Speed Vigilance System

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Abstract - *Car accidents is a serious issue in our country that needs to be resolved. One of the leading causes for car accidents is over speeding. Traditional system used sign boards for indicating the speed limit of the area. Most of the drivers ignore these signs while driving. This method seemed to be ineffective and has led to increase in number of accidents. The aim of this paper is to resolve this problem by creating an efficient speed limiting and accident alert system. So to alert the driver about the speed limit at slow speed zones and to detect crash automatically, it is done by utilizing RF, GPS, IOT and cloud computing technologies. The advantages of proposed technology are, it saves around 5-6 minutes which are wasted in contacting hospital and locating crash site. Secondly, it alerts driver entering slow speed zones by displaying speed limit, blinking of red LED and beeping of buzzer. Finally, system reduces speed of electric vehicles within slow speed zones. This will help in reducing the number of accidents, thereby saving uncountable number of lives across the country.*

Key Words: *RF, IOT, GPS, UBIDOTS.*

1. INTRODUCTION

Road safety is a worldwide issue in general and in United Arab emirates(UAE) in particular. The UAE for example has fatality rate of 12.7 per 100,000 people[1], a number that is much higher than that of developed countries such as the United Kingdom, Sweden and Japan.

- Travelling is part of our daily lives. Everyone has to be on the road, may it be on going to work, school or elsewhere.
- Slow speed zone is considered as an area where vehicular traffic must follow a particular speed limit, hospitals, schools, government offices, small villages near highways are considered as slow speed zones.
- Speed limit is 30 kmph for hospitals and 20 kmph for schools.
- Slow speed zone is 150 meter radius area around school, hospitals etc.
- Economic times, published an article in 2018 stating that, about 1500 crashes occur in a year due to speeding in slow speed zone and about 800 crashes occur because driver has no information about the upcoming institution.

Vehicular traffic congestion is a well known economic and social problem generating significant cost and safety challenges, and increasing pollution in the cities. According to the result of the survey provided by the center for economics and business research and traffic Information Company, the cost of traffic congestion also affects the quality of life and the environment, by causing pollution which has well known negative effects on health and climate. Traffic congestion usually occurs in the city area, mostly in urban and highway environment and usually form when road capacity is smaller than traffic demand.

The main objective is to design a smart display controller for vehicle`s speed limit and crash alerts which can run on an embedded system. Smart display and control(SDC) can be custom designed to fit into a vehicle dashboard, and displays information on the vehicle.

Now-a-days, people are driving very fast, accidents are occurring very frequently, we lose our valuable life by making small mistake while driving(zone-wise, hilly area, highways). So in order to avoid such kind of accidents and to alert the drivers about the speed limits in such kind of places, the highway department has placed the sign board. But, sometimes it may not be possible for the driver to see the board and there is a chance of accident. So to alert the driver about the speed limit at zones and to detect crash automatically, is done by means of using RF, GPS, IOT and cloud computing technologies.

According to Emergency Management Research Institute (EMRI), the average time it takes for an ambulance to reach a victim after driver receives the information is 15 minutes. Out of these 15 minutes, 5-6 minutes are wasted in contacting hospital and locating crash site and due to this delay in medical aid, many victims have lost their valuable life. In some cases, when accident occurs in deserted areas and no one is present in vicinity of crash site, the fainted victim is unable to get medical help.

In the proposed paper, a provision is created to alert the nearby hospital automatically by making a recorded call to nearby hospital and by sending a link to open map widget which contains accurate location of crash site. At the same time, same recorded call and link of map widget will be sent to emergency contacts registered on device beforehand.

This will reduce the time it takes to communicate with hospital and to locate the crash site for dispatching ambulance.

2. LITERATURE SURVEY

Vehicular accidents are a serious problem in our country. Major reason for umpteen number of accidents is found to be speeding beyond prescribed speed-limit. Urban areas have many schools, hospitals, etc. In spite of traffic speed limit signs, it is clear that drivers are willing to sacrifice safety by over speeding. Problem is that drivers do not limit their vehicular speed in speed sensitive zones.

In [2] an effective system is proposed that automatically detect and reduce the speed of vehicle with the help of Electronic Control Unit and providing a network for schools/hospitals. The car module is linked with throttle valve that reduces speed.

In [3] a system is proposed that transfers the details of over speeding vehicles to Traffic Control Board automatically. A number of XBees are installed in speed sensitive zones to send details to vehicle. Vehicle contains a device that gets speed limit of region and checks it with speed of vehicle at that instant. If speed is more than limit, a warning is displayed to reduce speed. Speed is again checked after some time slot and if speed is greater than prescribed limit than information of registration number of vehicle is transmitted to master XBee installed in traffic office.

The problem with this approach of alerting the driver is that XBee modules are very costly and such expensive system that require large number of such modules cannot be implemented in developing country like India on a very large scale.

3. METHODOLOGY

Our research for reducing the accidents started with determining the main causes of accidents and the main reason was found to be over-speeding.The aim of this paper is to design a system which will alert the driver about the speed limit. It also aims to reduce the speed of electric vehicle and to report the location of accident to the nearby hospital.

We Started with drawing an efficient hardware design for the system using OrCAD. After finalizing the design, we started building the hardware of the system. In the proposed system, the RF transmitter is fixed in hospitals, schools, colleges, villages and in crowded areas. HT12E is used for converting parallel data into serial form for RF transmitter. Address pins of HT12E of transmitter and HT12D of receiver must have same combination. This RF transmitter has a range of 3m(without antenna) and up to 100m(with antenna). Transmitter uses different 4-bit data codes for schools and hospitals. The module placed in the vehicle consists of RF receiver, NodeMCU, LCD display, buzzer, LEDs. As the vehicle enters the field of transmitter, RF receiver generates data after sensing field through antenna. NodeMCU acts on the generated signal to interact with buzzer, display and LEDs. System uses Pulse Width Modulation technique to reduce speed of electric vehicle by chopping the electrical power supplied to Brushless DC(BLDC) motors in discrete parts. Vehicle module alters the duty cycle of PWM signal supplied to BLDC motor and amount of chopping depends upon the transmitter placed in speed sensitive zone. When vehicle is not in the vicinity of field, the LCD will display the message "Normal Speed", Buzzer is off with LED ON and no effect on BLDC motors. When this vehicle enters in the range of RF transmitter fixed in school, the LCD displays the message "School Ahead Speed limit 30kmph" with Simultaneous beeping of buzzer, blinking of Red LED and reduction in the speed of electric vehicle by reducing the duty cycle of signal by corresponding amount. When this vehicle enters in the range of RF transmitter fixed in hospital, the LCD displays the message "Hospital Ahead Speed limit 20kmph" with Simultaneous beeping of buzzer, blinking of Red LED and reduction in the speed of electric vehicle is done by reducing the duty cycle by corresponding amount. The second part of paper focuses over condition when the vehicle has met with an accident. Accident impact will trigger the limit switches located deep inside the body(to avoid unwanted triggers), around the periphery of vehicle. Then, NodeMCU will send the Geo-location inside a link with message "Accident alert, please check the link" to registered mobile number and medical authority in the form of SMS and call. When this link is clicked, It will open associated ubidots cloud account with Geo-location of accident.
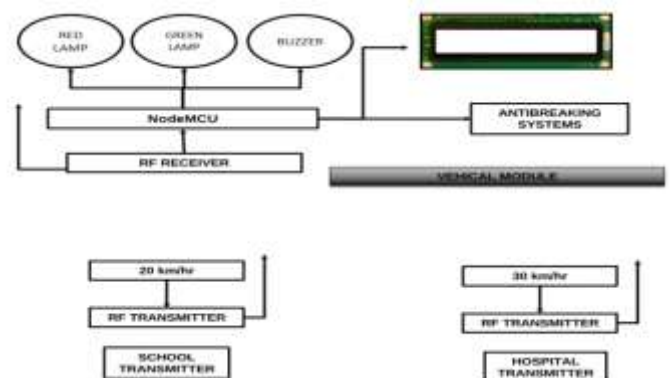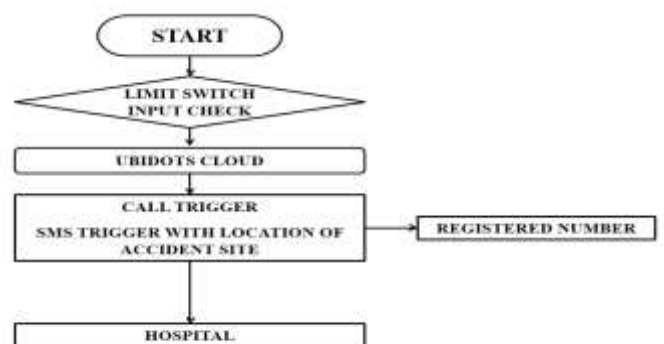

Fig -1: Block diagram of proposed system

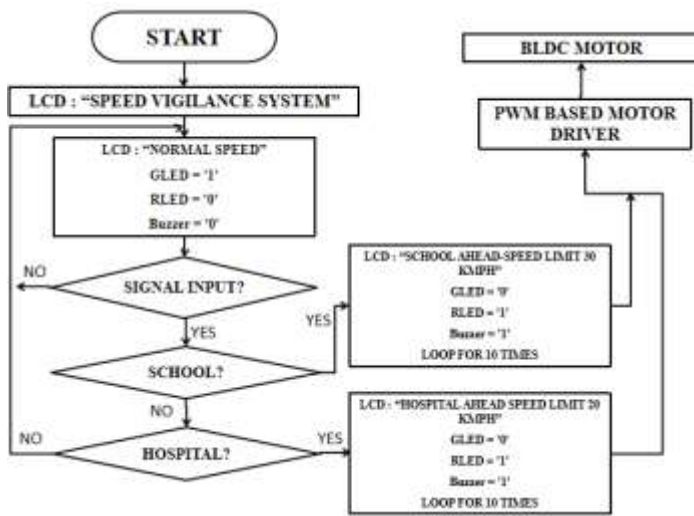**Fig -2**: Flowchart for accident alert

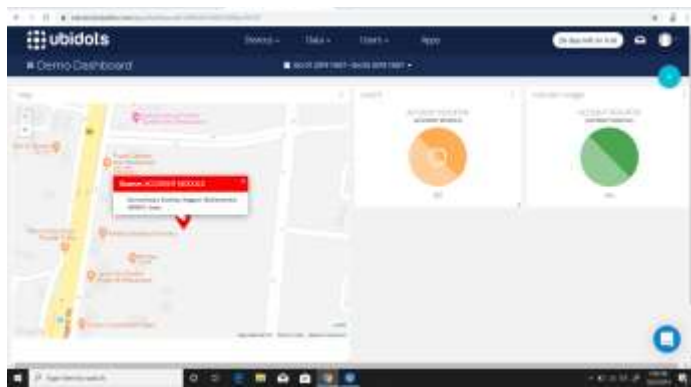**Fig -3**: Flowchart for slow speed zone alert

Fig -4: Ubidots dashboard

4. CONCLUSIONS

This paper proposes an efficient slow speed vigilance system to tackle accidents in slow speed zones by reducing the speed of electric vehicle and also alerting the driver. Another advantage of the proposed system is that it helps in reducing the time required for medical help to reach the accident victim. As compared to the traditional method, the proposed system requires very less time saving innumerable lives of people.

We have successfully achieved the aim and objectives that were in our minds during the early stages of project. We have used RF transmitter and receiver to detect the presence of vehicle in the speed sensitive zones. We have created a vehicular dashboard consisting of buzzer and LEDs to alert the driver about upcoming zones. We have used Pulse Width Modulation technique to decrease the speed of electric vehicle within speed limit of zone. Finally, we have created a cloud platform on Ubidots for generating accident alert triggers, in the form of sms to registered number and medical authorities with location of accident site. The proposed system will significantly reduce number of accidents that occur near school, hospitals, government institutions and other speed sensitive zones.

5. REFERENCES

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