

2-WAY SIGNAL SYSTEM

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Stream:- CSE(IoT)

Subject:- SOLO Project



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1.Introduction

Traffic Problems are very common and very huge in every densely populated developing nation(especially India). The problem becomes more strenuous if the operator of the signal is a human. This problem can be solved by a few(~100) lines of code in ‘C’ language and some minuscule wiring and small twitches to a microcontroller(in this case Arduino UNO R3). The basic design is simple, it uses 2 ultrasound sensors paired with DHT-22 to make sure the signal functions properly in all terrain and weather, one pointing in the top-bottom direction and another in the right-left direction.

2. Objectives

- Automating a Traffic Signal to eliminate chances of human error.**
- This apparatus can be twitched further to add an additional Zebra Crossing feature for blind people.**
- This can also be used to catch traffic signal violators effortlessly.**

3.Procedure

- **Connect 2 ultrasound sensors to the Arduino as follows**
 - **Ultrasound 1**
 - **ECHO PIN:- ARDUINO DIGITAL PIN 12**
 - **TRIGGER PIN:- ARDUINO DIGITAL PIN 12**
 - **VCC:- ARDUINO 5V PIN**
 - **GND:- ARDUINO GND PIN**
 - **Ultrasound 2**
 - **ECHO PIN:- ARDUINO DIGITAL PIN 5**
 - **TRIGGER PIN:- ARDUINO DIGITAL PIN 5**
 - **VCC:- ARDUINO 5V PIN**
 - **GND:- ARDUINO GND PIN**
 - **DHT-22**
 - **+PIN:- ARDUINO 5V PIN**
 - **-PIN:- ARDUINO GND PIN**
 - **O/P PIN:- ARDUINO DIGITAL PIN 7**
- **Then the code is uploaded to the Arduino UNO.**
- **Since the apparatus involves use of 2 ultrasound sensors simultaneously, it is connected to two 9V batteries parallelly.**

4.Arduino Code

```
/*
    Name:- MainFrame KuznetSov
    Date:- 3rd January, 2023
    Venue:- IEM KOLKATA :-(
*/
#include <DHT.h>
//#include <DHT_U.h>
#include <NewPing.h>
//#include <New_Ping.h>
#define TPIN1 12
#define EPIN1 12
#define TPIN2 5
#define EPIN2 5
#define R1G2 9
#define R2G1 10
#define MaxDist 500
#define DPIN 7
#define DHTTYPE DHT22
#define wait 1000
NewPing np1(TPIN1,EPIN1,MaxDist);
NewPing np2(TPIN2,EPIN2,MaxDist);
float dur1,dur2,dist1,dist2;
const int iter=5;
DHT dht(DPIN, DHTTYPE);
void setup()
{
    // put your setup code here, to run once:
    Serial.begin(9600);
    pinMode(R1G2,OUTPUT);
    pinMode(R2G1,OUTPUT);
    dht.begin();
}

void loop()
{
    delay(500);
    // put your main code here, to run repeatedly:
    float speed;
    //dur = pulseIn(EPIN, HIGH);
    float hum, temp;
```

```

hum = dht.readHumidity();
temp = dht.readTemperature();
Serial.print("Humidity:- ");
Serial.println(hum);
Serial.print("Temperature:- ");
Serial.println(temp);
speed = 331.4 + (0.606 * temp) + (0.0124 * hum);
dur1=np1.ping_median(iter);
dist1= (dur1 / 2) * (speed/ 10000);
Serial.print("Speed:- ");
Serial.print(speed);
Serial.println(" m/s");
if (dist1 > 500 || dist1 < 1)
{
    Serial.println("Not in Range");
}
else
{
    Serial.print("Distance 1:-> ");
    Serial.print(dist1);
    Serial.println(" cm");
}
dur2=np2.ping_median(iter);
dist2= (dur2 / 2) * (speed/ 10000);
if (dist2 > 500 || dist2 < 1)
{
    Serial.println("Not in Range");
}
else
{
    Serial.print("Distance 2:-> ");
    Serial.print(dist2);
    Serial.println(" cm");
}
if(dist1>dist2)
{
    Serial.println("Signal 1 RED, Signal 2 GREEN");
    digitalWrite(R2G1,LOW);
    digitalWrite(R1G2,HIGH);
    delay(wait);
}
else if(dist2>dist1)
{

```

```

    Serial.println("Signal 1 GREEN, Signal 2 RED");
    digitalWrite(R1G2,LOW);
    digitalWrite(R2G1,HIGH);
    delay(wait);
}
else
{
    int randNum=rand();
    if(randNum%2==0)
    {
        digitalWrite(R2G1,LOW);
        digitalWrite(R1G2,HIGH);
    }
    else
    {
        digitalWrite(R1G2,LOW);
        digitalWrite(R2G1,HIGH);
    }
    delay(wait);
}
delay(200);

Serial.println("-----
-----
-----
-");
}

```

5. Working

The 2 ultrasound sensors calculate the distance of the nearest object(in this case, vehicle). The one which is closer to the vehicle gives GREEN signal and the other one gives RED signal and vice versa. The distance is computed to two places of decimal but still if in any case the distances of the nearest vehicle become equal, the rand() function is used to allow a single signal to be active.