

ULTRASONIC SMART GOGGLES FOR BLIND PEOPLE

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in Electrical and Electronics Engineering

by

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SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY (DEEMED TO BE
UNIVERSITY)**

**Accredited with Grade "A" by NAAC JEPPIAAR NAGAR, RAJIV
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APRIL 2022



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **JAMPULA SAITEJA** (Reg. No. 39130177), **UKANTI BHARATH CHANDRA REDDY** (Reg. No. 39130486) and **VENKATA SAI VASHISTA V** (Reg. No. 39140062) who carried out the project entitled **"ULTRASONIC SMART GOGGLES FOR BLIND PEOPLE"** under our supervision from Febraury 2022 to April 2022.

Dr. RADHIKA. S
Internal Guide

Dr. V. SIVACHIDAMBARANATHAN
Head of the Department

Submitted for Viva voce Examination held on

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Signature:

Internal Examiner

External Examiner

DECLARATION

We **JAMPULA SAITEJA** (Reg. No. 39130177), **UKANTI BHARATH CHANDRA REDDY** (Reg. No. 39130486) and **VENKATA SAI VASHISTA V** (Reg. no. 39140062) hereby declare that the Project Report entitled “**ULTRASONIC SMART GOGGLES FOR BLIND PEOPLE**” done by us under the guidance of **Dr. RADHIKA. S** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electrical and Electronics Engineering.

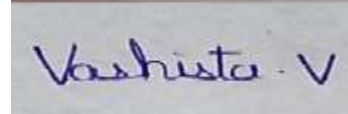
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DATE: 24-04-2022

PLACE: CHENNAI

SIGNATURE OF THE CANDIDATES

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr. N. M. Nandhita., Dean, School of Electrical and Electronics Engineering** and **Dr. V. Sivachidambaranathan, Head of the Department, Dept. of Electrical and Electronics Engineering** for providing us necessary support and details at the right time during the progressive reviews.

We would like to express our sincere and deep sense of gratitude to our Project Guide **Dr. Radhika. S** for her valuable guidance, suggestions and constant Encouragement paved way for the successful completion of our project work.

We wish to express our thanks to all Teaching and Non-teaching staff members of the Department of Electrical and Electronics Engineering who were helpful in many ways for the completion of the project.

ABSTRACT

Blind mobility is one of the major challenges encountered by visually impaired persons in their daily lives. Their life and activities are greatly restricted by loss of eyesight. They normally travel using blind navigation system or by their accumulated memories in their long term exploration. The main objective of the present work is to develop a low cost, reliable, portable, user friendly, low power and robust solution for smooth navigation. This project (Smart Glasses for Blind People), as meant are the glasses are for visually impaired people. It has an in-built sensor in it which spreads ultrasonic waves in the direction the person is going by scanning at most 5-6 meters of 30° range. As soon as the obstacle is detected, the sensor detects it and sends it to the device which generates an automated voice in the earphone connected to the person's ear.

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CHAPTER 1

INTRODUCTION:

On an approximation 285 million people are visually impaired across the globe, among which 39 million are blind and 246 have low vision according to WHO statistics of 2011 [1]. About 90% of the world's visually impaired live in low-income settings whereas 82% of people living with blindness are aged 50 and above. India is now home to the world's largest number of 102 blinds. Out of the 37 million blind people worldwide, over 15 million are from India. The worst thing is that 75% of these are cases of avoidable blindness. India has an acute shortage of optometrists and donated eyes for the treatment of corneal blindness. While India needs 40,000 optometrists, it has only 8,000. Blind people are usually dependent on assistance from others. The assistance can be from human beings, dogs or some special electronic devices. There are already many existing devices which help a blind person in walking. The most common is the simple walking stick or cane. The blind man uses it to detect the obstacles by sweeping the cane back and forth but unfortunately sometimes the blind man gets aware about the obstacle too late. With the recent advances in technology normal walking cane has been modified to a blind stick with an ultrasonic sensor attached to it. It has several limitations. Therefore, the solution that has been portrayed in this paper is cost effective, reliable, robust and portable device which would help a blind person to walk on the streets almost like any other pedestrian.

CHAPTER-2

LITERATURE SURVEY:

In a rapidly flourishing country like our innumerable number of attempts has been made for the welfare of especially able people of our society. One of such attempts is the project "Project Prakash"[2], an empathetic attempt towards the blind children to help them gain knowledge of a set of obstacles around them by using their brains. Sheth et al [3] worked on how a blind people can be able to detect any type of pits, potholes and several ups and downs by using a smart white cane where they have used ultrasonic sensors. In this device a multilingual system for audio feedback cannot be used because it can record only for 680 seconds. The idea that can be seen in [4] has an ultrasonic sensor, a water sensor and a pit sensor. It also consists of a GPS system but here the user needs to give the present location as the input itself. The method of doing so has not been mentioned herein. In [5] it can be observed that it consists of a video camera on the frame itself as well as a computer processing unit precise enough to get fit in the pocket and the software that provides images of objects close by to transparent displays on the eyepieces. The major limitation of this device is that it is not at all suitable for completely blind people. It is recommended only for people with low vision or night blindness. There is another new attempt of assisting the blind people which is named as H.A.L.O or Haptic Assisted Location of Obstacles [6]. It consists of rangefinders that would take input from the ultrasonic sensors and output feedback to pulse vibration motors which are placed on the blind man's head. When the person gets closer to the object, the intensity and frequency of the vibration are increased. The main limitation is the use of vibration motor. The vibrations as an output feedback are far way irritating for any blind person.

CHAPTER3:

AIM,SCOPE OF PRESENT INVESTIGATION:

The main objective of our present work is to provide a reliable, cost effective, low power solution for a blind people which would help them to move almost like any other normal pedestrian. The cost of this system makes it affordable for the majority of the society which in turn an effective device for them to spend on, just for once and assures wonderful travel guidance for them.

CHAPTER-4

EXPERIMENTAL MATERIALS AND METHODS:

ARDUINO

Arduino comprises of both a physical programmable circuit board (commonly known as a microcontroller) and a programming software, or IDE (Integrated Development Environment) that can be run on a PC, used to compose and transfer PC code to the circuit board. It can be done by using the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Unlike other programmable circuit boards, the Arduino does not require a different equipment (called a software engineer) to upload code to the circuit board, one can essentially utilize a USB link. Also, the Arduino IDE utilizes a rearranged rendition of C++, making it simpler to figure out how to program. In a word, Arduino make the functions of the microcontroller into a more accessible package. The Uno is one of the more prevalent boards in the Arduino family and an extraordinary option for the beginners.

TYPES OF ARDUINO

There are different types of Arduino boards for different purposes. But all the boards have the majority of following components in common.

Starting clockwise from the top center:

- Analog Reference pin (orange)
- Digital Ground (light green)
- Digital Pins 2-13 (green)

•Digital Pins 0-1 /Serial In/Out - TX/RX (dark green) - These pins cannot be used for digital i/o (digitalRead and digitalWrite) if serial communication is also being used (e.g. Serial.begin).

- Reset Button - S1 (dark blue)
- In-circuit Serial Programmer (blue-green)
- Analog In Pins 0-5 (light blue)
- Power and Ground Pins (power: orange, grounds: light orange)
- External Power Supply In (9-12VDC) - X1 (pink)
- Toggles External Power and USB Power (place jumper on two pins closest to desired supply)
- SV1 (purple)

•**USB** (used for uploading sketches to the board and for serial communication between the board and the computer; can be used to power the board) (yellow)

Digital Pins The digital pins on an Arduino board can be used for general purpose input and output via the pinMode(), digitalWrite(), and digitalRead() commands. Each pin has an internal pull-up resistor which can be turned on and off using digitalWrite() (w/ a value of HIGH or LOW, respectively) when the pin is configured as an input.

- **Serial:** 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data.[1]

•External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.[1]

•PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function. On boards with an ATmega8, PWM output is available only on pins 9, 10, and 11.

Analog Pins

The analog input pins support 10-bit analog-to-digital conversion (ADC) using the analogRead() function. Most of the analog inputs can also be used as digital pins: analog input 0 as digital pin 14 through analog input 5 as digital pin 19. [1]

Power Pins

•9V: The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). Different boards accept different input voltages ranges.

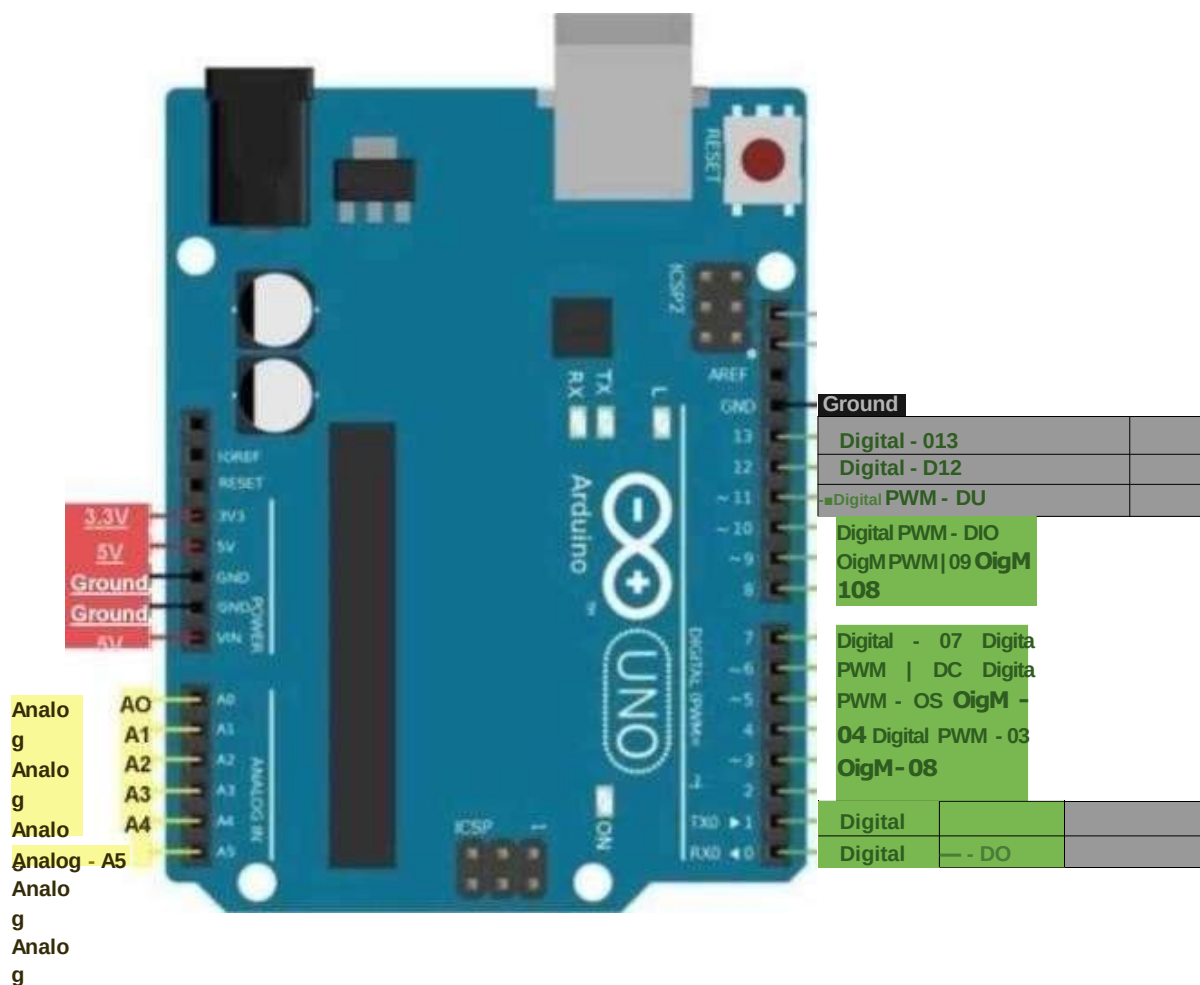
•5V: The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply. •

- **3V3:** (Diecimila-only) A 3.3 volt supply generated by the on-board FTDI chip.

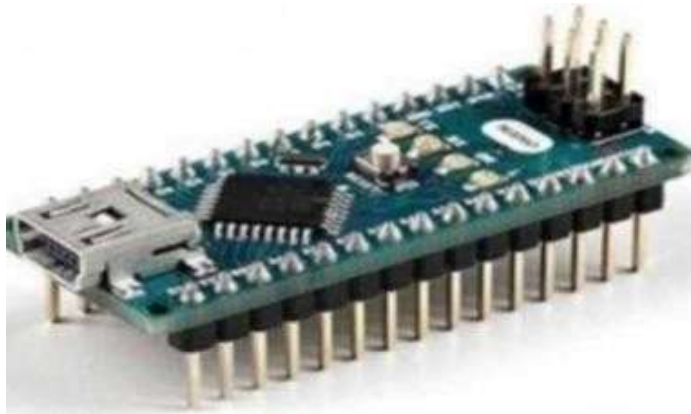
• **GND:** Ground pinS **SOFTWARE:-**

Download the Arduino IDE ARDUINO 1.8.10 The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux.

The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. Refer to the Getting Started page for Installation instructions



A. Hardware and Software Components Required:



1.Arduino NANO:

Arduino Nano is one [type of microcontroller board](#), and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used [in Arduino UNO](#). It is a small size board and also flexible with a wide variety of applications. [Other Arduino boards mainly](#) include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, [Raspberry Pi](#), [Intel Edison](#), MSP430 Launchpad, and ESP32 board.



2) Arduino Software (IDE):

The open source Arduino Software (IDE - Integrated Development Environment) is a cross platform application that is written in functions from C and C++. This software can be used with any Arduino compatible board which makes it easy to write code and upload it to the board.

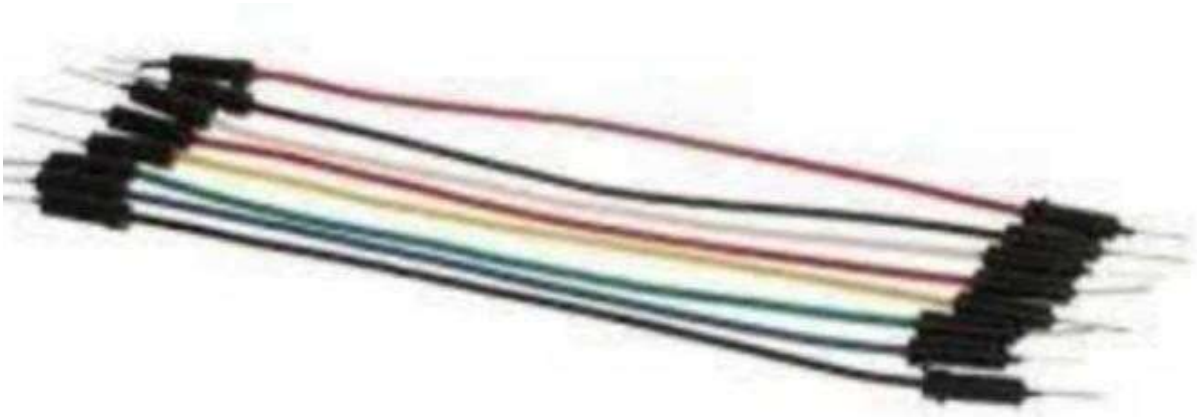
3) Ultrasonic Sensor:

Ultrasonic Sensor is a transducer which uses the physical characteristics and various other effects of ultrasound of a specific frequency which may transmit or receive the ultrasonic signal of a particular strength. These are available in electromagnetic or piezoelectric versions. The piezoelectric type is generally preferred due to its lower cost and simplicity to use comparatively than other types [7]. The system mainly lies on the principle of Ultrasonic Range Finding sensor or simply an ultrasonic sensor. It works on 40 KHz ultrasonic sound wave which when triggered by its transmitter module, its receiver module receives back the echo of the triggered signal, having a sensing angle of 30°. The block diagram of an ultrasonic sensor is shown below in Fig.1. The propagation velocity of the ultrasonic wave is approximately 340m/s at 15°C of air or atmospheric temperature. The ultrasound velocity depends by the propagation medium and its temperature; hence the velocity in air is calculated using the equation 1, where t is the temperature in °C.



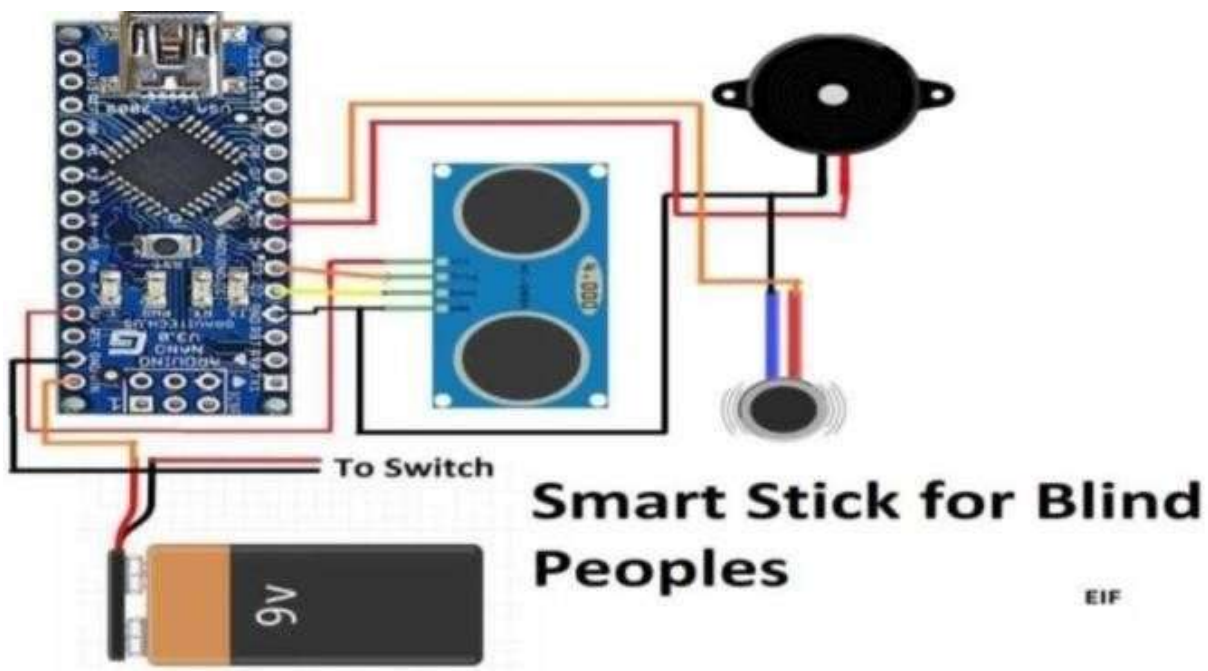
4) **Connecting Wires:**

Connecting wires allows an electrical current to travel from one point on a circuit to another, because electricity needs a medium through which to move.



METHODS:

Circuit Diagram:



Working For our model we need 5V power supply, which we can give using a computer and USB cable. But sometimes the 5V pin does not provide power supply equal to 5V, which may make the board unstable hence, external power supply can be used which should not exceed 12V

CHAPTER 5:

CODE:

Arduino code:

```
const int trigPin = 3;
const int echoPin = 2;
//const int buzzer = 5;
const int motorPin = 6;
```

```
long duration; int
distance; int
safetyDistance;
```

```
void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  //pinMode(buzzer, OUTPUT);
  pinMode(motorPin, OUTPUT);
  Serial.begin(9600);
}
```

```
void loop() {
```

```
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
```

```
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
```

```
  duration = pulseIn(echoPin, HIGH);
```

```
distance= duration*0.034/2;
```

```
safetyDistance = distance; if  
(safetyDistance <= 10){  
  //digitalWrite(buzzer, HIGH);  
  digitalWrite(motorPin, HIGH);  
}  
else{  
  //digitalWrite(buzzer, LOW);  
  digitalWrite(motorPin, LOW);  
}
```

```
Serial.print("Distance: ");  
Serial.println(distance);  
}
```

CHAPTER 6

RESULT:

In the protocol when find object but distance greater than 1 meter then it not sense, if distance less than 100cm then it sense and vibrate. When the distance between object and user are closer then sound effect is highly gradually.

Here this smart glass can detect the object by sensor and make alert the user.



CHAPTER 7

CONCLUSION:

This smart glass implemented for blind person who are unable to see any object so this person can aware about accident. In future it can be implemented as a image recognition where sensor gives information user about object.

SCREENSHOT OF HARDWARE:



SCREENSHOT OF COMPILATION



```
Smart Glasses | Arduino 1.8.19 | Windows | IDE 1.8.19.0
File Edit Sketch Tools Help

Smart Glasses

const int trigPin = 31;
const int echoPin = 21;
//const int buzzer = 50;
const int motorPin = 61;

long duration;
int distance;
int safetyDistance;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  //pinMode(buzzer, OUTPUT);
  pinMode(motorPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
```

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