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Research paper

IOT Based Vehicle Speed Control Automatically in Restricted Areas using RFID

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Abstract

Now-a-days road accidents are occurring frequently, due to rash driving of people. The most unfortunate thing is that by making small mistakes during driving, we lost our valuable future. If we observe, most of the accidents will occur at school zones, parks, hospitals, hill areas and highways. Even a police also can't monitor all such kind of accidents. So in order to reduce the number of accidents and to control the vehicle speed the highway department has placed the signboards. But it is difficult to observe such kind of signboards and hence accidents will occur. This paper will provide a new way for controlling the speed of the vehicle without harming others. In this paper, we are using RFID module to limit vehicle speed. The RF transmitter will be placed at first and last of the restricted areas and RFID receiver should be placed inside the vehicle. The vehicle speed was obtained by speedometer which is available in vehicle. And that speed is compared and monitored by the controller. If the vehicle speed exceeds the limited speed, It automatically controls the speed of the vehicle according to that particular zone. Hence, automatically the speed reduced. If there is any emergency, a switch will be available in the vehicle. When the switch is ON, the speed is not controlled automatically. The vehicle which is switched ON, that vehicle number was stored in cloud. Here the main purpose of cloud is it loads the route map of the vehicle.

Keywords: *Micro controller unit; cloud; RFID Module;*

1. Introduction

Rash driving makes city roads unsafe. In present days, rash driving and over speed are the major moving traffic violation. The rash driving indicates the mental state of the driver. Psychologists said that, Reckless driving has been found that reckless drivers who are risk-taking personalities. Numbers of accidents are increase every year by more vehicles on ground. Over speed, rash driving, violation of rules, failure to understand the sign boards, drowsiness and alcohol of driver are main factors of road accidents. So we start to think about how to reduce all such kind of things. At first we have an idea i.e., by using ultrasonic sensors the speed of the vehicle is sensed. Based on that vehicle speed, the height of the speed breakers increased. But it is difficult to implement practically and cost effective. First we choose Infra Red (IR) module to implement this task, but there is a draw back in using this module. It works under line of sight so finally decided to use RF module [1]. The components of radio frequency (RF) module are RF transmitter and RF receiver (**Figure 1**). The RF transmitter should be placed at the restricted areas where as RF receiver placed inside the vehicle. The information will transfer to controller and the current speed is monitor by separate module or by using ultrasonic sensor which sends information to the controller. The controller will compare the vehicle speed with the restricted speed. If the speed of the vehicle exceeds the restricted speed, driver no need to reduce the speed, speed can control itself automatically. If there is any emergency in the vehicle, there is a switch which is available in the vehicle. When the person ON the switch, then the RF module is not worked for that particular vehicle so speed is control by its own by the driver and the vehicle number was stored in cloud (blynk) which is used to monitor the route of the vehicle by the blynk app, by using this application each vehicle has its unique token number is generated. So we can easily monitor the vehicle by its ID.

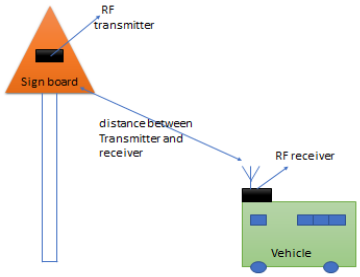

Fig. 1: Overall pictorial representation

2. Experimental model

Here the experimental hardware consists of two parts: 1. RF section, and 2. microcontroller section.

2.1. RF section

A Radio frequency identity (RFID) section is an electronic device that is used to transmit as well as receive the radio signals between two devices. In an embedded system, it is often necessary to transmit the data to another device wirelessly. RF communications

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includes a transmitter and receiver. They are of different types and ranges. Some can transmit the signals up to 500 feet. The frequency range varies between 30 kHz & 300 kHz. The transmission through RF module is better than IR module because of so many reasons. RF signals can travel through large distances that makes it is suitable for long distance applications. And we can say mostly IR operates on line- of-sight mode, but RF signals can travel even an obstacles are in between the transmitter and receiver. RF communications are strong and reliable when compared to IR communication.

2.1.1. RF transmitter

The RF module has an antenna that sends signals into the space. The RF transmitter is a module that can able to transmit the radio waves in to the space. It works along with the microcontroller. Here, the microcontroller gives the data to the module which is to be transmitted. Transmitter takes data which is in serial form and transmits that serial data wirelessly through its antenna. Transmitted output power can be reduced by the physical environmental changes such as distortion, noise and some other signal impairments. So, it is necessary to take some steps to overcome such problems to increase or maintain the quality of transmitter.

2.1.2. RF receiver

The transmitted information (RF signals) is received by using RF receiver. The frequency which is appearing at the transmitter should be appearing at the receiver. The modulated RF signal was received by RF receiver and it demodulates the data which is received. Two types of receiver modules are available. First one is super heterodyne receiver and the second one is super-regenerative receivers. A series of amplifiers are used in Super-regenerative receivers to extract modulated data from a carrier wave and hence these are low cost and low power designs. Super heterodyne receivers are most preferable receivers over super-regenerative receivers. Super heterodyne receivers will increase accuracy, stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in turn leads to a comparatively more expensive product.

2.2 Microcontroller and RF sections:

2.2.1. Transmitter

Here the transmitter placed at front and back of speed limiting areas. The total information that is how much the speed of the vehicle in that region is presented in this unit. The information is transmitted from RF transmitter to receivers by this controller unit.

2.2.2. Receiver

Here receiver gets the information from transmitter. According to that received information the receiver controls the speed of the vehicle. RF receiver, LCD display and DC Motors are placed in the RF module. The driver information that is who drives the vehicle is displayed on the LCD display.

3. Working

This is a process of decreasing or limiting the speed of vehicle. Whenever the vehicles enter in to the normal zone, there is no speed limit. Whenever vehicle enter into the restricted zone i.e., hospitals, school, parks the speed is automatically reduced. For this purpose, a module is designed that is RF module (**Figure 2**). It has two modules; one is transmitter module and receiver module. Transmitter module is placed at sides of road. Receiver module is placed inside the vehicle. The radio waves are radiated from the transmitter module and these are sensed by receiver module and compare the speed with recorded speed. If vehicle speed less than the recorded speed it does not allowed to decrease the speed of vehicle. Otherwise it controls the speed automatically. The vehicle speed is displayed on the LCD module. If there is any emergency (for hospital purpose or Ambulance) in our own vehicles, a switch will be available in the vehicle. When the switch is ON, the speed is not controlled automatically. The vehicle which is switched ON, that vehicle number will store in cloud. Here the main purpose of cloud is it loads the route map of the vehicle. If the vehicle is ambulance, this mechanism will not work and the speed of other vehicles which are on the road will automatically decrease. This is accomplished by using the same transmitter module in the ambulance. To accomplish the above process ESP8266 module was used. The reason behind using this module is low cost and high integrated performance compared to other modules.

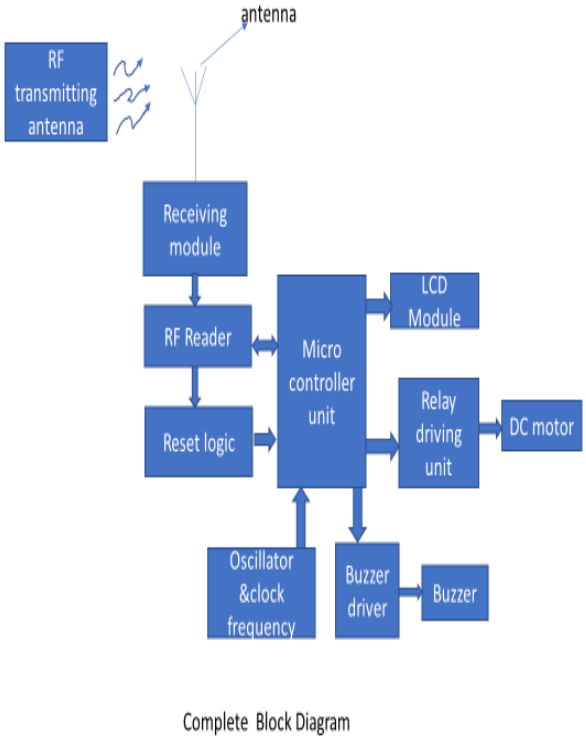

Fig. 2: Block diagram Representation

4. Blynk app

This will install [6] on the monitoring unit then automatically if the vehicle cross the speed limit then automatically notification will send to the control and monitoring unit. Because every vehicle has its own unique ID (token) .IoT means that, if the blynk app will install in the owners mobile phone then owners car will drive by some other people automatically owners will alerted by this system.one major limitation by the blynk app is we can't add more number of vechiles.by this proto type system we have only one vehicle that's why we are using this app. for the real time application we can design a new app for more vehicles

5. Results and Discussion

In this paper, the vehicle can control the speed has been demonstrated. It is of very low cost and this project is simple. It is very easy to implement. And it increases the life time of the human by preventing the accidents. The results (**Figure 3**) are shown in the blynk app at different speed levels when the vehicle reaches to RF zone. And also this information will send to concerned monitoring team.



Fig. 3: Screen shots (a-b) shown by blynk app at different speed levels when the vehicle reaches to RF zone

6. Conclusion

We are trying to focus on pros and cons related to this project. Our future implementation is try to include all this mechanism to cloud and we will monitor to done all this process with automatically that is without using hardware components. And we are trying to include SQL database so that we can store the zone wise data.

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