

A
Report
on
"THIRD EYE FOR BLIND PERSON"
by

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As
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Under the guidance of
Asst. Prof. Debarshita Biswas



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ICFAI TECHNICAL SCHOOL
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DECLARATION

We hereby declare that the work recorded in this project report entitled “ **Third eye for blind person**” in partial fulfillment of the course requirement of Special project for the award of the degree of Bachelor of Technology in Electronics & Communication Engineering from **ICFAI University, Tripura** is a faithful and bonafied project work carried out as special project under the guidance of Asst. Prof. Debarshita Biswas.

The results of this investigation reported in the project have so far not been reported for any other Degree/Diploma or any other Technical forum.

The assistance and help received during the course of the investigation have been duly acknowledged.

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ABSTRACT

Third eye for the blind is an innovation with the help of the multidiscipline subjects like computer science, electronics engineering and health science 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 a buzzer sound or vibration. According to WHO 39 million people are estimated as blinds worldwide. They are suffering a lot of hardships in their daily life. The affected ones have been using the tradition white cane for many years which although being effective, still has a lot of disadvantages. This will be a wearable technology for the blinds. One of the main peculiarity of this device is that it will be affordable. The Arduino Pro Mini 328- 15/16 MHz board is worn like a device. This will be equipped with ultrasonic sensors, consisting of module. Using the sensor, visually impaired can detect the objects around them and can travel easily. When the sensor detects any object it will notify the user by beep or vibration. Thus this is an automated device. Thus this device will be of a great use for the blinds and help them travel different places.

Signature(s) of Student(s)

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TABLE OF CONTENTS

Chapter Name	Page Number
1. CHAPTER 1.....	6-7
1.1 Introduction to THIRD EYE.....	6
1.2 Why THIRD EYE.....	7
1.3 Use of THIRD EYE.....	7
2. CHAPTER 2.....	8
2. 1 Objective.....	8
3. CHAPTER 3.....	9-20
3.1 Hardware Components.....	9
3.2 Block diagram of this project.....	9
4. CHAPTER 4.....	21
4.1 Making the modules.....	21
5. CHAPTER 5.....	22-23
5.1 Working operations.....	22-23
6. CHAPTER 6.....	24-25
6.1 Programing.....	25
7. CHAPTER 7.....	26
7.1 Results.....	26
8. CHAPTER 8.....	27
8.1 Benefits.....	27
9. CHAPTER 9.....	29
9.1 Conclusion.....	29
10. References.....	30

CHAPTER 1

1.1 Introduction to THIRD EYE

The Third Eye for the Blind is to design a product which is very much useful to those people who are visually impaired and those who often have to rely on others. Third eye for Blind project is an innovation which helps the visually impaired people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with buzz sound or vibrations. It allows the user those who are visually impaired to walk freely by detecting the obstacles. They only need to wear this device as a band or cloth on their body. According to WHO or the World Health Organization, 39 million people are estimated as blinds worldwide. They are suffering a lot of hardship in their daily life. The physically disabled ones have been using the traditional way that is the white cane for many years which although being effective, still has a lot of disadvantages and limitations. Another way is, having a pet animal such as a dog, but it is really expensive. Thus the aim of the project Third eye for the Blind is to develop a cheap, affordable and more efficient way to help the blind people to navigate with greater comfort, speed and confidence. This is the wearable technology for the blinds which helps resolve all the problems of the existing technologies. it is affordable for everyone, the total cost being less than \$25 or ~1500 INR. There are no such devices available in the market that can be worn like a cloth and having such a low cost and simplicity. With the use of this improvised device in a large scale, with improvements in the prototype, it will drastically benefit the community of the visually impaired or the blind people. The walking cane is a simple and purely mechanical device dedicated to detect the static or the constant obstacles on the ground, uneven surfaces, holes and steps via simple tactile-force feedback. This device is light, portable but limited to its size and it is not used for dynamic obstacle detection [4] . These devices operate like the radar and the system of the device uses the ultrasonic waves fascicle to identify the height, direction and the speed of the objects. The distance between the person and the obstacle is measured by the time of the wave travel. However, all the existing systems inform the blind the presence of the object at a specific distance in front of or near to him. These details helps the user or the blind people in detecting the obstacles and thus change the way and walk accordingly.

Information about the objects and their place in the way of the walking like an obstacle and their characteristics can create additional knowledge to enhance the space manifestation and memory

of the blind or the visually impaired people. To overcome, the above mentioned limitations this work offers a simple, efficient, configurable virtual for the blind.

1.2 Why THIRD EYE

With the improvement of the living standards of the people, we have become so materialistic that we have forgotten how the physically disabled people live tough life. They undergo rigorous, apathetic and indifferent behavior towards them for being physically disabled. They become dependent on other people in a way for their day to day routine chores. Blind and impaired persons always depend on other people for their locomotion. Eye are prime sense of organ in perceiving the outside environment; dysfunction of such prime sense organ severely effects the knowledge perceiving capability of the outside environment. Therefore, going around to places in such environment is a very big challenge because the blind people cannot depend on their own eyes and thus face many difficulties .

1.3 Use of THIRD EYE

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.

CHAPTER 2

2.1 OBJECTIVE

The objective of this project The Third Eye for the Blind is to design a product which is very much useful to those people who are visually impaired and those who often have to rely on others. Third eye for Blind project is an innovation which helps the visually impaired people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with buzz sound or vibrations. It allows the user those who are visually impaired to walk freely by detecting the obstacles. They only need to wear this device as a band or cloth on their body. According to WHO or the World Health Organization, 39 million people are estimated as blinds worldwide. They are suffering a lot of hardship in their daily life. The physically disabled ones have been using the traditional way that is the white cane for many years which although being effective, still has a lot of disadvantages and limitations. Another way is, having a pet animal such as a dog, but it is really expensive. Thus the aim of the project Third eye for the Blind is to develop a cheap, affordable and more efficient way to help the blind people to navigate with greater comfort, speed and confidence. This is the wearable technology for the blinds which helps resolve all the problems of the existing technologies. it is affordable for everyone, the total cost being less than \$25 or ~1500 INR. There are no such devices available in the market that can be worn like a cloth and having such a low cost and simplicity. With the use of this improvised device in a large scale, with improvements in the prototype, it will drastically benefit the community of the visually impaired or the blind people. The walking cane is a simple and purely mechanical device dedicated to detect the static or the constant obstacles on the ground, uneven surfaces, holes and steps via simple tactile-force feedback. This device is light, portable but limited to its size and it is not used for dynamic obstacle detection [4] . These devices operate like the radar and the system of the device uses the ultrasonic waves fascicle to identify the height, direction and the speed of the objects. The distance between the person and the obstacle is measured by the time of the wave travel. However, all the existing systems inform the blind the presence of the object at a specific distance in front of or near to him. These details helps the user or the blind people in detecting the obstacles and thus change the way and walk accordingly.

CHAPTER 3

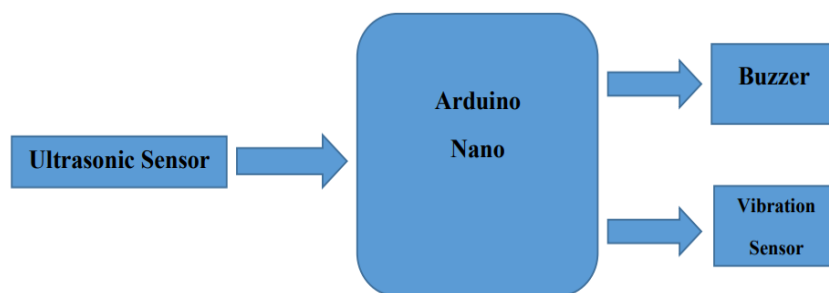
Technology and Literature Survey:

This project aims to develop a third eye which is able to detect walls and other obstacles and also able to notify the blind person about it by beeping sounds and vibrations using minimal components. The third eye for Blind project is an innovation which helps the blind person to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with buzz sound or vibrations.

3.1 Hardware Components

- Arduino Nano with cable
- Ultrasonic Sensor
- Buzzer
- Zero PCB
- Vibration Sensor
- Battery Cap
- 9 Volt Battery
- Soldering Wire
- Soldering Iron
- Connecting Wire

3.2. Block diagram



➤ ARDUINO NANO

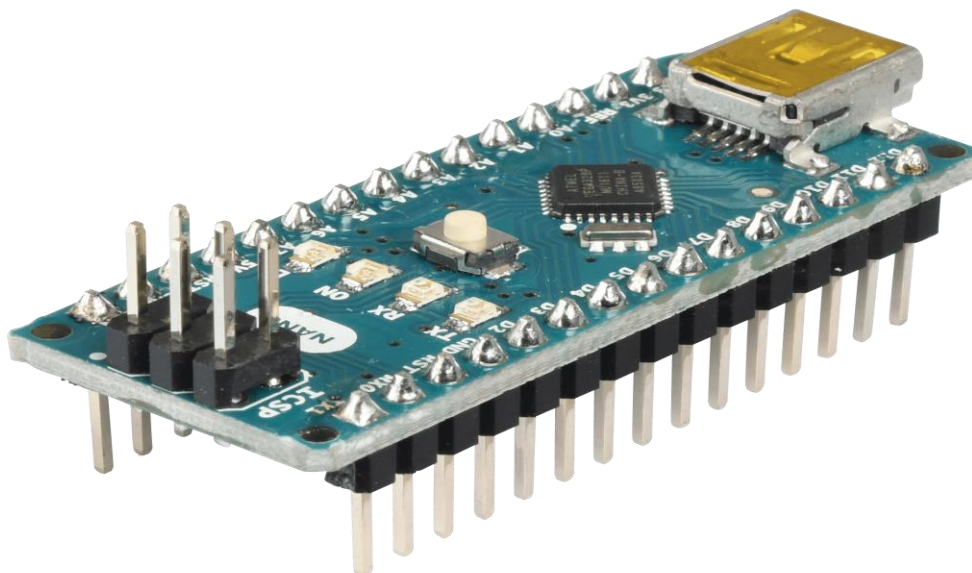
Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications.

This board has many functions and features like an Arduino Duemilanove board. However, this Nano board is different in packaging. It doesn't have any DC jack so that the power supply can be given using a small USB port otherwise straightly connected to the pins like VCC & GND. This board can be supplied with 6 to 20volts using a mini USB port on the board.

The communication of an Arduino Nano board can be done using different sources like using an additional Arduino board, a computer, otherwise using microcontrollers. The microcontroller using in Nano board (ATmega328) offers serial communication (UART TTL). This can be accessible at digital pins like TX, and RX. The Arduino software comprises of a serial monitor to allow easy textual information to transmit and receive from the board.

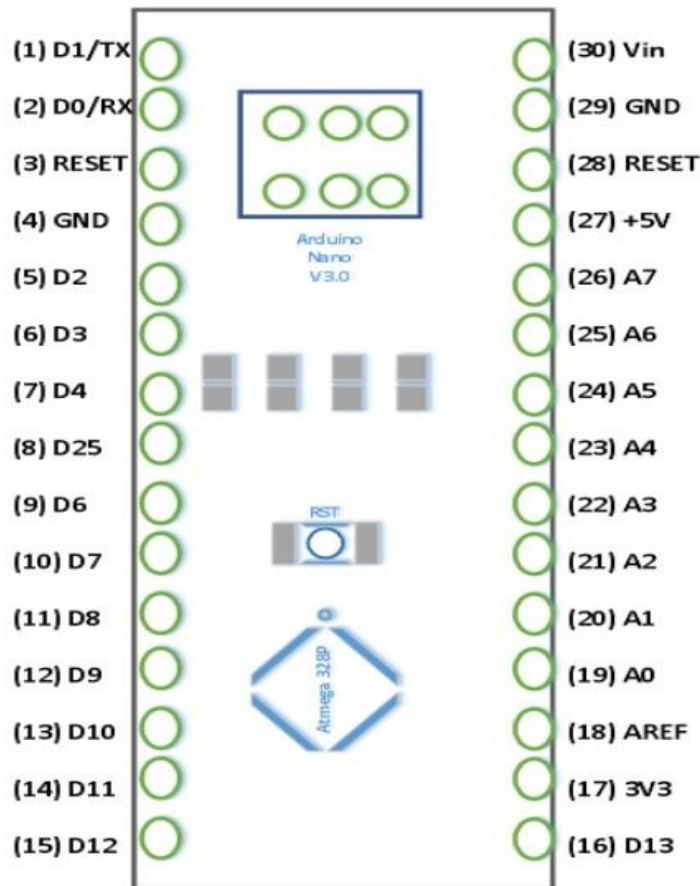
The programming of an Arduino nano can be done using the Arduino software. Click the Tools option and select the nano board. Microcontroller ATmega328 over the Nano board comes with preprogrammed with a boot loader. This boot loader lets to upload new code without using an exterior hardware programmer. The communication of this can be done with the STK500 protocol.

ARDUINO NANO DIAGRAM



Arduino Nano Pinout

Arduino nano pin configuration is shown below and each pin functionality is discussed below.



Power Pin (Vin, 3.3V, 5V, GND):

These pins are power pins.

- Vin is the input voltage of the board, and it is used when an external power source is used from 7V to 12V.
- 5V is the regulated power supply voltage of the nano board and it is used to give the supply to the board as well as components.
- 3.3V is the minimum voltage which is generated from the voltage regulator on the board.
- GND is the ground pin of the board.

RST Pin(Reset): This pin is used to reset the microcontroller.

Analog Pins (A0-A7): These pins are used to calculate the analog voltage of the board within the range of 0V to 5V.

I/O Pins (Digital Pins from D0 – D13): These pins are used as an i/p otherwise o/p pins. 0V & 5V.

Serial Pins (Tx, Rx): These pins are used to transmit & receive TTL serial data.

External Interrupts (2, 3): These pins are used to activate an interrupt.

PWM (3, 5, 6, 9, 11): These pins are used to provide 8-bit of PWM output.

➤ **ULTRASONIC SENSOR**

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. The ultrasonic sensor works on the principle of SONAR and RADAR system which is used to determine the distance to an object. An ultrasonic sensor generates the high-frequency sound (ultrasound) waves. When this ultrasound hits the object, it reflects as echo which is sensed by the receiver. Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object.

While some sensors use a separate sound emitter and receiver, it's also possible to combine these into one for ultrasonic sensing, the most widely used range is 40 to 70 kHz. The frequency determines range and resolution; the lower frequencies produce the greatest sensing range. At 58 kHz, a commonly used frequency, the measurement resolution is one centimeter (cm), and range is up to 11 meters having an ultrasonic element alternate between emitting and receiving signals. This type of sensor can be manufactured in a smaller package than with separate elements, which is convenient for applications where size is at a premium.

Ultrasonic sensors are used around the world, indoors and outdoors in the harshest conditions, for a variety of applications. Our ultrasonic sensors, made with piezoelectric crystals, use high frequency sound waves to resonate a desired frequency and convert electric energy into acoustic energy, and vice versa.



Fig:- Ultrasonic sensor

➤ **BUZZER:**

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

When current is applied to the buzzer it causes the ceramic disk to contract or expand. Changing the This then causes the surrounding disc to vibrate. That's the sound that you hear.

By changing the frequency of the buzzer, the speed of the vibrations changes, which changes the pitch of the resulting sound.

Piezo buzzers are simple devices that can generate basic beeps and tones. They work by using a piezo crystal, a special material that changes shape when voltage is applied to it. If the crystal pushes against a diaphragm, like a tiny speaker cone, it can generate a pressure wave which the human ear picks up as sound

Operating voltage: Normally, the operating voltage for a magnetic buzzer is from 1.5V to 24V, for a piezo buzzer is from 3V to 220V.

A "piezo buzzer" is basically a tiny speaker that you can connect directly to an Arduino. ... From the Arduino, you can make sounds with a buzzer by using tone. You have to tell it which pin the buzzer is on, what frequency (in Hertz, Hz) you want, and how long (in milliseconds) you want it to keep making the tone.



Fig:- buzzer

➤ **ZERO PCB:**

Printed circuit boards (PCBs) are the boards that are used as the base in most electronics – both as a physical support piece and as the wiring area for the surface-mounted and socketed components. PCBs are most commonly made out of fiberglass, composite epoxy, or another composite material.

There are several overall types of PCB boards each with their own particular manufacturing specifications, material types and usages: Single-layer PCBs, Double-layer PCBs, Multi-layer PCBs, Rigid PCBs, Flexible PCBs, Rigid-Flex PCBs, High-frequency PCBs, Aluminum-backed PCBs.

A printed circuit board, or PCB, is used to mechanically support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive substrate.

As its name suggests, general purpose PCB's are widely used to embed circuits randomly for running of hardware. Its layer is coated with copper and allows proper soldering without any short circuit. General purpose board, connections are not built so connections are to be created.

For instance, printed circuit boards are a development that makes connecting components simpler and cheaper than the way it “used to be done.” Printed circuit boards are conveniently thin and useful boards. They're made from an insulating material and have a metal coated surface.

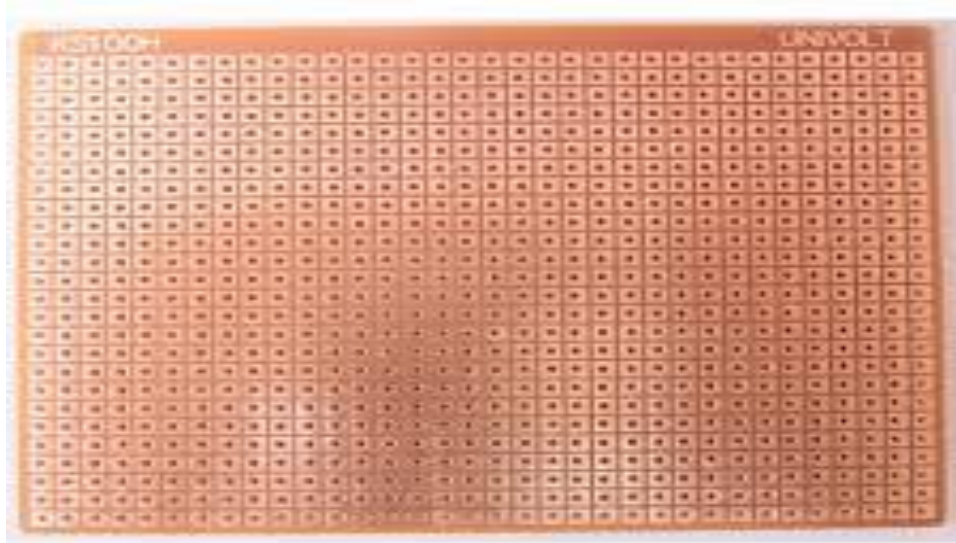


Fig:-Zero pcb

➤ **VIBRATION SENSOR:-**

Shear mode accelerometer (vibration sensor) designs feature sensing crystals attached between a center post and a seismic mass. ... Under acceleration, the mass causes a shear stress to be applied to the sensing crystals. This stress results in a proportional electrical output by the piezoelectric material. Vibration sensors are sensors for measuring, displaying, and analyzing linear velocity, displacement and proximity, or acceleration. Vibration however subtle and unnoticed by human senses is a telltale sign of machine condition.

The working principle of vibration sensor is a sensor which operates based on different optical otherwise mechanical principles for detecting observed system vibrations. The sensitivity of these sensors normally ranges from 10 mV/g to 100 mV/g, and there are lower and higher sensitivities are also accessible.

In a standard application (50g range), the sensitivity of a typical vibration sensor is 100mV/g, while in low vibration applications (10g) the sensitivity is 500mV/G

Vibration is most commonly measured using a ceramic piezoelectric sensor or accelerometer. An accelerometer is a sensor that measures the dynamic acceleration of a physical device as a voltage.

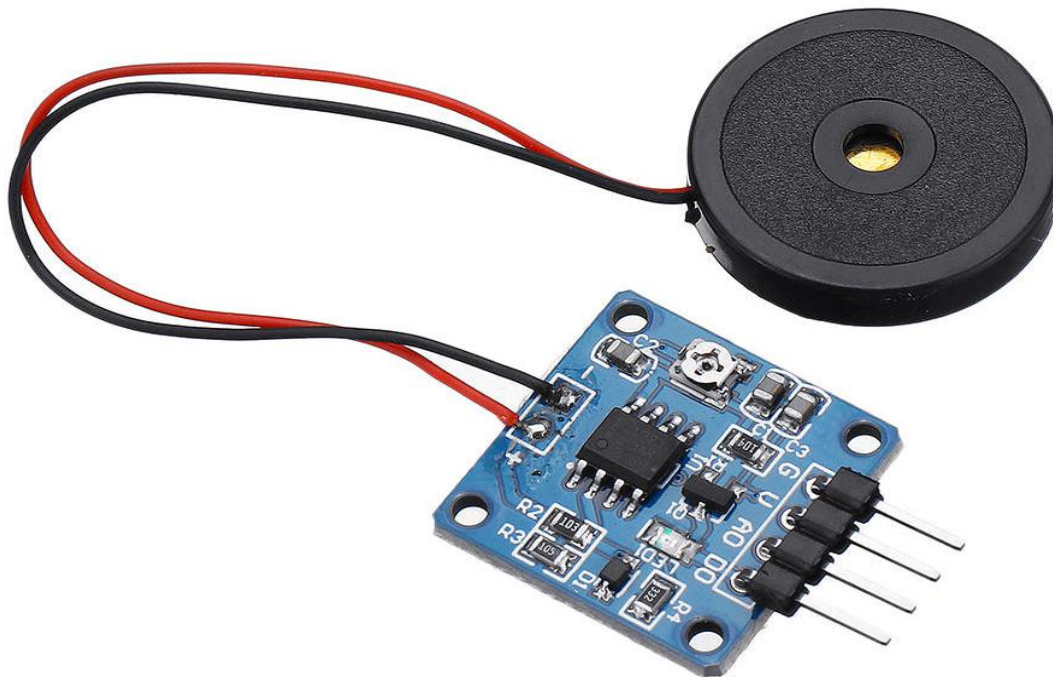


Fig:- Vibration sensor

➤ **BATTERY CAP:-**

A battery assembled cap, a cylindrical battery with the cap and a method for making the same. The vent cap is attached to the battery cover by a hinge connection which allows for play between the vent cap and the battery cover and which allows for rotation of the vent cap.

A battery holder is one or more compartments or chambers for holding a battery.

For dry cells, the holder must also make electrical contact with the battery terminals. For wet cells, cables are often connected to the battery terminals, as is found in automobiles or emergency lighting equipment. The purpose of the vent caps is to allow for the escape of gases formed when the battery is charging. In addition, the vent caps allow water and acid levels of the battery to be

checked during maintenance. Lead-acid batteries can produce explosive mixtures of hydrogen and oxygen gases when they are being charged.

Battery can play an important role in achieving the target of universal access to clean, reliable and affordable electricity services. Battery is an energy storage device consisting of two or more electrochemical cells that convert stored chemical energy into electrical energy and used as a Source of Power.

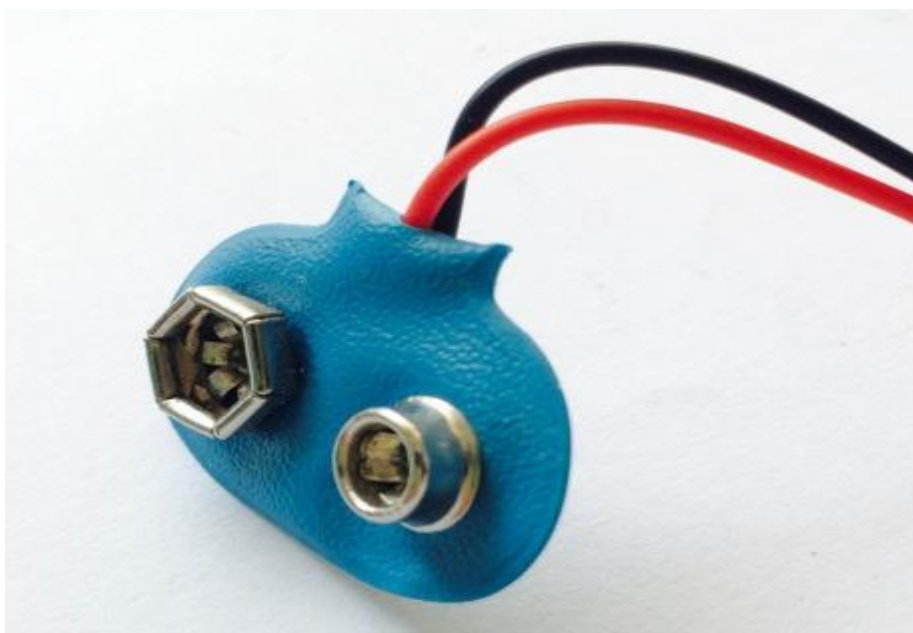


Fig:- Battery cap

➤ **VOLT BATTERY:-**

A battery is an electrochemical device that produces a voltage potential when placing metals of different affinities into an acid solution (electrolyte). The open circuit voltage (OCV) that develops as part of an electrochemical reaction varies with the metals and electrolyte used

A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode

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the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy.

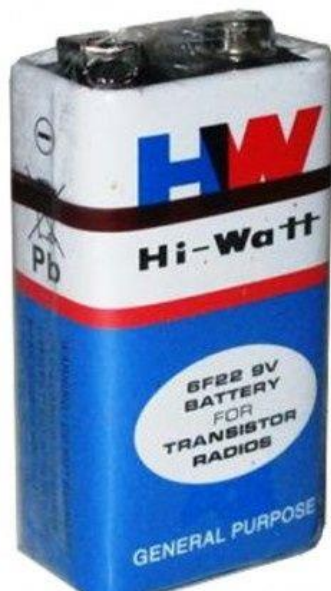


Fig:- Battery

➤ **SOLDER WIRE:-**

Solder is a fusible alloy used to join less fusible metals or wires, etc. ... Solder wire is comprised of different alloys, or of pure tin. Each metal requires a certain type of soldering wire to create strong bonds, because the combinations of metals that comprise soldering wire melt at different temperatures. Solder is a fusible alloy used to join less fusible metals or wires, etc. Solder is sold in spools of wire or in bars. Solder wire is comprised of different alloys, or of pure tin. Each metal requires a certain type of soldering wire to create strong bonds, because the combinations of metals that comprise soldering wire melt at different temperatures.



Fig:- solder wire

➤ **SOLDERING IRON:-**

A soldering iron is a hand tool used in soldering. It supplies heat to melt solder so that it can flow into the joint between two workpieces. A soldering iron is composed of a heated metal tip and an insulated handle.

The basic purpose of a soldering iron is to create a bond between two workpieces using electronically heated soft metal (ie, the solder). The soldering iron supplies heat to the soldering tip, which is used to melt the solder. The melted solder forms a bond in the joint between two workpieces



Fig:- soldering iron

➤ **CONNECTING WIRE:-**

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum. Copper is cheap and good conductivity.

The Function of Connecting Wires. Connecting wires provide a medium to an electrical current so that they can travel from one point on a circuit to another. In the case of computers, wires are embedded into circuit boards to carry pulses of electricity.



Fig:- connecting wire

CHAPTER 4

4.1 MAKING THE MODULES:-

- First cut the perf board in 5 X 3 cm dimension and solder the female headers for the arduino to the board.
- Then solder the buzzer.
- Then connect the vibrating motor using the glue gun and solder wires to it.
- Then connect the LED.
- Then connect the switch.
- Then connect header pins for ultrasonic sensors and for battery input.
- Then solder everything as shown in the circuit diagram.
- Now connect the arduino and ultrasonic sensor to the board.

WIRING INSTRUCTION:-

- Ground of buzzer and vibration sensor to GND of Arduino.
- +ve of 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 12.

CHAPTER 5

5. WORKING OPERATIONS :

This proposed system consists the equipment like Arduino mini pro, ultrasonic sensor, pref board, vibrating motor, buzzers for detecting the obstacles and letting the user know about the obstacle, Red LEDs, Switches, Jumper cable, power bank, Male and female header pins, 3.3 volt old mobile battery which is unused or discarded, some elastic and stickers to make the device wearable as a band for wearing for the users. The wiring of the device is done in a following manner.

The Ground of LED, buzzer and vibration motor are connected to GND of the Arduino. The +ve of the LED and the middle leg of switch is connected to the Arduino pin 5. The +ve of the Buzzer is wired to the first leg of the switch and the +ve of the Vibration motor is wired to the third leg of the switch. The Ultrasonic sensor are wired accordingly. The Ultrasonic sensor pin VCC is connected to the Arduino pin VCC, Ultrasonic sensor pin GND is connected to the Arduino pin GND, Ultrasonic sensor pin Trig is attached to the Arduino pin 12, Ultrasonic sensor pin Echo is connected to the Arduino PIN 12. The switch used here is for selecting the mode. (Buzzer or vibration mode.) We first cut the pref board in 5 X 3 cm dimension and solder the female headers for the arduino to the board. Then soldering of the buzzer is carried out. Then using the glue connect the vibrating motor and solder the wires to it. Then connection of the LED is done. Then connect the switch. Connect the header pins for ultrasonic sensors and for the battery input. Then solder all the things and connect the arduino and ultrasonic sensor to the board. Also connect the elastic band to all the modules. For making the module for the hand, connect the ultrasonic sensor to the board by using 4 jumper cables. Then connect a 3.7 volt mobile battery to this module. Then connect the elastic band. In the end after all the connections are done to the Arduino board, upload the code to each arduino board and power the 4 other modules using a power bank.

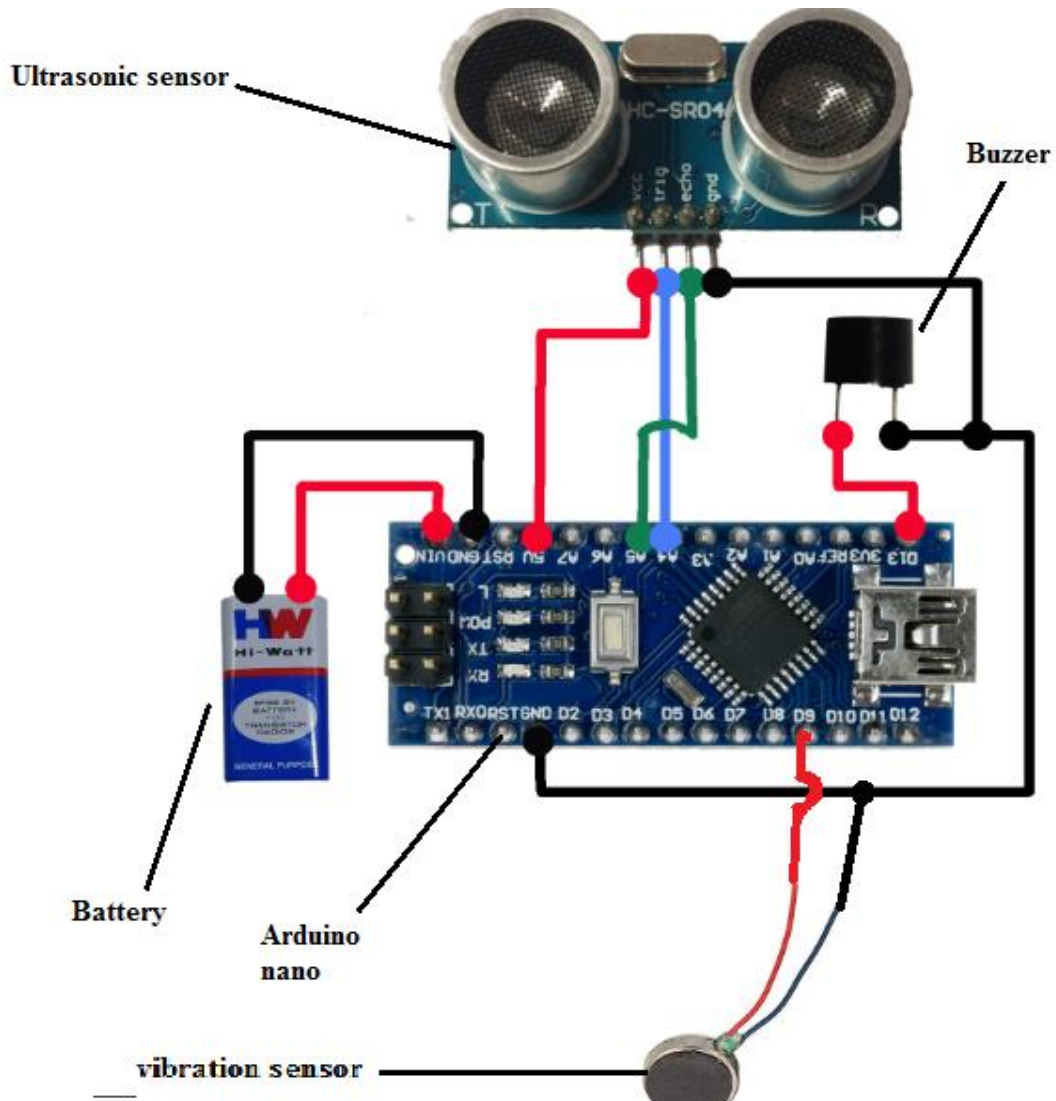
The US sensor is a transducer, and is used in pair as transreceiver. The transmitter emits the US waves and if obstacles are present in the path, the US waves hits the obstacles and gets reflected back, the reflected wave is received by the receiver. The US sensor is a combination of one transmitter and receiver. The time interval between sending and receiving of the US signal is calculated, this time interval is used to calculate the distance between sensor and the obstacle.

The sensors which are placed in waist belt are in such a manner that the Ultrasonic pulses of sensors must not be overlapped one over the other. Sensors has a field of view (coverage) of about 60 degrees for 4 feet distance, as the distance from the sensor increases, the coverage angle decreases. Thus, the objective is to cover a wide angle to detect the obstacles with the help of the ultrasonic sensors to help the blind and make it easy for them to move around easily without any hassle.

Hence, the distance calculation is calculated and the sensor detects and the further procedure of the buzz sound to the user is carried out. Thus, this way Third Eye for Blind will be designed for the visually impaired people and will make it very easy and convenient as it will be a wearable device and thus will help the user in travelling and detecting the obstacles while walking very easily.

CHAPTER 6

6.1 ARDUINO PROGRAMMING:-




```

const int pingTrigPin = A4; //Trigger connected to PIN 7
const int pingEchoPin = A5; //Echo connected yo PIN 8
int buz=13; //Buzzer to PIN 4
int buz1=9;
void setup() {
  Serial.begin(9600);
  pinMode(buz, OUTPUT);
  pinMode(buz1, 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<=100 && cm>0)
  {
    int d= map(cm, 1, 100, 20, 2000);
    digitalWrite(buz, HIGH);
    digitalWrite(buz1, HIGH);
    delay(50);
    digitalWrite(buz, LOW);
    digitalWrite(buz1, LOW);
    delay(d);
  }
  Serial.print(cm);
  Serial.print("cm");
  Serial.println();
  delay(40);
}
long microsecondsToCentimeters(long microseconds)
{
  return microseconds / 29 / 2;
}

```

CHAPTER 7

7. 1 RESULT:

The presented system is designed and configured for the use of the blind and visually disabled people. This device is able to handle several states that the visually impaired people face. This device responds to the user in all the circumstances which is faced by the blind people with the help of the use of the Ultrasonic sensors and the Arduino Board.

Case 1: When the obstacle or the object is in the left it will tell the user that: The obstacle is in left.

Case 2: When the obstacle is in right it will say: The obstacle in right.

Case 3: When the obstacle is in front, the device will say: the obstacle is in front. Similarly for all the directions like left, right, back etc it will notify the user wearing it.

CHAPTER 8

8.1 BENEFITS:-

Third eye for blinds is an innovation to help blind people to navigate with greater comfort, speed and confidence, while making use of ultrasonic waves to detect nearby obstacles and to notify the user through vibration.

This is the first wearable technology for blinds 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 are there. 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 (2000INR). 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.

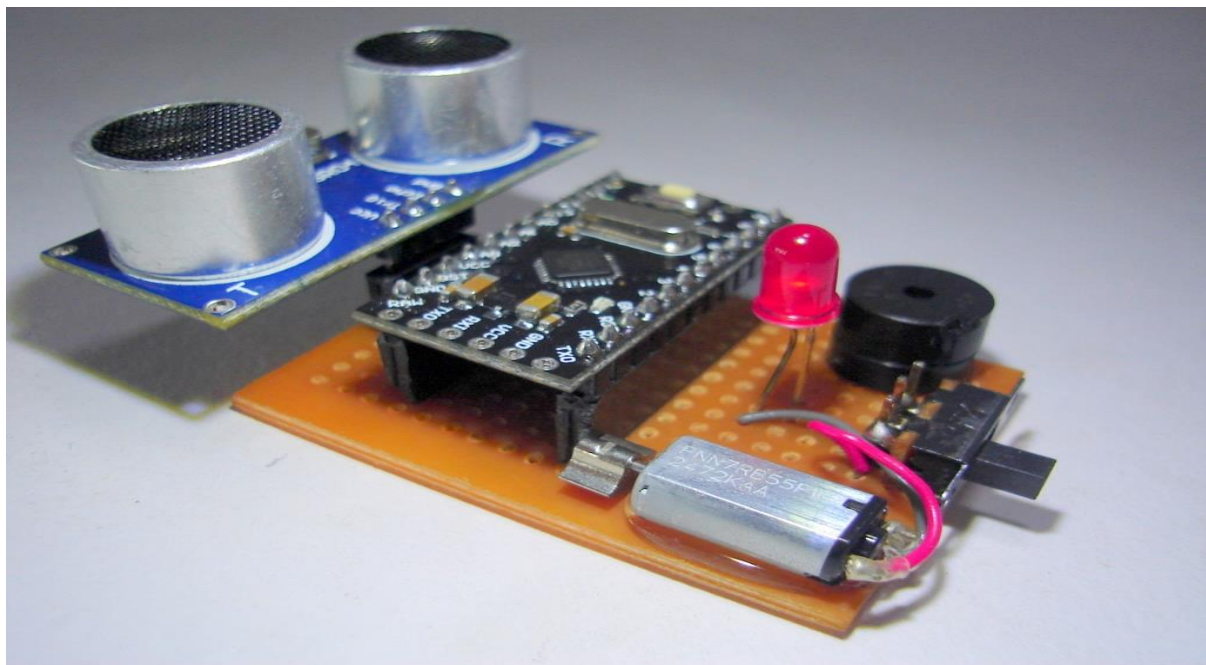
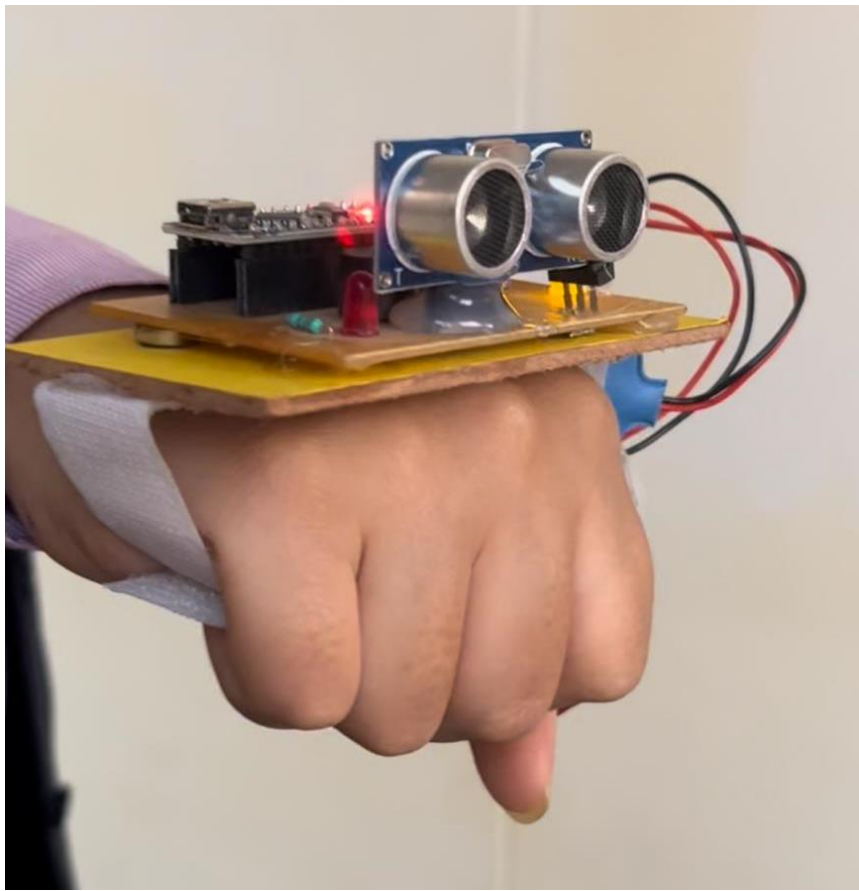


Fig – Practical view of third eye for blind person

CHAPTER 9

9. CONCLUSION:

Thus, this project proposed the design and architecture of a new concept of Arduino based Virtual Eye for the blind people. A simple, cheap, efficient, easy to carry, configurable, easy to handle electronic guidance system with many more amazing properties and advantages is proposed to provide constructive assistant and support for the blind and visually impaired persons. The system will be efficient and unique in its capability in specifying the source and distance of the objects that may encounter the blind. It is able to scan and detect the obstacles in the areas like left, right, and in front of the blind person regardless of its height or depth.

With the proposed architecture, if constructed with at most accuracy, the blind will be able to move from one place to another without others help.

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.

References:

Composition of Solder Wire / Hunker

<https://create.arduino.cc/projecthub/muhammedazhar/third-eye-for-the-blind-8c246d>

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