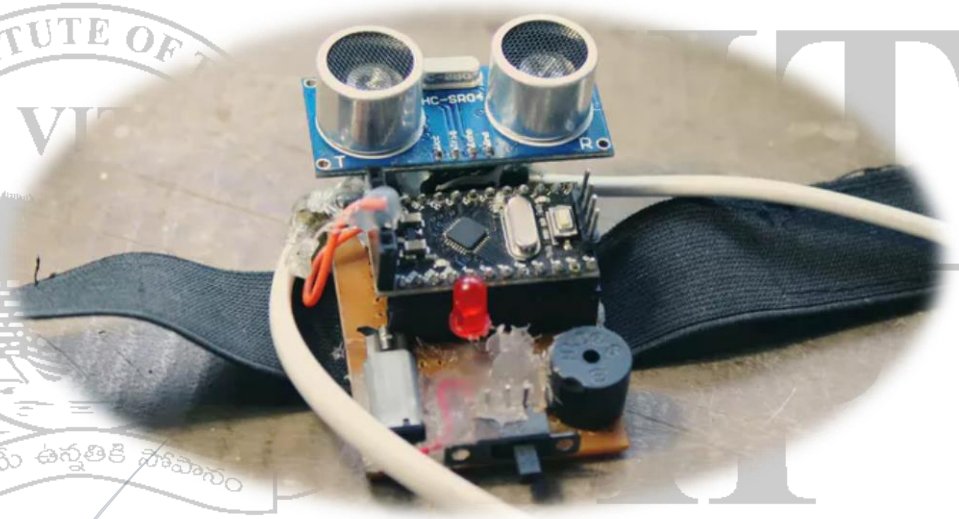
Eng. Clinics
Project Report
Fall Sem - 2018

Third Eye for the Blind

Guided by: Prof. Asish Kumar Dalai



(BATCH : 180272)

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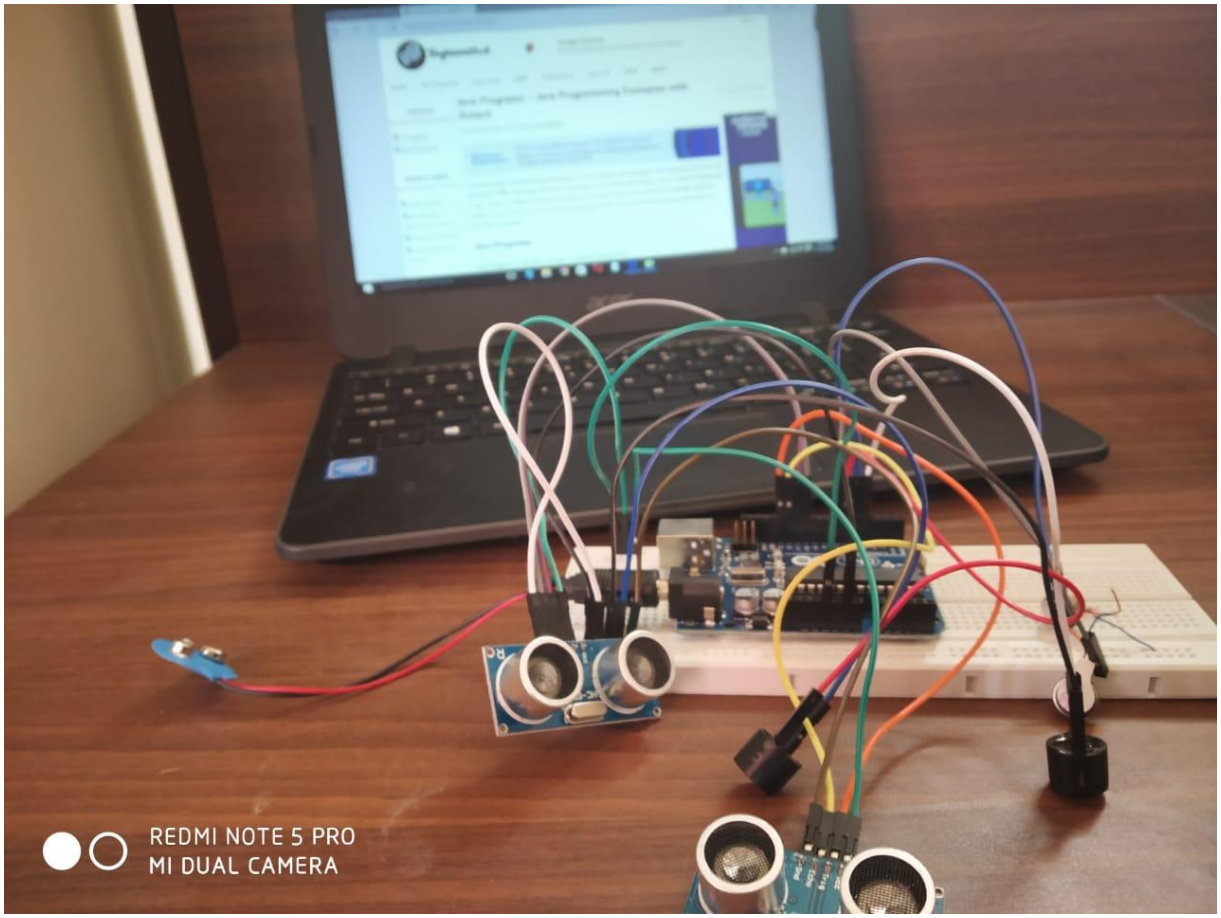
ABSTRACT

Third eye for people who are blind is an innovation which helps the blind people to navigate with speed and confidence by detecting the nearby obstacles using the help of ultrasonic waves and notify them with buzzer sound or vibration. They only need to wear this device as a band or a complete top.



1.Introduction:

- The first wearable technology for people who are blind
- Using ultrasonic waves to detect the obstacles
- Notifying the user through vibrations/buzzer sound

Third eye for people who are blind is an innovation which helps the blind people to navigate with speed and confidence by detecting the nearby obstacles using the help of ultrasonic waves and notify them with buzzer sound or vibration. They only need to wear this device as a band or cloth.

According to WHO 39 million peoples are estimated as blind worldwide. They are suffering a lot of hardship in their daily life. The affected ones have been using the traditional white cane for many years which although being effective, still has a lot of disadvantages. Another way is, having a pet animal such as a dog, but it is really expensive. So the aim of the project is to develop a cheap and more efficient way to help visually impaired to navigate with greater comfort, speed and confidence.

This is the first wearable technology for blind people which resolves all the problems of existing technologies. Now a days there are so many instruments and smart devices for visually impaired peoples for navigation but most of them have certain problems for carrying and the major drawbacks is those need a lot of training to use. The one of the main peculiarity of this innovation is, it is affordable for everyone, the total cost being less than $25 (~1500INR). There are no such devices available in the market that can be worn like a cloth and having such a low cost and simplicity. When used on a large scale, with improvements in the prototype, it will drastically benefit the community.

2.Background:

According to WHO 39 million peoples are estimated as blind worldwide. They are suffering a lot of hardship in their daily life. The affected ones have been using the traditional white cane for many years which although being effective, still has a lot of disadvantages. Another way is, having a pet animal such as a dog, but it is really expensive. So the aim of the project is to develop a cheap and more efficient way to help visually impaired to navigate with greater comfort, speed and confidence

3.Problem Definition:

Visual impairment, also known as vision impairment or vision loss, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses. Some also include those who have a decreased ability to see because they do not have access to glasses or contact lenses. Visual impairment is often defined as a best corrected visual acuity of worse than either 20/40 or 20/60. The term blindness is used for complete or nearly complete vision loss. Visual impairment may cause people difficulties with normal daily activities such as driving, reading, socializing, and walking.

The World Health Organization (WHO) estimates that 80% of visual impairment is either preventable or curable with treatment. This includes cataracts, the infections river blindness and trachoma, glaucoma, diabetic retinopathy, uncorrected refractive errors, and some cases of childhood blindness. Many people with significant visual impairment benefit from vision rehabilitation, changes in their environment, and assistive devices.

Blindness can occur in combination with such conditions as intellectual disability, autism spectrum disorders, cerebral palsy, hearing impairments, and epilepsy. Blindness in combination with hearing loss is known as deaf blindness.

It has been estimated that over half of completely blind people have non-24-hour sleep–wake disorder, a condition in which a person's circadian rhythm, normally slightly longer than 24 hours, is not entrained (synchronized) to the light/dark cycle

Problem of the Existing Systems:

- White cane - May easily crack/break. The stick may get stuck at pavement cracks of different objects.
- Pet dog - Huge cost. (~$42,000 / Rs.280000)
- Common Disadvantages (Including the the smart devices) Cannot be carried easily, needs a lot of training to use

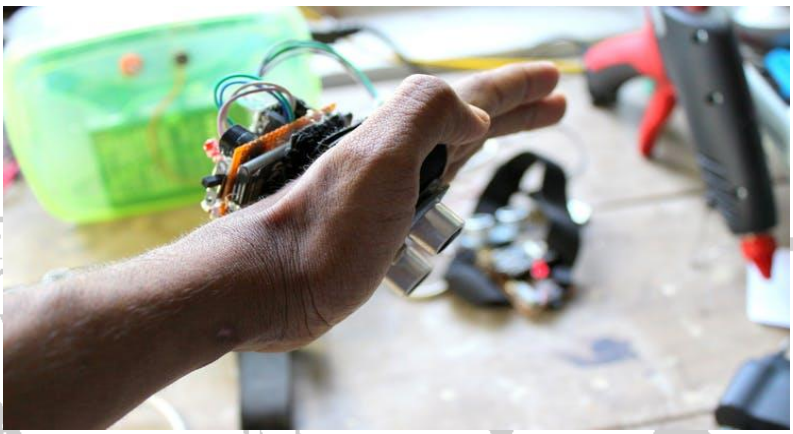
4.Objective:

This is the first wearable technology for blind people which resolves all the problems of existing technologies. Now a days there are so many instruments and smart devices for visually impaired peoples for navigation but most of them have certain problems for carrying and the major drawbacks is those need a lot of training to use. The one of the main peculiarity of this innovation is, it is affordable for everyone, the total cost being less than $25 (~1500INR). There are no such devices available in the market that can be worn like a cloth and having such a low cost and simplicity. When used on a large scale, with improvements in the prototype, it will drastically benefit the community.

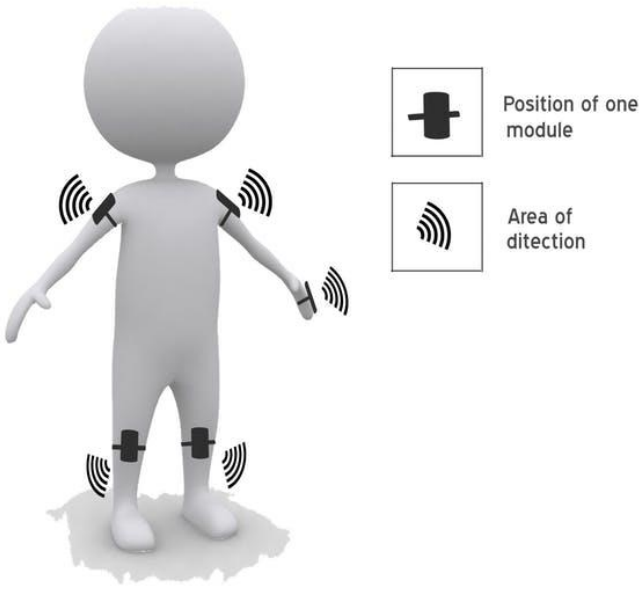
By wearing this device, they can fully avoid the use of white cane and such other devices. This device will help the blind to navigate without holding a stick which is a bit

annoying for them. They can simply wear it as a band or cloth and it can function very accurately and they only need a very little training to use it.

5.Methodology/Procedure:

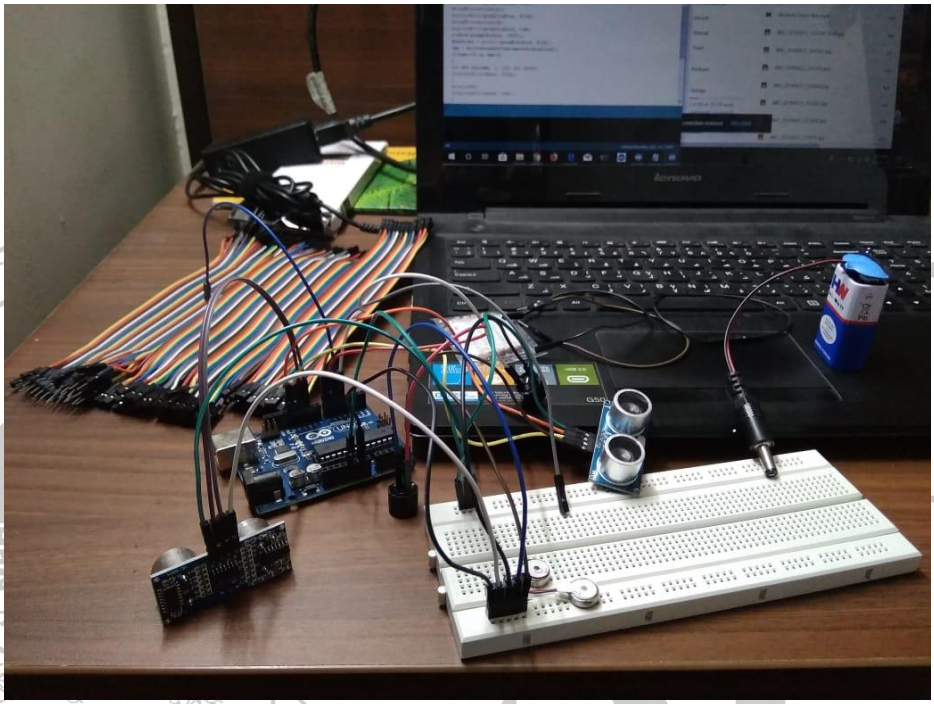


We have designed a special wearable device based on the Arduino board which can be worn like a cloth for blinds. This device is equipped with five ultrasonic sensors, consisting of five modules which are connected to the different parts of the body. Among them, two for both shoulder, another two for both knees and one for the hand. Using the five ultrasonic sensors, blind people can detect the objects in a five dimensional view around them and can easily travel anywhere. When the ultrasonic sensor detects obstacle the device will notify the user through vibrations and sound beeps. The intensity of vibration and rate of beeping increases with decrease in distance and this is a fully automated device. Since we have developed one for illustration purpose we have made 2 modules for both the hands. similar replicas can be made for remaining parts of the body.

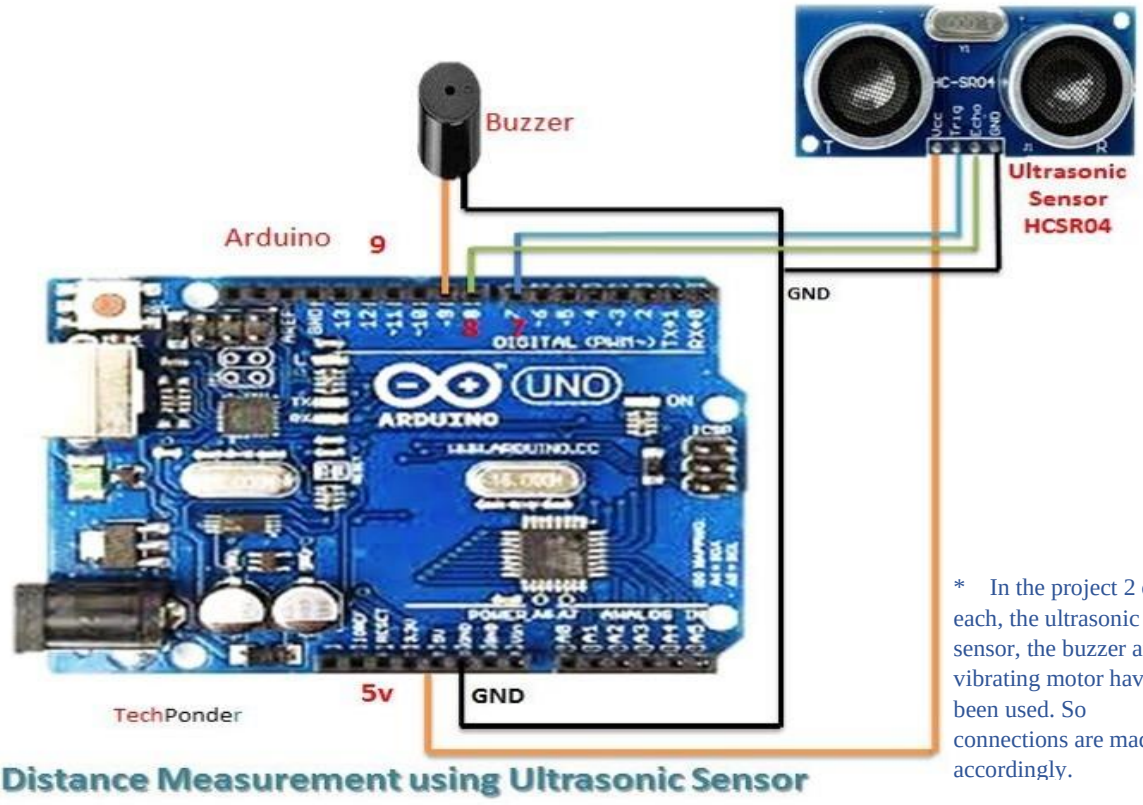


THINGS USED IN THIS PROJECT:

- 2 Arduino UNO
- 2 ultrasonic sensors
- 2 Vibrating motors
- 2 Buzzer
- Jumper wires
- Elastic band
- Snap cable for power supply from battery to arduino
- 9V battery



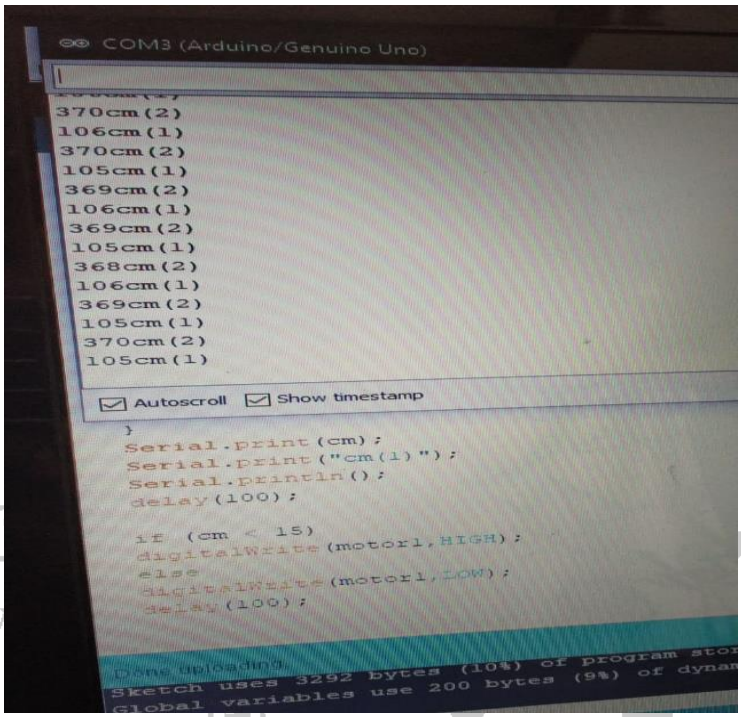
Basic* circuit diagram



* In the project 2 of each, the ultrasonic sensor, the buzzer and vibrating motor have been used. So connections are made accordingly.

6.Results and Discussions:

Tested Successfully by blindfolding a person. A screenshot of distance detection by the ultrasonic sensor is shown below :



Since there are two sensors , (1) indicates the reading of first sensor and (2) indicates reading from the second one.

7.Conclusion and Improvements:

The entire module can be embedded in a jacket, so that it doesn't have to be worn separately. Use of specially designed boards like Arduino and high-quality ultrasonic sensors makes faster response which make the device capable of working even in heavily crowded zones.

We still plan to introduce an LDR sensor to our project with an additional 3 way slide switch so that the person can sense the presence or absence of light around him.

8.References:

- https://www.robotechmaker.com/2016/11/third-eye-for-blind.html
- www.google.com
- www.Wikipedia.com

APPENDIX:

Code used in Arduino:

```
  const int pingTrigPin = 13;
  const int pingEchoPin = 12;
   const int pingTrigPin2 = 11;
  const int pingEchoPin2 = 10;
  int buz1=6;
  int motor1=7;
  int buz2=4;
  int motor2=5;
  void setup() {
  Serial.begin(9600);
  {pinMode(buz1, OUTPUT);
  pinMode(motor1,OUTPUT);
pinMode(buz2, OUTPUT);
  pinMode(motor2,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(buz1, HIGH);
}
delay(100);
{digitalWrite(buz1, LOW);
}
delay(d);
}
Serial.print(cm);
Serial.print("cm(1)");
Serial.println();
delay(100);

if (cm < 15)
digitalWrite(motor1,HIGH);
else
digitalWrite(motor1,LOW);
delay(100);

long duration2, cms;
pinMode(pingTrigPin2, OUTPUT);
digitalWrite(pingTrigPin2, LOW);
delayMicroseconds(2);
digitalWrite(pingTrigPin2, HIGH);
delayMicroseconds(5);
digitalWrite(pingTrigPin2, LOW);
pinMode(pingEchoPin2, INPUT);
duration2 = pulseIn(pingEchoPin2, HIGH);
cms = microsecondsToCentimeters(duration2);
if(cms<=50 && cms>0)
{
```

```
int d2= map(cms, 1, 100, 20, 2000);
{digitalWrite(buz2, HIGH);
}
delay(100);
{digitalWrite(buz2, LOW);
}
delay(d2);
}
Serial.print(cms);
Serial.print("cm(2)");
Serial.println();
delay(100);

if (cms < 15)
digitalWrite(motor2,HIGH);
else
digitalWrite(motor2,LOW);
delay(100);}

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