

Third Eye for Blinds

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 cloth.

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.

Introduction

According to WHO 39 million peoples are estimated as blind worldwide. The loss of one of the most important human senses causes them a lot of hardships in 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. Therefore, 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. Main features of this project:

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

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.

Past work done on this type of model

The idea was inspired from bats, which also use sound waves of high frequency to move. Using this idea we saw obstacle handling robots has been made previously. On that projects, we can see the usage of ultrasonic sonar sensor for handling the obstacle which is used for this project also.

Moreover, in recent past, another innovative project has made using the same model which is smart walking cane. The idea was the same that is finding any obstacle and alerting the blind person about that. However, the problem of carrying a cane was not resolved.

Another work for the same model is finding distance. Using the sonar sensor, the bot calculates the distance and give the reading as an output.

Proposed method

We have designed a special wearable device based on the Arduino Uno 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 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.

Why Ultrasonic Sensors?

- Accurate calculations.
- Can be used inside/outside.
- Does not get affected with external sources such as sunlight.
- Does not refract/does not pass through.

Why NOT Infra-red Sensors?

One of the major reasons being that infra-red sensors are not very accurate as compared to ultrasonic ones, I didn't use them for the purpose of detecting obstacles. Moreover, it also doesn't work well in bright sunlight conditions/outdoors and will also pass through transparent objects

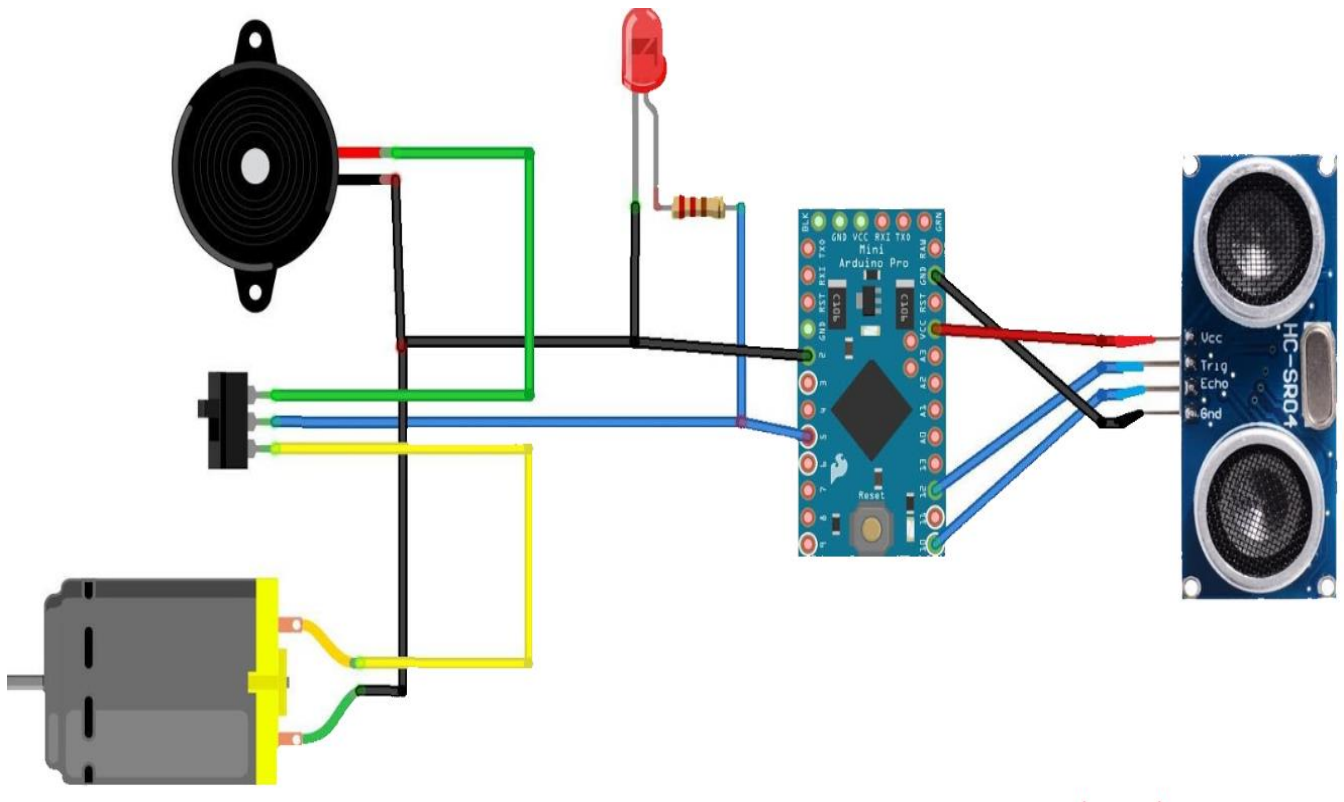
Details Work

Materials

- 1 x Arduino Uno R3
- 1 x Ultrasonic sensor
- 1 x Bread board
- 1 x Vibrating motor
- 1 x Buzzers
- 1 x Red LED
- 1 x Blue LED
- 1 x Switches
- Male and female jumper wires

- One power bank.
- 9 Volt battery.
- Connecting wires
- Some elastics and (to make it as a band for wearing)

Circuit Diagram:



Wiring instruction:

Ground of LED, buzzer and vibration motor to GND of Arduino

+Ve of LED and middle leg of switch to Arduino pin 5

+Ve of Buzzer to first leg of switch

+Ve of Vibration motor to third leg of switch

Ultrasonic sensor

Ultrasonic sensor pin VCC - Arduino pin VCC

Ultrasonic sensor pin GND - Arduino pin GND

Ultrasonic sensor pin Trig - Arduino pin 12

Ultrasonic sensor pin Echo - Arduino PIN 10

The switch used here is for selecting the mode. (Buzzer or vibration mode.)

Arduino Code:

//Codified by Torpass Solution, a sister concern of Raptor Inc.

const int pingTrigPin = 12; //Trigger connected to PIN 12

const int pingEchoPin = 10; //Echo connected yo PIN 10

int buz=5; //Buzzer breakout board to PIN 5

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;
}
```

Results

The one of the main peculiarity of this innovation is, it is affordable for everyone, the total cost being less than BDT 1500 (\$25). 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.

Existing Systems

- 1.White cane
- 2.Pet dog
- 3.Vision a torch for blinds

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. (~ BDT 50,000)

Common Disadvantages (Including the 'vision' the smart device)

Cannot be carried easily, needs a lot of training to use.

The features of Third eye for blinds: 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.

Conclusion

The project as a whole was successful in developing a more durable navigation technique apart from the existing ones. This was just a prototype of the original idea that had to be presented here. The project, if used on a wider scale and distributed to blind people, really has the ability to make an impact to the community. The best part is that the parts' cost doesn't exceed 1800rs thus making it affordable by everyone.

Drawbacks:

- This device cannot be used in crowded. The present technology of this project doesn't allow it to be used at places which may require very fast responses.

Future Improvements:

- The entire project can also be made in the form of jacket, so that the device doesn't need to be wear one by one.
- Make the device much smaller by use of surface mounted components (SMD) and avoid spacing between the parts.
- Use Lithium Polymer battery instead of Lithium ion to provide greater power with less weight.
- Use of specially designed boards instead of Arduino makes faster response.

