AUTOMATED SPEED BREAKER TO CONTROL THE SPEED OF THE VEHICLE BASED ON IoT

Kumaravel A[1], Tharani R[2], Thillaikarasi G[3], Varsha A[4]

[1]*Professor, Department of ECE, Muthayammal Engineering College, Tamilnadu, India*
[2, 3& 4]*UG Students, Department of ECE, Muthayammal Engineering College, Tamilnadu, India*

Abstract - *Safety is a necessary part of man's life. Due to the accident cases reported daily on the major roads in all parts of the developed and developing countries, more attention is needed for research in the designing an efficient car driving aiding system. It is expected that if such a device is designed and incorporated into our cars as a road safety device, it will reduce the incidence of accidents on our roads and various premises, with subsequent reduction in loss of life and property. When it comes to the use of a motor vehicle, accidents that have occurred over the years tell us that something needs to be done about them from an engineering point of view. Now it is suffice to say that the implementation of certain highway safety means such as speed restrictions, among others, alone has done a lot in reducing the rates of these accidents. Many motorists have had to travel through areas with little light under much fatigue, yet compelled to undertake the journey out of necessity. It is therefore imperative to consider the advantages of an early warning system where the driver is alerted of a possible collision with some considerable amount of time before it occurs.*

Key Words: Smart Speed Breaker, RFID tag, Servo Motor, IR sensor, IoT

1. INTRODUCTION

The main objective of this project is to control the speed of any vehicles in schools, hospitals and speed in restricted regions etc. Smart speed breakers are the traffic claiming devices where over speeding vehicles will activate the speed breaker and it will raise the speed breaker above the surface of the road and will give the physical remainder to the driver for slowing down the vehicle. If the speed of the vehicle will be in the given allowed speed limit then the speed bumps will remain flat on the surface of the road and the vehicle can pass through it comfortably. In implementation we are using an iron made flat speed breaker which is proficient of rising itself using control circuitry of embedded system. In this project, the Arduino controller relates the speed, if it outstrips the restricted speed the controller warnings the driver and the proximity sensors are used to detect the speed and activate the speed breaker and a warning is shown to the driver using a standard traffic light signal. If the speed exceeds the allowed speed an image is also captured of the vehicle and is sent to the cloud, which can be accessed by RTO for fining the vehicle.

1.1 Proposed System

In our System, The Smart Speed breaker system with IOT which will be surfaced and will show up only if the vehicle speed is higher than permissible limits. To control lift of the speed breaker Arduino based board are preferred which triggers a motor for surfacing the speed breaker system, for real time control RTC circuit is used. Depending upon the speed of the vehicle and the distance of the vehicle from the speed breaker, the Arduino board sends a signal to buzzer to start the beep sound to warn the driver that its speed is beyond the permissible speed. If the speed of the vehicle will be in the given allowed speed limit then the speed hump will remain flat on the surface of the road and the vehicle can pass through it comfortably. If the speed is more than the allowed speed, then Arduino board sends a signal to servo motor to rotate 90 degrees causing the speed hump to rise above the road surface. Arduino will also send the speed to connected android device which upon receiving the signals is being used as a notification system and taking images of vehicle and will alert the driver that the speed is high or low by displaying it on the screen. If the vehicle at the abnormal speed cross the speed breaker more than three time the message will be send to the particular person and head of the police department, if the same person at the abnormal speed cross the speed breaker more than five times the license will be blocked.

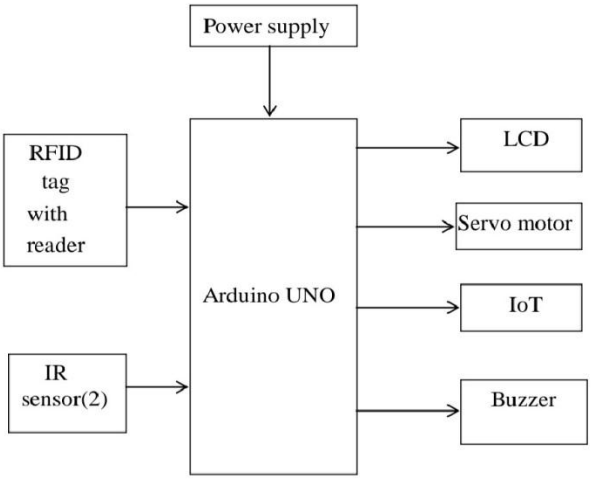

Fig- 1: Proposed diagram

1.1 Working Principle

If the speed is more than the allowed speed, then Arduino board sends a signal to servo 90 motor to rotate 90 degrees causing the speed hump to rise above the road surface. Arduino will also send the speed to connected android device which upon receiving the signals is being used as a notification system and taking images of vehicle and will alert the driver that the speed is high or low by displaying it on the screen. One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

2. MATERIALS AND METHODS

Materials used in this project are Arduino Uno, IR sensor, RFID tag with reader, Servo motor, LCD, IOT, Buzzer.

2.1 Arduino UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. Simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.

Fig- 2: Arduino UNO

2.2 IR Sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. 11 Usually in the infrared spectrum , all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

Fig- 3: IR Sensor

2.3 Servo Motor

The Servo Motor is used to rotate the device speed breaker. The motor required power supply is 4 to12 volts. Therefore two DC motors are used to drive the robot. If the speed is more than the allowed speed, then Arduino board sends a signal to servo 90 motor to rotate 90 degrees causing the speed hump to rise above the road surface.

2.4 LCD

LCD is used to display the results of the system operation such as sensed values, motor status etc. A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. The LCD standard requires 3 control lines and 8 I/O lines for the data bus. The interfacing with various microcontrollers, various interfaces (8-bit/4-bit), programming, special stuff and tricks. The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780controllers.

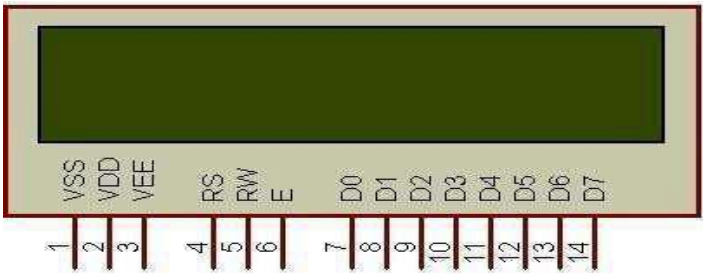

Fig- 4: LCD Display

2.5 IoT

Internet of things (IoT) is the network of devices such as vehicles, and home appliances that contain electronics, software, actuators, and connectivity which allows these things to connect, interact and exchange data. The IoT involves extending Internet connectivity beyond standard devices, such as desktops, laptops, smartphones and tablets, to any range of traditionally dumb or non internet enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled.

2.6 BUZZER

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC- connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high- pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off. In game shows it is also known as a "lockout system," because when one person signals ("buzzes in"), all others are locked out from signalling. Several game shows have large buzzer buttons which are identified as "plungers".

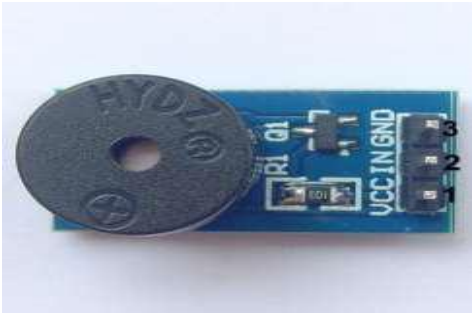

Fig- 5: Buzzer Module

3. SYSTEM IMPLEMENTATION

The transmitting side of the Ardunio Uno is connected to the receiving side of the IR sensor .The power supply is given to the Ardunio Uno. From the Ardunio Uno the power is distributed to all other components. Each component are connected and controlled by the Ardunio. By using MQTT client application we can receive the message. In upward motion, the bump are rises few centimeter above the road surface and give physical remainder to driver. The upward motion to the bumps is provides by various mechanism like Rack and Pinion mechanism, Scissor Jack mechanism. In downward motion, the bumps of smart speed breaker lower into the road surface production match in road surface thus giving physical remainder to driver. The downward motion of bump is provided by roller mechanism. Screw jack along with electric motor can be used to load lifting easier. The output is the turning on and off of the buzzer every other second. The picture below shows the setup of your module and Arduino. If the vehicle at the abnormal speed cross the speed breaker more than five times the license will be blocked and we will receive the warning message in third time of the same vehicle cross the speed breaker at abnormal speed.

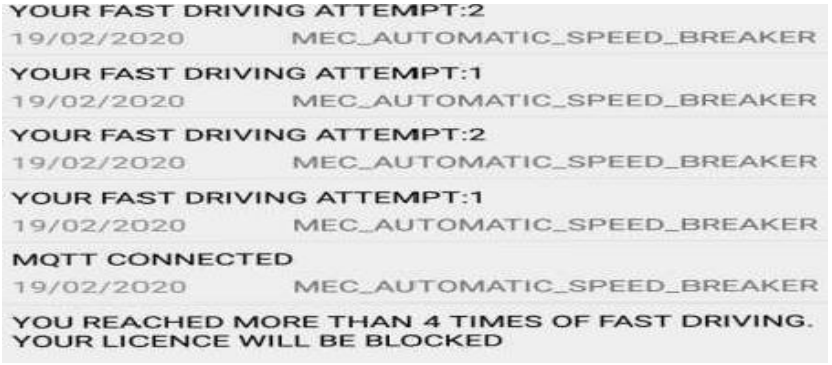

Fig- 6: MQTT message

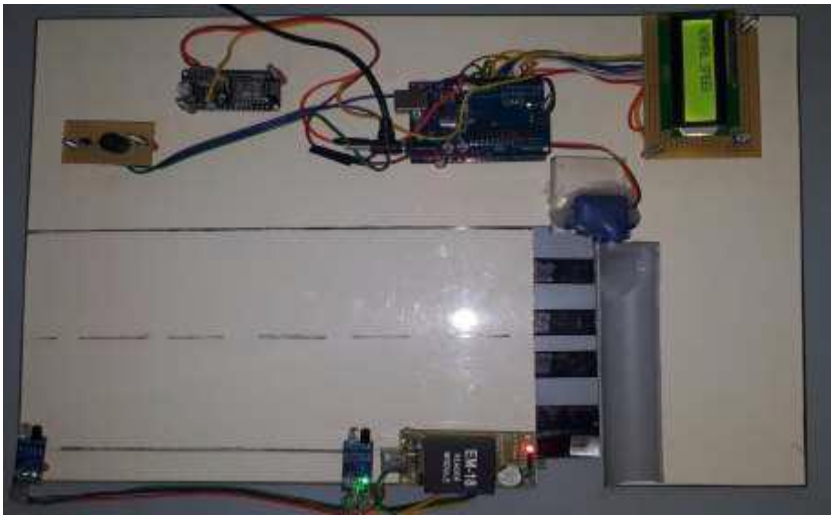

Fig- 7: Smart speed breaker when the vehicle at normal speed

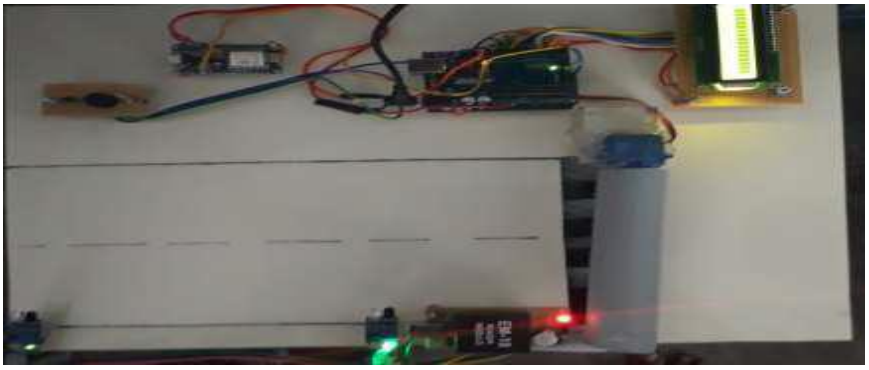

Fig-8: Smart speed breaker when the vehicle at abnormal speed

4. CONCLUSIONS

We proposed and implemented a Smart Speed breaker system, Smart speed breakers are the traffic claiming devices where over speeding vehicles will activate the speed breaker and it will rise the speed bumps above the surface of the road and will give the physical remainder to the driver for slowing down the vehicle. If the speed of the vehicle will be in the given allowed speed limit then the speed bumps will remain flat on the surface of the road and the vehicle can pass through it comfortably. In implementation we will be using an iron finished flat speed breaker which is skilled of rising with the help of control circuitry of embedded system. In this project we used an Arduino board and proximity sensors to detect the speed of vehicle and activate the speed

breaker and a warning to shown to the driver using a standard traffic light signal where Red led for slowing down and green to maintain the speed and a buzzer is also used to warn the driver of speed breaker ahead of him. If the speed exceeds the allowed speed an Image is also captured of the vehicle and is sent to the cloud, which can be accessed by RTO for fining the vehicle. We have tested our system on multiple times called as stress testing to see if the model works correctly in stress and the results are good a expected.

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BIOGRAPHIES

Prof. A. Kumaravel is currently working as Professor in ECE department of Muthayammal Engineerng College, Rasipuram, Tamilnadu. His area of interest includes VLSI, Sensor Networks, embedded system.

Ms. R. Tharani is currently doing her Final year UG course in ECE department of Muthayammal Engineering College, Rasipuram, Tamilnadu. Her area of interest is Embedded system.

Ms. G. Thillaikarasi is currently doing her Final year UG course in ECE department of Muthayammal Engineering College, Rasipuram, Tamilnadu. Her area of interest is Embedded system.

Ms. A. Varsha is currently doing her Final year UG course in ECE department of Muthayammal Engineering College, Rasipuram, Tamilnadu. Her area of interest is Embedded system.