicle owner account. The message information to vehicle owner is send using CC3200 microcontroller. The RFID reader will track how many vehicles have passed the specific area for a specific period and determines the congestion density. Therefore, it sets the green light duration for that path. Second part is for the emergency vehicle clearance. In this module, every emergency vehicle has ZigBee transmitter module in it and the ZigBee receiver will be employed at the traffic junction. During the emergency situation the buzzer in the vehicle will be switched ON. This will send the signal through the ZigBee transmitter to the ZigBee receiver, which makes the traffic light to change to green.

Once the ambulance passes through, the receiver no longer receives the ZigBee signal and the traffic light is turned to red. The third part is accountable for stolen vehicle detection. Here, when the RFID reader reads the RFID tag, it compares

it to the list of stolen RFIDs. If an ID is found to be matched, it sends a message to the police control room and turns the traffic light to red, so that the vehicle is made to stop in the traffic junction and local police can take appropriate action .the entire system is automated, it requires very less human intervention. When stolen vehicle detection unit, finds the stolen vehicle the signal automatically turns to red, so that the police officer can take appropriate action on the culprit. Also a notification will be sent to all check point authorities so that they can prepare to catch the stolen vehicle at the next possible junctions. Ambulance, fire trucks, needs to reach their destinations at the earliest since they are used for emergency purpose. If they spend a lot of time in traffic jams, precious lives of many people may be in danger. As long as the emergency vehicle is waiting in the traffic junction, the traffic light will be green with the help of emergency vehicle clearance. The signal turns to red, after the emergency vehicle passes through. Additional enhancements can be done to the prototype by testing it with RFID readers which has long ranges. In addition, to know the exact location of the vehicle GPS module can be placed into the stolen vehicle detection module. Currently, the system is developed and implemented for one road of the traffic junction. It can be upgraded by extending to multi lanes.

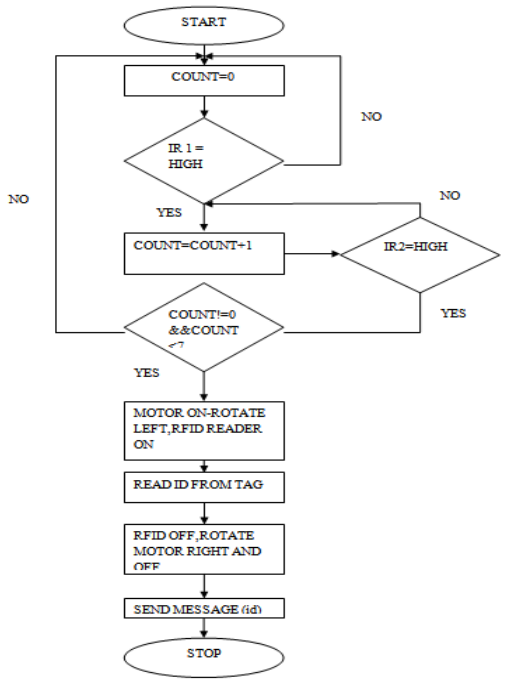

Fig.3.2 Flow for the working of vehicle speed detection unit.

In the control unit a CC3200 controller is used to find the details of the vehicle and its user detail. Then the details of vehicle violating traffic rules will be displayed using a display unit along the vehicle lane. The control unit plays a major role in identifying the vehicle and informing the traffic violation. An additional task included is, if an ambulance is violating the speed limit then the microcontroller will transfer the signal to nearby traffic signal lane through ZigBee mode to make the traffic control light in green color.

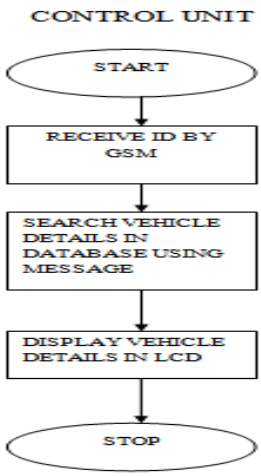

Fig.3.3 Flow chart of the control unit

The circuit diagram for the detection unit and control unit is shown below. The detection unit is used to determine the vehicle speed and to drive the DC motor for speed breaker elevation and the control unit plays the remaining roles.

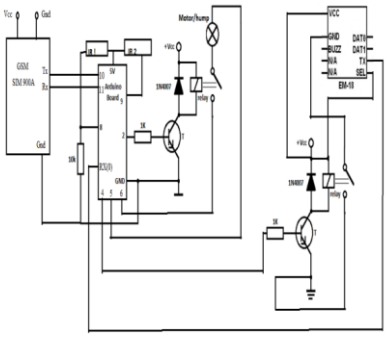

Fig.3.4 Circuit diagram for detection unit.

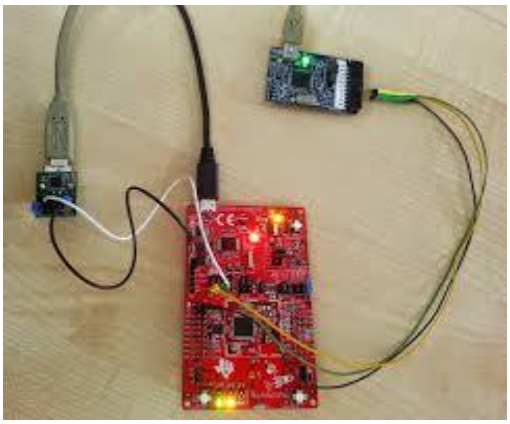

Fig.3.5 Prototype model of detection unit working prototype model

IV. CONCLUSION

This model of automatic road surveillance system finds the over speed vehicle and automatically impose the warning as well as fine. Reading the vehicle ID, make the automatic speed breaker to appear on the lane way and find the vehicle

details along with the owner name and registration. The exemption provided for the ambulance vehicle eliminates the risk of human life in vehicle by turning the signal to green light condition. This model can implement in the zones where the vehicles should drive with the limited speed. So, it must be installed in many zones along the road lanes to avoid accidents due to over speeding vehicles.

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