A
Practical Activity Report
Submitted for

ENGINEERING DESIGN-II (UTA014)

Assignment2 Report

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Assignment-1

1. OBJECTIVE: To design an ultrasonic blind walking stick.

2. HARDWARE USED:

Sr. No	Name of Components	Quantity
1.	Arduino Uno	1
2.	Breadboard	1
3.	Ultrasonic Distance Sensor (HC-SR04)	1
4.	Piezo Buzzer	1
7.	Jumper wires	10-15

3. SOFTWARE USED: Tinkercad

4. THEORY:

According to the WHO, about 30 million people are estimated to be permanently blind worldwide. These people are totally dependent on others. So here I have decided to design an ultrasonic blind walking stick device which will help blind people to navigate with ease independently.

Description of main components used in the circuit:

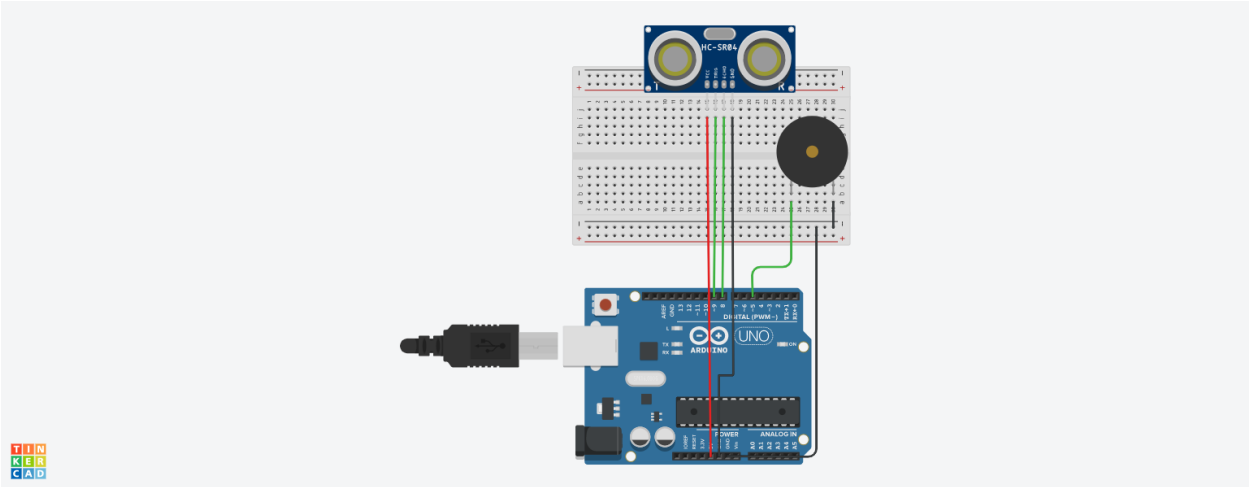
1. **Arduino UNO:** Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. It is used to control the whole system by programming it accordingly.

2. **HC – SR04 :** The HC-SR04 Ultrasonic Distance Sensor is a sensor used for detecting the distance to an object using sonar. It consists of two ultrasonic transmitters (basically speakers), a receiver, and a control circuit. The transmitters emit a high frequency ultrasonic sound, which bounce off any nearby solid objects, and the receiver listens for any return echo. That echo is then processed by the control circuit to calculate the time difference between the signal being transmitted and received.

- Operating voltage +5V
- Theoretical measuring distance : 2cm to 450cm
- Practical measuring distance : 2cm to 80cm
- Measuring angle covered:<15 degrees
- Operating Current: <15mA
- Operating frequency: 40Hz

3. **Piezo Buzzer:** Piezo buzzers are simple devices that can generate basic beeps and tones. They work by using a piezo crystal which changes its shape when voltage is applied to it.

5.LOGIC/CIRCUIT DIAGRAM:



6.CODE:

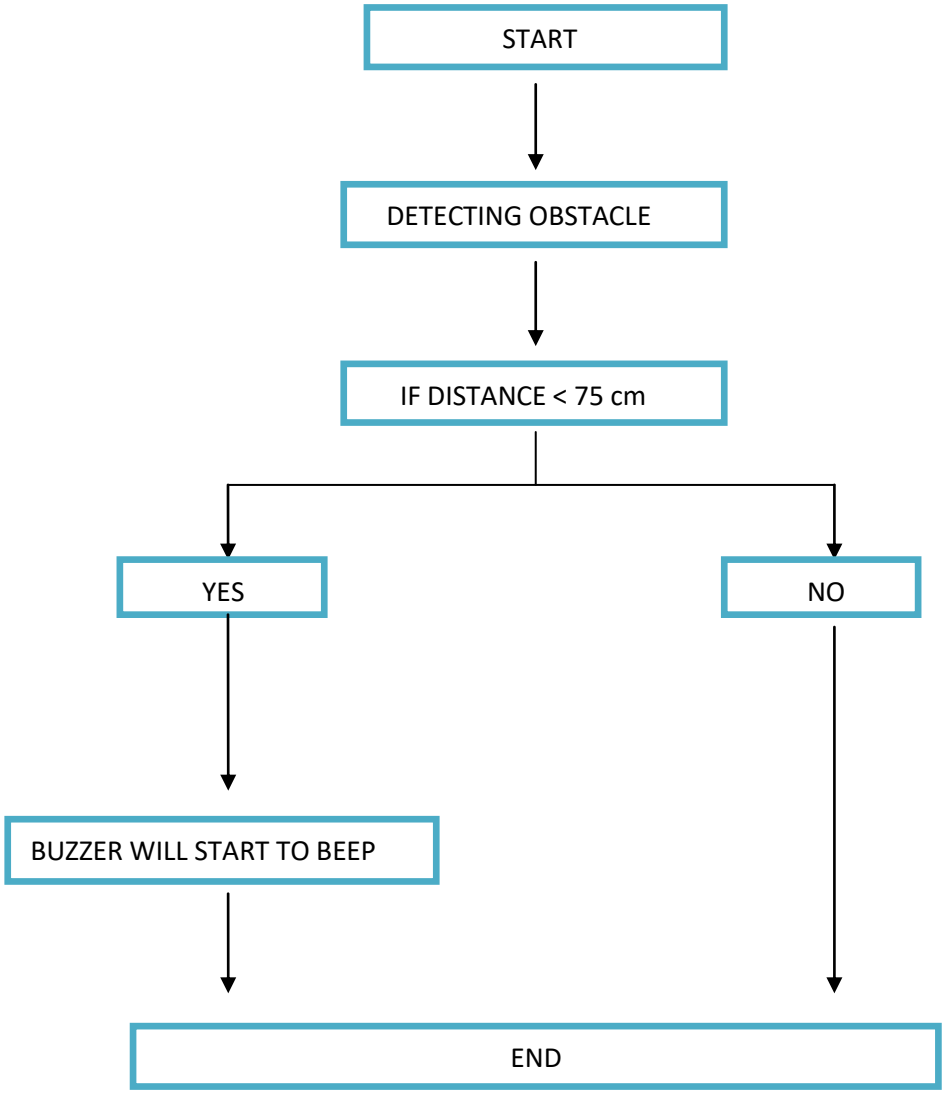
```
#define trigPin 9
#define echoPin 8
#define Buzzer 5

void setup() {
 Serial.begin(9600);
 pinMode(trigPin, OUTPUT);
 pinMode(echoPin, INPUT);
 pinMode(Buzzer, OUTPUT);
}
void loop() {
```

```
long duration, distance;
digitalWrite(trigPin, LOW);
delay(2);
digitalWrite(trigPin, HIGH);
delay(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = (duration/2) / 29; //in cm
Serial.print("Distance:");
Serial.print(distance);
Serial.println("cm");
digitalWrite(Buzzer, LOW);
if (distance<75) {
  digitalWrite(Buzzer, HIGH);
  delay(2000);
}
}
```

7. WORKING OF THE UNIT : When an object comes in front of the stick the high frequency pulse transmitted by ultrasonic sensor strikes and reflects back and is further received by the receiver of the sensor. The time difference between the transmission and reception of sound pulse is determined to calculate the distance of the object. If the object is within the decided range the piezo buzzer will start to beep in order to alert the user about the obstacle**.**

Please find the workflow on the next page.



8. LINK TO VIDEO :

https://drive.google.com/file/d/1m-rl4tzXhh0UcSP9kgPUnX9G054O3CZe/view?usp=sharing

9. RESULT ANALYSIS AND CONCLUSION:

Successfully designed Ultrasonic Blind Walking Stick which will help blind people to navigate with ease independently.

10. REFERENCES

- https://www.youtube.com/watch?v=Z-j08CbcHPA&ab_channel=TechWeek
- https://www.arduino.cc/reference/en/language/functions/advanced-io/pulsein/
- https://components101.com/ultrasonic-sensor-working-pinout-datasheet

Signature of Faculty member