Report

on

Automatic Vehicle Horn & Alert System

IoT Based Project

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ACKNOWLEDGEMENT

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Many Thanks goes to Dr Shankey Saxena who has invested his full effort to guide our project team to do this project.

ABSTRACT

In this project we are going to build a automatic vehicle horn and Alert system using a NodeMCU ESP32 Wi-Fi module and ultrasonic sensors .It is basically for vehicles ,sometimes driver forget to blow the horn ,in this situation it may cause of accident so in this project we are using ultrasonic sensors and set a range when any object or vehicle is in this range the horn will blow automatically , another feature of this project that it alert the driver about the vehicles which are coming from behind , generally this is for large vehicles or loaded vehicles ,suppose a loaded vehicle is running on the road and the driver the not aware about the vehicles which are coming from the backside so he does not know about the backside vehicle and the the driver is continuously asking for for the side but he is not hearing the sound of the horn so our system is about alerting the driver by detecting the vehicle coming from the backside by the help of ultrasonic sensor. We are using LEd for alert..

Introduction

Automatic Horn and Vehicle Detection System is an automatic system which is designed for large vehicles for automatic horn and backside vehicle detection . We are using two ultrasonic sensors one is on the front of the vehicle for detecting the objects and one ultrasonic sensor is on the backside of the vehicle to detect the vehicle from backside and we are using buzzer and LEDs for alerts ,here we are using NodeMCu as microcontroller .

The system consists of two main part The Hardware and The Software

The Hardware system consists NodeMCU , Ultrasonic sensors, Buzzer, Led

The Software consists of the Arduino IDE and NodeMcu ESP8266 firmware.

It is programmed using the Arduino IDE and NodeMcu firmware . The system is designed to send alert using buzzer and leds when the vehicle or object is detected on the set range.

Objective of the Project

The main objective of our project is to contribute in reducing the road accidents which are happened due to no horn by the driver , we say that lot of times driver of the vehicle forget to blow the horn so it may be cause of accident. Basically our project is for loaded or large vehicles ,we are providing automatic horn when any object is detect at certain distance , the horn will be blown automatically, another feature of our project will be detecting the vehicles which are on the backside of the vehicle so it will alert the driver that there is a vehicle on the backside ,so you can give them a pass by . So our objective is to reduce the accidents which are happened hue to forgetting of horn blown.

COMPONENTS DETAILS

These are the components that we are using for this IOT based project

1. NodeMCU
2. Ultrasonic sensor (2)
3. LED
4. BreadBoard
5. Resistor
6. Buzzer
7. Jumper Wires

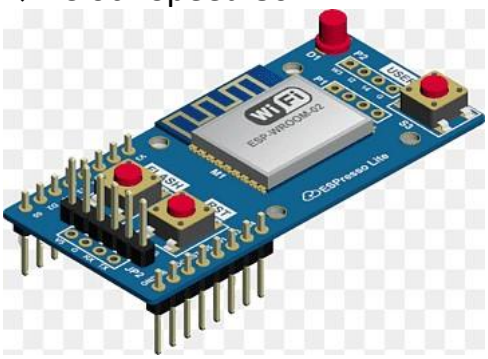
1.NODEMCU

It is a low cost Wi-Fi Microcontroller Board that is based on the ESP8266 chip.It has a build in module voltage regulator and can be powered either bya usb port or a external battery . It has a wide range of applications in the field of Internet of things .

It has 17 digital Input output pins of which 6 can be used as PWM outputs ,1 analog pin , a 16MHz oscillator , a usb connection ,a power jack and one reset button.

Specifications

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa
- Operating voltage:3.3V
- Input voltage : 7-12V
- Digital I/O Pins :16
- Analog Input Pins :1
- UARts:1
- SPIs:1
- Flash Memory:4Mb
- SRAM:64kb
- Clock Speed:80MHz



2 . Ultrasonic sensor

Ultrasonic/level sensors use ultrasonic waves to measure distance, as the name

suggests.An ultrasonic wave is emitted by the sensor head, which then receives the wave reflected back from the target. Ultrasonic and level sensors use the difference in time between emission and reception to calculate the target's distance

Sensor Description

The module which we used in our project is powered by 5V supply.The trigger pin has to be made high for 10usec and after that turned off. This results that the transistor to send an ultrasonic wave with frequency of 40Hz.

Specifications

- Operating voltage : +5V
- Operating current : <15mA
- Practical Distance which can be measured 2cm to 80cm
- Accuracy : 3mm
- Measuring angle covered <15degree

Working of Ultrasonic Sensor

Its working is all about sending a sound wave at a frequency above the range of human hearing.Sensor's transducer is acted as a microphone which receives and send the ultrasonic sound .This sensor basically determines the total distance to the target by just measuring time lapses between the receiving and sending ultrasonic pulse .

It's working principle is simple . Ultrasonic pulses are just send at the frequency of 40kHz which travells through the airs and when this hit an object , it will return back to the sensor . Then by calculating the travel time we can calculate the distance between the sensor and the object.

3 LEDs

LED means Light Emitting Diode is a semi conductor device , the current is flowed when the electric current is passed .

We are using LED here for alerting the driver , when any vehicle is detected in the background of the vehicle , the LEDs will be blink.

4. Breadboard

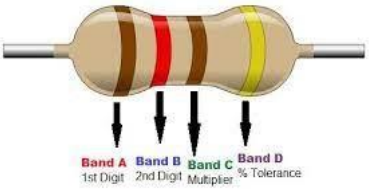
It is a plastic box which holds electric sockets of suitable sizes for gripping the connection wires or transistor's pins. In this board sockets are connected in rows of five sockets.It is basically a "solderless" breadboard

Features of this Breadboard

- There are 400 tie-point plug-in solderless Breadboard
- There are four independent common bus lines

5. Resistor

It is basically a two terminal electrical component which is used for electrical resistance. It is used in electric circuits for reducing current flow,adjust levels ,to divide the voltage etc



6 Buzzer

It is basically a sound device which converts the audio signal to sound signal. The main use of this device is to prompt or alarm . It has different different designs and applications so it is used for many purposes,music sound flute sound,buzzer sound , electric bell sound can be produced .

The buzzer is also known as piezo,which is used for generating sound .Its like a digital component which is generally connected to the digital outputs and its emits the tone when its output is high. The grove Buzzer is operated at 3.3V as well as 5V with the sound of 85 decibels. This can be used to give the module of sound to our application just like button's click sound of an digital watch.

The main application of this device is alarm device,fire alarm,air defence alarm,burgler alarm. It is mainly used in households.

Understanding of buzzer

due to the electric current . When tone is executed the current is passed through membrane and it is deformed . When there is no tone the membrane goes back to its original form .

Specifications

Operating voltage :5V

Frequency : 3300Hz

Current : <15mA

Numbers of pins: 2

6. Jumper Wires

The jumper wire is an electrical wire or we can say the group of wires in a cable which have connector or pins on the both ends which are very helpful to connect the components of the breadboard or any other circuit .

7 Battery (For Power)

Working of the project

In this project we are using NodeMCU ESP8266 as microcontroller and we are using Arduino IDE for uploading the program in the microcontroller and for detecting the distance of vehicle or object we are using two ultrasonic sensor one is fitted on the front of the vehicle and another one is fitted on the backside of the vehicle , we are using piezo buzzer as a horn and Led for alerting the driver that there is any object behind the vehicle , we are connecting this system through the breadboard with jumper wire .For power supply we are using 5V battery .

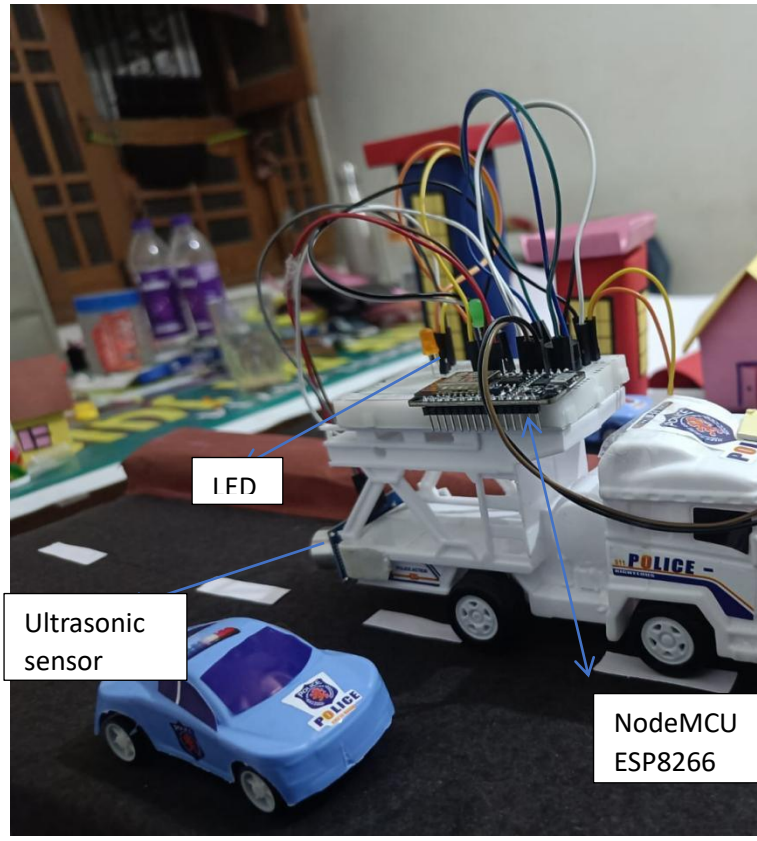
Basically what everything will work in this project we are explaining here so when the ultrasonic sensor which is on the front of the vehiche detect any object at the certain distance then the buzzer will honk ,we will set the distance in the program according to our will and the backside sensor by ddetecting any object at certain distance will alert the driver by blinking the Led fitted just in front of the driver .

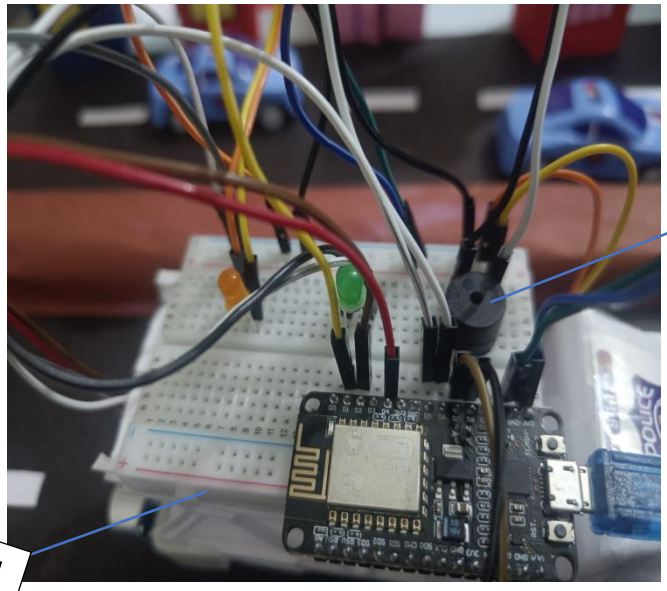
Program Uploaded

```
#define echoPin1 D8
#define trigPin1 D7
#define echoPin2 D2// New
ultrasonic sensor's echo pin
#define trigPin2 D4 // New
ultrasonic sensor's trigger pin
#define buzzerPin D6
#define ledPin1 D1
#define ledPin2 D5

// defines variables for the first
sensor
long duration1;
int distance1;
unsigned long previousMillis1 = 0;
const long interval1 = 1000;

// defines variables for the second
sensor
long duration2; // variable for the
duration of sound wave travel for
the second sensor
int distance2; // variable for the
distance measurement from the
second sensor
unsigned long previousMillis2 = 0;
// variable to store the last time
the LED1 blinked
const long interval2 = 1000; //
interval for LED1 blinking in
milliseconds

void setup() {
pinMode(trigPin1, OUTPUT);
```

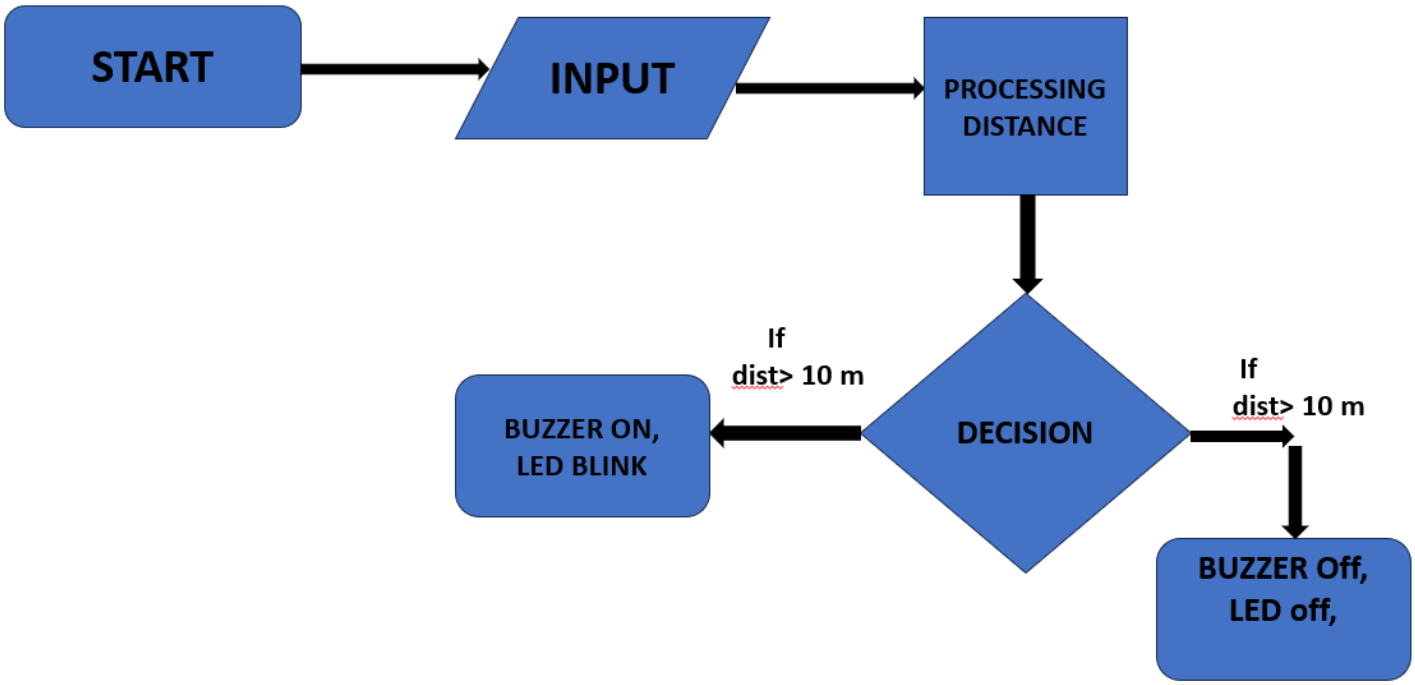
```
pinMode(echoPin1, INPUT);
pinMode(trigPin2, OUTPUT); // Set the trigger pin of the second sensor as an OUTPUT
pinMode(echoPin2, INPUT); // Set the echo pin of the second sensor as an INPUT
pinMode(buzzerPin, OUTPUT);
pinMode(ledPin1, OUTPUT);
pinMode(ledPin2, OUTPUT);
Serial.begin(9600);
Serial.println("Ultrasonic Sensor HC-SR04 Test");
Serial.println("with NODEMCU");
}

void loop() {
// Sensor 1
digitalWrite(trigPin1, LOW);
delayMicroseconds(2);
digitalWrite(trigPin1, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin1, LOW);
duration1 = pulseIn(echoPin1, HIGH);
distance1 = duration1 * 0.017;
Serial.print("Distance 1: ");
Serial.print(distance1);
Serial.println(" cm");

// Sensor 2
digitalWrite(trigPin2, LOW);
delayMicroseconds(2);
digitalWrite(trigPin2, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin2, LOW);
duration2 = pulseIn(echoPin2, HIGH);
distance2 = duration2 * 0.017;
Serial.print("Distance 2: ");
Serial.print(distance2);
Serial.println(" cm");

// Check if the distance from the first sensor is less than 10 cm
if (distance1 < 10) {
digitalWrite(buzzerPin, HIGH);
delay(2000);
digitalWrite(buzzerPin, LOW);
delay(2000);
digitalWrite(ledPin1, HIGH);
// Blink the second LED
unsigned long currentMillis1 = millis();
if (currentMillis1 - previousMillis1 >= interval1) {
previousMillis1 = currentMillis1;
digitalWrite(ledPin2, !digitalRead(ledPin2));
}
} else {
digitalWrite(buzzerPin, LOW);
digitalWrite(ledPin1, LOW);
digitalWrite(ledPin2, HIGH);
}
```

```
// Check if the distance from the second sensor is less than 10 cm
if (distance2 < 10) {
digitalWrite(ledPin1, HIGH);
digitalWrite(ledPin2, LOW);
unsigned long currentMillis2 = millis();
unsigned long cur = currentMillis2 - previousMillis2;

if (cur >= interval2) {
previousMillis2 = currentMillis;
digitalWrite(ledPin1, !digitalRead(ledPin1)); // Toggle the state of the first LED
}
}
}
```





BLOCK DIAGRAM:



PROJECT MODEL:

Literature review

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Paper title	Authors name	Year of publication	Methodology	Limitations
[01]	NAKANDHRAKUMAR. R. S, RAMKUMAR VENKATASAMY, JOSHUVA AROCKIA DHANRAJ	2022	[1] In the previous system the horn is set to be generally free whether the driver wants to honk the horn or not ,its totally dependent on the driver according to the condition ,it is known that horn is necessary for any vehicle but sometimes it creates unnecessary noise so it is not good for the environment , So in some areas it is totally prohibited basically near the zoo,schools,hospitals by regulation ,it was proposed in the system that in the noisy area the circuit will not operate the system to honk the horn on the prohibited area however where the horn will be need to honk,it will honk.	In these systems there is limitation that there is no automatic horn and there is no feature such that which can detect the vehicle from the backside and alert the driver , mostly accidents took place that driver does not honk the horn and it may be the cause of accident so there should be feature that when at certain distance if any object or vehicle is detected the horn shold be blown automatically
[02] **Security Door Lock Using Multi-Sensor System Based on RFID, Fingerprint, and Keypad**	Joni Welman Simatupang, Ramses Wanto Tambunan	2022	[2] In this system the driver came to know that from which direction the noise is coming or the vehicle is coming from which side so it is like a safety for four wheeler , but sometimes driver came to know that from which direction the vehicle is coming from but he forget to honk the horn .In this system for detecting the direction of the vehiche two microphones are set on the front and back of the vehicle, servomotor is	In this system there is a limitation that it may confuse the driver because things are happened generally very fast at the time of driving , generally most important thing is that driver should know only about the vehicles which are coming from

RESEARCH GAP

In the proposed system the horn will be honk automatically when the object or any vehicle is detected at the certain distance from the vehicle , for this we are using ultrasonic sensor which will detect the distance of the vehicle and horn will be honk automatically , another feature , we are adding to our system is that it will detect the vehicles which are coming from the backside of the vehicle through ultrasonic sensor which is fitted on the backside of the vehicle , we are using the Leds to alert the driver that there is any vehicle on the back . We are using buzzer as a horn .NodeMcu ESP 8266 is taken as a microcontroller .

Conclusion

Finally this project, Automatic vehicle Horn and alert System can be quite a good approach in protecting other people's lives especially those using heavy motions like loaders , loaded tractors in order to enhance their safety measure on roads. Many people believe that this innovation could solve the unnecessary road honks but also to promote safer driving.

In summary, the development and usage of the Automatic Horn and Vehicle Detection System is of great significance towards improvement of safety on road and lowering noise levels.

References

[1] https://www.irjet.net/archives/V5/i5/IRJET-V5I5450.pdf

[2] S. Nanda, H. Joshi and S. Khairnar, "An IOT Based Smart System for Accident Prevention and Detection," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), Pune, India, 2018, pp. 1-6, doi: 10.1109/ICCUBEA.2018.8697663.

[3] http://www.acadpubl.eu/hub/2018-118-21/articles/21b/77.pdf