

## **19Z604 - Embedded Systems**

Report - Wearable System for the Visually Challenged

Team – 15

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## **Introduction:**

Blindness is one of the most misunderstood disabilities. Without even speaking with a blind person, the general public has preconceived views about blind people that they sincerely believe to be true. The majority of non-blind individuals assume that the visually challenged are incapable of living a regular life.

This project is a technological advancement that allows blind individuals to travel with precision and efficiency by detecting surrounding impediments using ultrasonic waves and alerting them with a buzz noise or vibration. This device can simply be worn as just a wristband or fabric.

According to the World Health Organization, 39 million people worldwide are blind. They have a lot of difficulties in their daily lives. For many years, those affected have relied on the traditional white cane, which, while useful, does have a number of drawbacks.

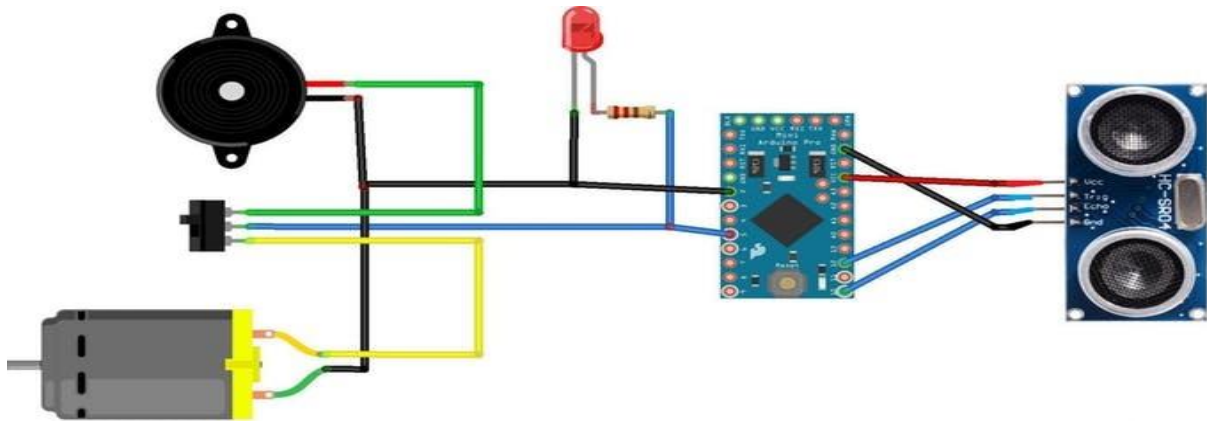
## **Problem Statement:**

To design an embedded system where the project's goal is to provide a low-cost, high-efficiency method of assisting visually impaired people to navigate with increased ease, speed, and confidence.

## **Components Required:**

- Ultrasonic Sensor
- Arduino UNO
- Vibrating Motor
- Buzzer
- Battery
- Fabric Band

## Schematic Diagram:



## Code:

```
const int pingTrigPin = 12; //Trigger connected to PIN 7
const int pingEchoPin = 10; //Echo connected yo PIN 8
int buz=5; //Buzzer to PIN 4
void setup() {
  Serial.begin(9600);
  pinMode(buz, OUTPUT);
}
void loop()
{
  long duration, cm;
  pinMode(pingTrigPin, OUTPUT);
  digitalWrite(pingTrigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingTrigPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(pingTrigPin, LOW);
  pinMode(pingEchoPin, INPUT);
  duration = pulseIn(pingEchoPin, HIGH);
  cm = microsecondsToCentimeters(duration);
  if(cm<=50 && cm>0)
  {
    int d= map(cm, 1, 100, 20, 2000);
    digitalWrite(buz, HIGH);

    delay(100);
    digitalWrite(buz, LOW);
    delay(d);
  }
}
```

```

Serial.print(cm);
Serial.print("cm");
Serial.println();
delay(100);
}
long microsecondsToCentimeters(long microseconds)
{
return microseconds / 29 / 2;
}

const int pingTrigPin = 12; //Trigger connected to PIN 7
const int pingEchoPin = 10; //Echo connected to PIN 8
int buz=5; //Buzzer to PIN 4
void setup() {
Serial.begin(9600);
pinMode(buz, OUTPUT);
}
void loop()
{
long duration, cm;
pinMode(pingTrigPin, OUTPUT);
digitalWrite(pingTrigPin, LOW);
delayMicroseconds(2);
digitalWrite(pingTrigPin, HIGH);
delayMicroseconds(5);
digitalWrite(pingTrigPin, LOW);
pinMode(pingEchoPin, INPUT);
duration = pulseIn(pingEchoPin, HIGH);
cm = microsecondsToCentimeters(duration);
if(cm<=50 && cm>0)
{
int d= map(cm, 1, 100, 20, 2000);
digitalWrite(buz, HIGH);

delay(100);
digitalWrite(buz, LOW);
delay(d);
}
Serial.print(cm);
Serial.print("cm");
Serial.println();
delay(100);
}
long microsecondsToCentimeters(long microseconds)
{
return microseconds / 29 / 2;
}

const int pingPin = 7;
const int echoPin = 6;

```

```
void setup() {
    Serial.begin(9600); // Starting Serial Terminal
}

void loop() {
    long duration, inches, cm;
    pinMode(pingPin, OUTPUT);
    digitalWrite(pingPin, LOW);
    delayMicroseconds(2);
    digitalWrite(pingPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(pingPin, LOW);
    pinMode(echoPin, INPUT);
    duration = pulseIn(echoPin, HIGH);
    inches = microsecondsToInches(duration);
    cm = microsecondsToCentimeters(duration);
    Serial.print(inches);
    Serial.print("in, ");
    Serial.print(cm);
    Serial.print("cm");
    Serial.println();
    delay(100);
}

long microsecondsToInches(long microseconds) {
    return microseconds / 74 / 2;
}

long microsecondsToCentimeters(long microseconds) {
    return microseconds / 29 / 2;
}
```

## Challenges Faced:

- Interfacing the project into a wearable device, due to time and space constraints wasn't possible.
- We weren't able to solve the portable power problem, hence affecting the durability and efficiency of the project.
- Fragility of the device made it extremely hard to work upon.

## Contribution of Team Members:

Roll No	Name	Contribution
19Z340	R M Venkatram	Assembly
20Z461	Chandraprakash J	Coding
20Z463	Niranjan V	Assembly

## Reference:

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- <https://create.arduino.cc/projecthub/albertoz/vibration-sensor-module-c88067>
- <https://techatronic.com/arduino-vibration-detector-using-sw-420-vibration-sensor/>
- <https://create.arduino.cc/projecthub/MinukaThesathYapa/arduino-ultrasonic-sensor-with-serial-monitor-22e2f3>