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Automated Management of Vehicle Speed in Heavy Traffic

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Abstract

Today's drivers are more likely to cause accidents than ever before. The worst part is that due to careless driving, we threw away our bright future. If we keep an eye out, we'll see that most accidents happen in and around schools, parks, hospitals, hilly places, and freeways. Not even the cops can keep tabs on every single one of these incidents. The highway agency put up the billboards to slow down drivers and cut down on accidents. But it's hard to keep an eye out for signs like that, so mishaps are inevitable. In this study, we propose a novel approach to limiting vehicle velocity in a safe manner. In this work, we propose employing an RFID module to enforce speed restrictions. Place the RF transmitter at the beginning and end of the restricted regions, and the RFID reader inside the car. The speed was measured using the car's built-in speedometer. And the controller keeps tabs on that relative velocity. It may automatically adjust the car's speed to stay within the zone's limits if it detects that yours is too high. As a result, the speed dropped automatically. There will be an emergency switch in the car for use in a pinch. The speed is not automatically adjusted while the switch is in the "ON" position. The cloud remembers the identification number of each car that is turned on. Here, cloud's primary function is to provide the vehicle's navigational map.

Key words

Microcontroller; Internet of Things; RFID Module.

Introduction

Intro Rapid driving endangers city residents. Most moving traffic violations nowadays involve drivers being reckless or going too fast. The driver's mental condition may be inferred from their reckless behaviour. Psychologists have observed that those with risk-taking personalities are more likely to engage in risky driving. More cars on the road each year means more accidents. The most common causes of traffic mishaps are drivers who are either too careless or too intoxicated to see the road well. Thus, we begin to consider methods for cutting down on all such occurrences. At first, we have a concept, such as, the speed of the vehicle may be detected using ultrasonic sensors. The height of the speed bumps was adjusted based on how fast the cars were going. However, efficient and practical implementation is challenging. The Infrared (IR) module was first selected for this duty;however, it has several limitations. We settled on an RF module since it just requires a direct line of sight to function [1]. Radio frequency (RF) modules consist of a transmitter and a receiver, as shown in Figure 1. It is recommended to install the RF transmitter outside the restricted area and the RF receiver inside the car. A separate module or ultrasonic sensor reports the current speed to the controller, and the controller acts on that data. The controller will make a comparison between the vehicle's current speed and the maximum allowed. In cases when the vehicle's speed exceeds the permitted limit, the driver need not intervene; the vehicle's speed may be automatically regulated. There is a switch accessible in the car for use in the event of an emergency. When the switch is turned on, the radio frequency (RF) module in that vehicle is disabled; the driver then has full control over the vehicle's speed; and the blink cloud service is used to track the location and movement of the vehicles. The vehicle's identification number allows for simple tracking.

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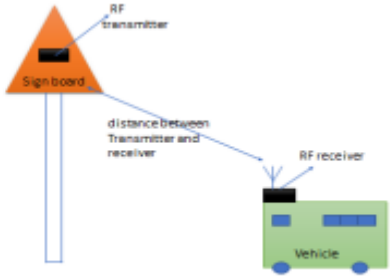

Fig. 1: Overall pictorial representation

Model for Experiment

The RF component and the microcontroller section make up the experimental hardware in this case.

RF Part

An RFID reader/transmitter is an electrical component used to send and receive radio signals between two other electronic devices. Wireless data transmission is often required in embedded systems. Radio frequency (RF) communication requires both a sender and a receiver. Various kinds and price points are available. The range of some of these devices is up to 500 feet. Between 30 kHz and 300 kHz, the frequency range changes widely. There are various advantages to RF transmission over IR transmission. Because radio frequency (RF) signals can travel great distances, they are well suited for long-range uses. While most infrared communication relies on a clear line of sight between the sender and the target, radio frequency (RF) waves may penetrate obstructions. When compared to infrared (IR), radio frequency (RF) communications are far more robust and dependable.

Radio Frequency Transmitter

An antenna on the RF module broadcasts communications into orbit. The radio frequency (RF) transmitter is a module that can broadcast signals into space. The microcontroller and it are able to function together. In this case, the microcontroller feeds the data to be transferred to the module. The transmitter receives serial data and sends it wirelessly through the antenna. Distortion, noise, and other signal impairments are examples of physical environment changes that might affect transmitted output power. As a result, action is required to address these concerns and improve or preserve transmitter quality.

Radio Frequency Receiver

A radio frequency (RF) receiver is used to pick up the broadcast data. The receiver should pick up the same frequency as the emitter is seeing. The RF receiver takes the data that was received from the modulated RF signal and "demodulates" it. There are two different kinds of receiver modules. Both the super heterodyne and the super regenerative receivers are state-of-the-art devices. Super regenerative receivers employ a chain of amplifiers to separate modulated data from a carrier wave, making them efficient and cheap to implement. When comparing super heterodyne with super regenerative receivers, the former is the better choice. Accuracy and stability throughout a wide voltage and temperature range are improved by super heterodyne receivers. A fixed crystal design provides this steadiness, albeit at the cost of a somewhat higher retail price.

Microcontroller and RF:

Transmitter

Here, the transmitter is installed in advance and aft of zones where speed limits are enforced. This device displays the overall data, which indicates how fast the car is traveling in that area. This controller device is in charge of sending data from the RF transmitters to the receivers. In this case, the information is received by the receiver from the transmitter. The receiver adjusts the vehicle's velocity in response to the data it receives. The RF module houses the receiver, the screen, and the DC motors. On the LCD screen, you may see details about the vehicle's driver.

Having a job

It's a method for controlling how fast a car can go. The regular zone has no speed restriction once the cars enter it. When a car or truck enters a school zone, a hospital zone, or a park zone, the speed limit drops instantly. To do this, an RF module (Figure 2) was developed. It's made up of a transmitter and a receiver, both of which are

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separate modules. The transmitter modules are installed on the curbs of the roads. The receiver unit is installed in the car. The speed is compared to the recorded speed using radio waves emitted from the transmitter module and received by the receiver module. It is forbidden to drive slower than the officially reported speed of a vehicle. The speed is automatically adjusted otherwise. The LCD module displays the current speed of the vehicle. In the event of a medical emergency (requiring hospital transport or an ambulance), we will have a button to activate the vehicle's emergency systems. The speed is not automatically adjusted while the switch is in the "ON" position. When a car is turned on, its serial number is recorded in the cloud. Here, cloud's primary function is to provide the vehicle's navigational map. This feature will not function if the vehicle is an ambulance, causing the speed of all other cars on the road to automatically lower. The same transmitter module found in the ambu lance is used for this purpose. The ESP8266 module was utilized to complete the aforementioned procedure. This module is preferred over alternatives because of its inexpensive price and good integrated performance.

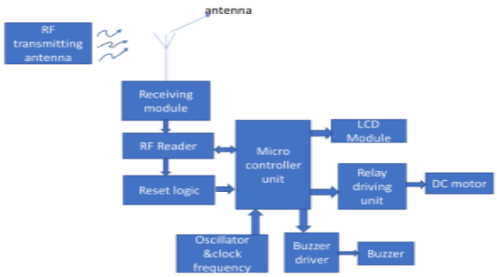

Fig. 2: Block diagram Representation

An example of a Blynk app

A notification will be sent to the control and monitoring unit as soon as the vehicle exceeds the predetermined speed threshold, thanks to the installation of [6] on the monitoring device. Because each car has its own unique identification number (token).Because of the Internet of Things, when the owner of a blynk-enabled vehicle drives by someone else, the owner of that vehicle will get an alert on their smartphone. The inability to add new vehicles is a significant drawback of the blynk app.Since we are utilizing a prototype system with just one car, this program is essential. We can develop a new app that can accommodate more automobiles in real time.

Discussion and Results

The ability to regulate vehicle velocity is shown. This undertaking is cheap and easy to do. It's simple to put into action. And by reducing the likelihood of harm to others, it extends their lives as well. When a user's car enters the RF zone, the app displays the findings (Figure 3) at varying speeds. Additionally, this data will be sent to the appropriate monitoring staff.

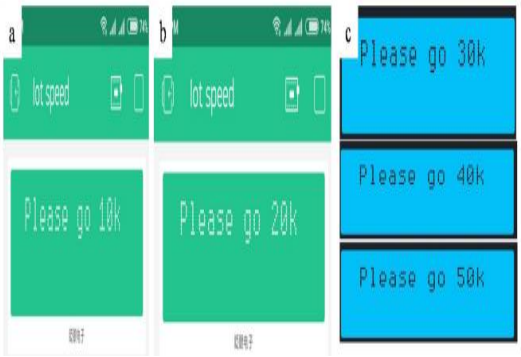

Fig. 3: Screen shots (a-b) shown by blynk app at different speed levels when the vehicle reaches to RF zone 6.

Conclusion

We're making an effort to weigh the benefits and drawbacks of this endeavor. In the future, we want to include all of these mechanisms into the cloud and to automate the monitoring and execution of these processes so that no hardware is required. To keep track of information by region, we're also working on integrating a SQL database.

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