

A Beacon Based Automatic Vehicle Speed Control System for Restricted Zone

¹ R. Ashok Kumar, ² Dr.V.Kavitha, ³ R.R.Jegan, ⁴ Satish S
^{1, 3,4} Assistant Professor, ² Professor,

Dept. of Electronics and Communication Engineering,
V.S.B. Engineering College, Karur.

ashokvsbec@gmail.com, emiroece@gmail.com, jeganvsb17@gmail.com, satishmtechece@gmail.com

Abstract

A beacon based automatic speed control of vehicles in specialized region is introduced. A steady speed limiting system is proposed with a beacon which connects the controlling system and the vehicle automatically. A Bluetooth equipped device like a smart phone can get the alert range of a beacon once it enters in the defined range. The beacon transmits a signal combination of letters and numbers on regular time interval approximately 1/10 of a second. Once the connection is established between the receiver in the vehicle and beacon, the control circuit gets enabled to reduce the speed of the vehicle within the range of the beacon. The receiver is also informed about the location or zone in which the vehicle is moving. This system of vehicle control ensures safety to the specialized residents even the vehicle operator lacks the knowledge of location. The time taken by the receiving end to respond to the beacon is not an issue in this task due to the wide range of span area.

Keywords: Beacon, speed control, range, road side device, alcoholic sensor, limiter, sensing.

1. Introduction

Reducing the number of accidents and alleviating the consequences is a major concern to the transportation authorities, the automobile industries and the manufacturer of transport carriers. One important action guide is in the use of the extended driver assist system, which is a sound, tactile, or visual signal generated by the vehicle itself to signal to the driver the possibility of a crash. This system is somewhat useful in today's commercial vehicles, and future trends indicate that high safety can be achieved with road driving and self-drive control and increasing sensors in the vehicle itself. The primary view is designed in an intelligent speed limit indicator in dangerous areas. A speed controller is installed in the vehicle and the speed limit indicator is indicated by a beacon. Using alcoholic sensors to detect the driver who consumed alcohol and stop his vehicle, accident can be prevented by avoiding driving with drinks. The device is set by employing a receiver in the vehicles and there are transmitters where they can communicate multiple devices to control the speed of the vehicle while entering the surveillance zone. Therefore, the limited speed is set as the default value, so that the speed of the vehicles will be controlled automatically to the rated speed. Therefore, this system provides the overall control of the covered area.

2. Existing Method Block Diagram

Available methods use RF to send speed limit information to the receivers. The Receiver in a vehicle detects a radio signal when it comes into coverage area. For the automatic speed control of vehicle, we have selected our basic idea from the reference paper1. The authors explains the method of RF(Radio frequency) signal transmitted through the antenna signal and received by the vehicle entering the specific region. This can be able to pair to only one device but multi device cannot be paired. The speed of the vehicle is monitored and is controlled from the over speed can be described by the paper titled as “Risky Driver Recognition Based on Vehicle Speed Time Series. The paper entitled as “Vehicle Speed Control System Using GSM/GPRS. This project that enable two kind of provisions Uses the vehicle tracking system to track the current location and speed of the vehicle and in accident prone zones, speed of vehicle is limited remotely.

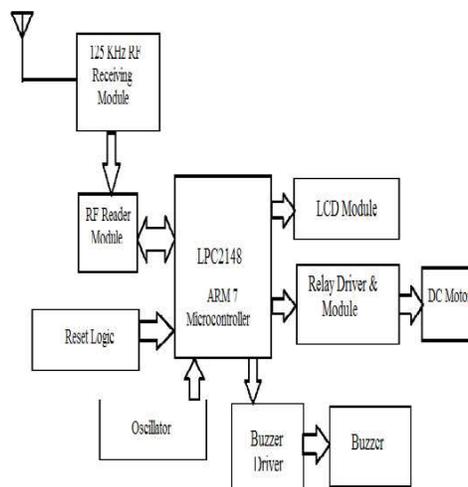


Fig.1 RF block setup

This block diagram explains about the pairing and controlling the termination of the system. In this block diagram the receiving section place a major role in the road sign ID chip and RF transmitter. These two are fixed on the road side undergo process will pair with each other the vehicle having very high speed which will pair with the receiving section. Hence they are transmitted by antenna will suffer from the definite losses and they cannot change with the mobile nodes suddenly from one device to another these receiving block has the major function that can be done with the RF reader. The RF reader which reads the information from tag over devices. These devices that are controlled by the microcontroller along with the additional necessary components. While controlling under processing with the receiver section the time synchronisation is necessary in this approach. The pairing is most important where it is not predictable but once it is paired it needs the termination control. It sends request for the termination at every time and it causes the mismatching in the connection system.

3. Proposed System:



Fig. 2 Device in road side

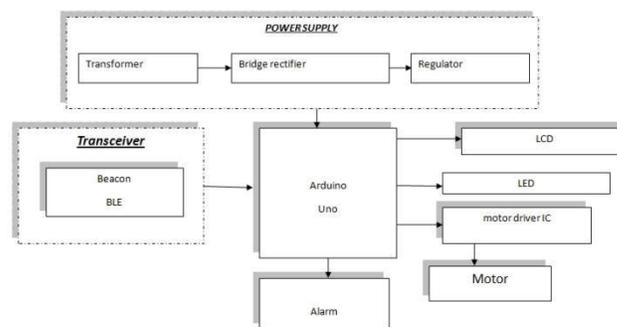


Fig.3 Device in vehicle

A beacon is an intentionally conspicuous device designed to attract attention to a specific location. The beacon setup repeatedly transmits a single that other devices can see. Instead of emitting visible light, though, it broadcasts a radio signal that is made up of a combination of letters and numbers transmitted on a regular interval of approximately 1/10th of a second. A Bluetooth-equipped device like a smart phone, another device can be paired and set the require range of distance over which the information of single can be transmitted by connecting these two devices with the help of Bluetooth can get the alert range beacon once it's in range. Here an example of vehicle the information between transmitter and receiver when the vehicle enters the range of the signals from transmitter device over the lane it connects via the proper authentication of the registered information by matching the devices between the receivers to transmitter. Once the transmitter found the proper authentication and then it pairs with the device from the range that before it enters the limit. Established connection will control the rate of speed on the vehicle. The receiver circuit is enabled with the beacon Bluetooth device which is connected by the interface of an android application through a mobile device. Which automatically turns on the notification which controls the motor enabled with switches and maintains it till the connection terminates.

3. Work and prototype

The beacon setup is provided in the starting of the lane so that the control for the vehicles starts to decrease from the point of entry. Since the control of speed experiencing sudden decrease would cause mal function in engine so the gradual

decrease in important so the area that limits speed should be installed with initial device which would range before it comes under the limit. Then the authentication process starts to pair with the device. The last four digits for the security purpose are enabled as the information key for pairing. Beacon frame is one of the management frames in IEEE 802.11. Based WLANs. It contains all the information about the network it is transmitted by access point (AP) in an infrastructure basic set (IBSS). In IBSS network beacon generation is distributed among the station. These are transmitted as fires are light that are served as warning signal to spread word of invasion natural disaster. It allows android devices to use beacon much like iOS devices do .An application can request to get notification when one or more beacon appear or disappear. An application can also request to get a range in update from one or more beacon at a frequency of approximately one heads.

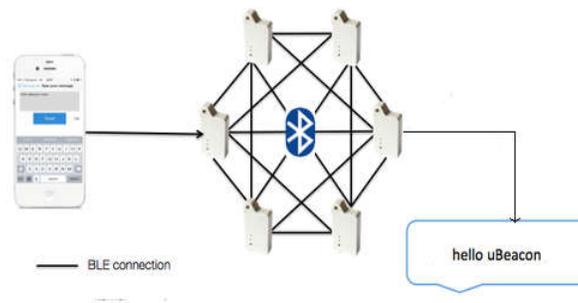


Fig.4 Pairing of beacon with mobile device

This involves in the connection of analysing and controlling devices is one to many, beacon enables connection of master and slave. It also chooses the mesh type network. The live notification and pairing details are shown in the mobile application. It can be stored for the further using and automatic detection for the next time usage. The android application consists of detection and pairing where the authentication is the major role of that process and to work as the mesh network. This will have the efficiency to connect in any high speed. This node will act as the slave node until it travels between the ranges of the master (transmitter).



Fig. 5 Mobile app notification

DC motor speed control is one of the most useful features of the motor. The speed control mechanism is applicable in many cases like controlling the movement of vehicles. Once the limit range is high then they automatically indicate to the DC motor and it will reduce the speed in steady state. This system also incorporates a mechanism that detects consumption of alcohol by the driver of the vehicle. When the alcohol sensor senses it and the range for alert is identified it automatically and brings the motor to speed zero. The vehicle is stopped immediately. The sensing range values are programmed and when that goes high the logic 1 is given as output to the motor that will reduce the speed to zero. So, the person will not be able to start the vehicle. This is one of the necessary features for safe travel. The alcohol sensor used in this work is MQ-135 alcohol sensor that consists of a tin dioxide (SnO₂), a perspective layer inside aluminium oxide micro tubes (measuring electrodes) and a heating element inside a tubular casing. With the ethyl alcohol cascade on the tin dioxide sensing layer, the resistance decreases. So that the value goes high and control over the motor is done. These sensor output is directly connected to the motor that controls the speed of vehicle. It automatically slows down and reaches zero speed. The detection is always on, whenever the driver gets in it again checks whether there is the sense of alcohol detection.

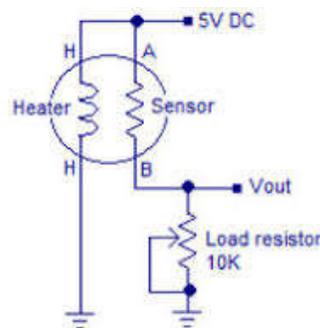


Fig .6 Alcoholic Sensors

4. Program Flow

```

void loop () {
  long duration, distance;

  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);

  distance = duration / 74 / 2;

  Serial.print(distance);
  Serial.println(" inch");

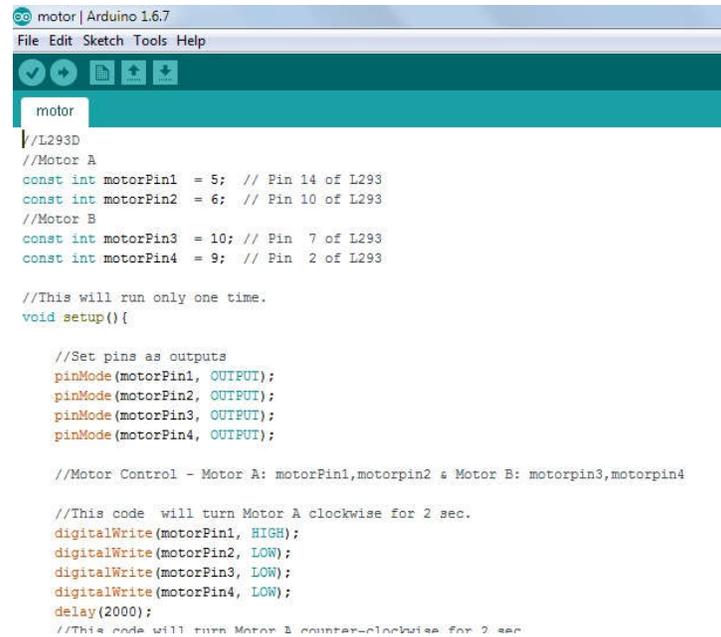
  if(distance <= 12)
  {
    digitalWrite(buzzer, HIGH);
    digitalWrite(led, HIGH);
  }else
  {
    digitalWrite(buzzer, LOW);
    digitalWrite(led, LOW);
  }
}

```

Fig.7 Program-alarm for range indication

This program the pairing control can be indicated for the range enabled by an alarm. For an example, consider the tollgate system, once the vehicle enters the range of transmitting signal they will enable the initialized loop from the declaration. The pairing of the vehicle device within the range can be analysed detail and enabling of pairing control is required. After this declaration when the main loop execute after the detection of connection establishment between the roadside device and the vehicle is enhanced as the priority one control. The sensor has been declared for the multiple users such as alcoholic sensor which is used to drink and drive. Alcoholic sensor has been in global declaration and which runs first only if the test case passes with the loop as zero, and then the program loop runs for further process of the program. This will continue for various devices with the single signal.

5. Output and Discussion



```
motor | Arduino 1.6.7
File Edit Sketch Tools Help
motor
//L293D
//Motor A
const int motorPin1 = 5; // Pin 14 of L293
const int motorPin2 = 6; // Pin 10 of L293
//Motor B
const int motorPin3 = 10; // Pin 7 of L293
const int motorPin4 = 9; // Pin 2 of L293

//This will run only one time.
void setup(){

//Set pins as outputs
pinMode(motorPin1, OUTPUT);
pinMode(motorPin2, OUTPUT);
pinMode(motorPin3, OUTPUT);
pinMode(motorPin4, OUTPUT);

//Motor Control - Motor A: motorPin1,motorpin2 & Motor B: motorpin3,motorpin4

//This code will turn Motor A clockwise for 2 sec.
digitalWrite(motorPin1, HIGH);
digitalWrite(motorPin2, LOW);
digitalWrite(motorPin3, LOW);
digitalWrite(motorPin4, LOW);
delay(2000);
//This code will turn Motor B counter-clockwise for 2 sec
```

The output of the program can be displayed when it is uploaded in the ARDUINO program. The range of the speed from the roadside device over the lane is enabled then it automatically signal is passed to the motor control and this is done by ARDUINO IDE. These two programs make an interface between them. When the sensor for alcohol, the loop is passed after the value only then it automatically reduces the speed. The motor output program is interfaced only along with the main control loop in the program. Both results are obtained over the motor control and then indication for the danger lights are enabled through the motor but only as the third priority of the loop is executed for the condition satisfying the loops are declared.

6. Conclusion

Implementation of speed controller and the alcoholic sensors will enable the efficient way of controlling and sustaining all zones automatically. Connection boundaries between each 30 m width will be adjusted and the additional range increases the variable range to adjust the long-range capable device. The GPS-enabled control system helps people to know that they can be added to the system with future implementations. The beacon may also be accommodating by information such as nearby hotels, hospitals, as well as it provide the details about type of zone to the vehicle enters that is hospital zone, or any other places. The information of toll Gate and the billing station can be given at the earlier and the entire system connects with internet with correct encryption will provide a great deal of control and many useful purposes. So this system along with the implementation of continuous development will be providing well managed and controlling system.

7. Reference

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