



“THIRD EYE FOR THE BLIND”

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ABSTRACT

It is with the Great sense of Satisfaction and Pride that we are sitting down to pen our Project report. On this day we stand indebted to Mr. Ajay Ingle Sir for his Valuable Advice, guidance and Suggestions to our project work which played a vital role in carrying out this project successfully.

Our Project “Third Eye for the Blind” will help Navigate them through streets, etc. We have tried to keep it a budget so its affordable to everyone. It works on the principle of SONAR. SONAR system uses ultrasound to detect the distance of the objects. It works by sending ultrasound and then sensing the reflected rays and thus determine the distance. We have used Arduino as our Microprocessor and Buzzer for giving Feedback Output

Since the kit contains 5 Units of same circuit We have made a single circuit for Demonstration. We can make 5 of them for the whole kit

Chapter 1

Introduction

1.1 CONCEPT & MOTIVATION

Third eye for blinds is an innovation which helps the blinds 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 blinds worldwide. They are suffering a lot of harder ship in there 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.

1.2 EXISTING SYSTEMS

- 1.White cane
- 2.Pet dog
- 3.Smart devices (eg : Vision a torch for blinds)



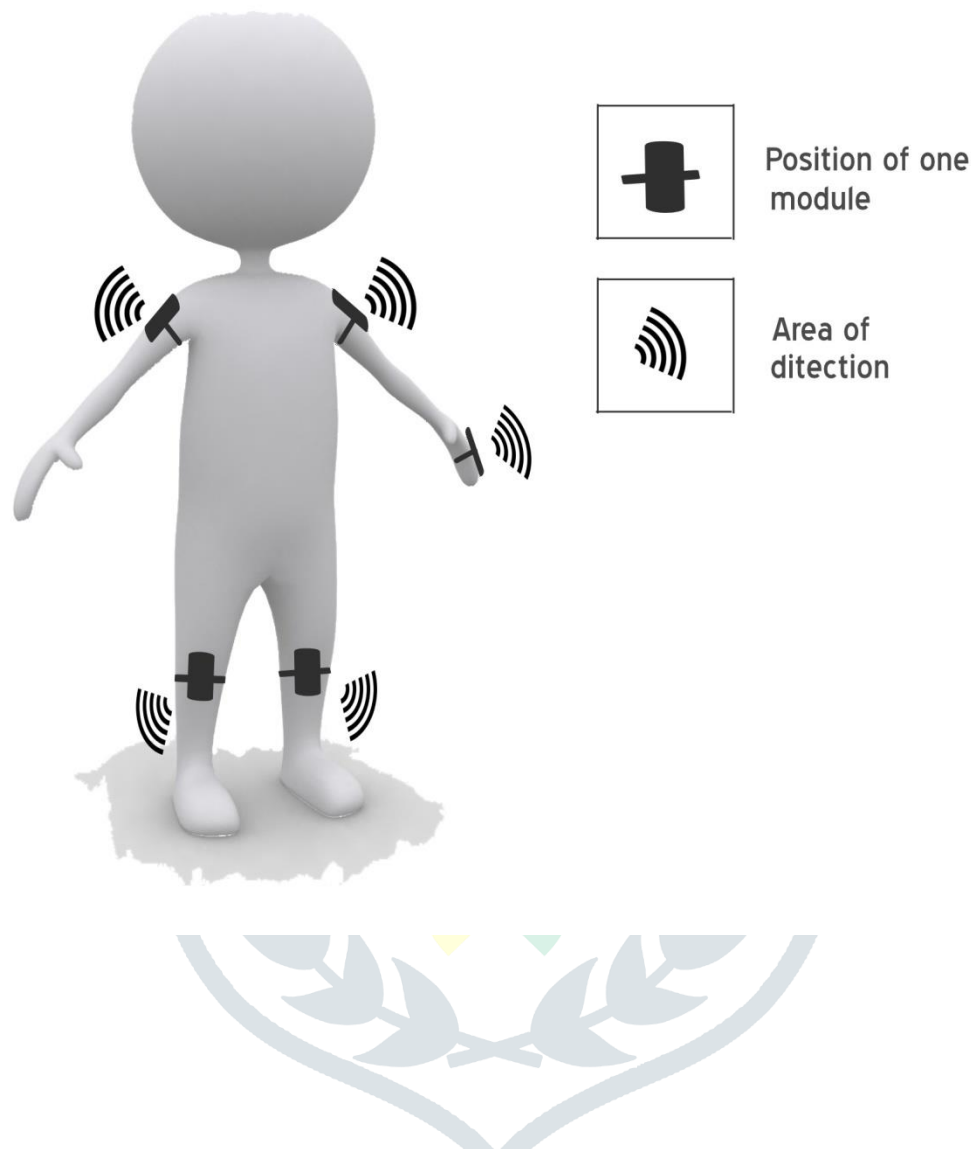
Problem of the Existing Systems

1. White cane - May easily crack/break, The stick may get stuck at pavement cracks or different objects.
2. Pet dog - Not everyone can afford its daily needs.

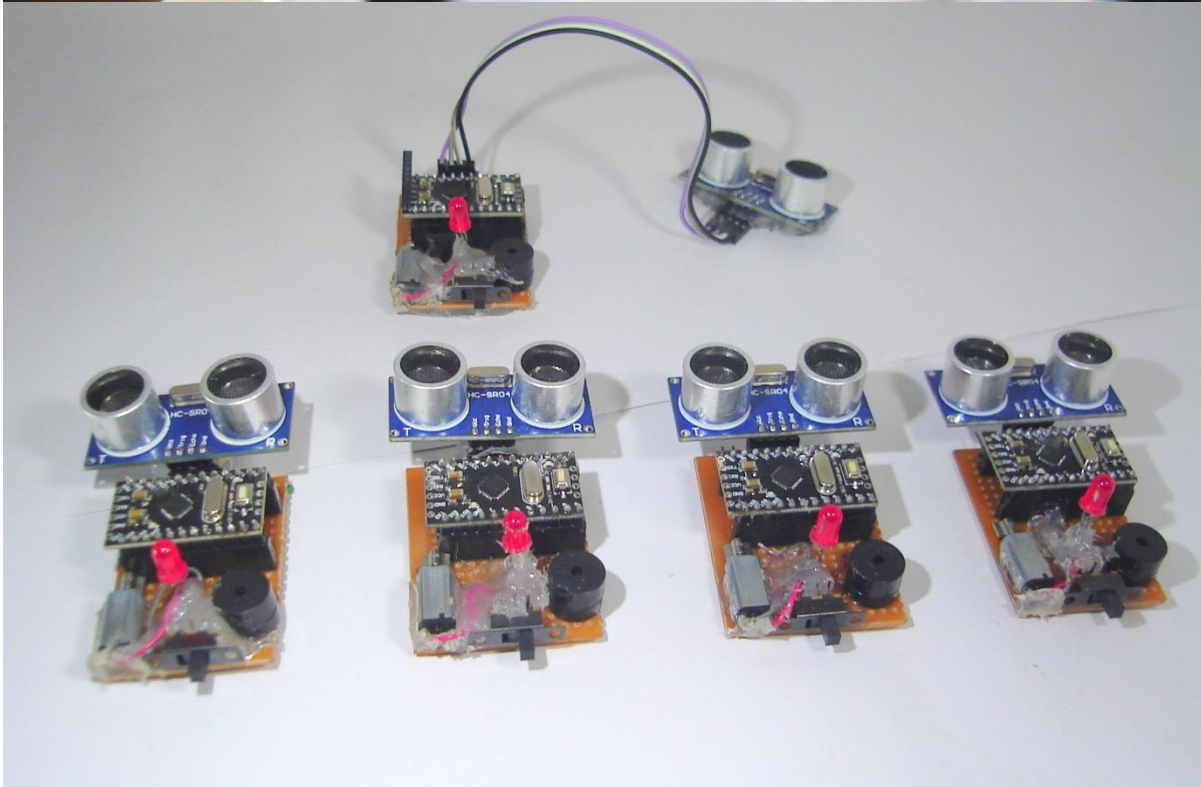
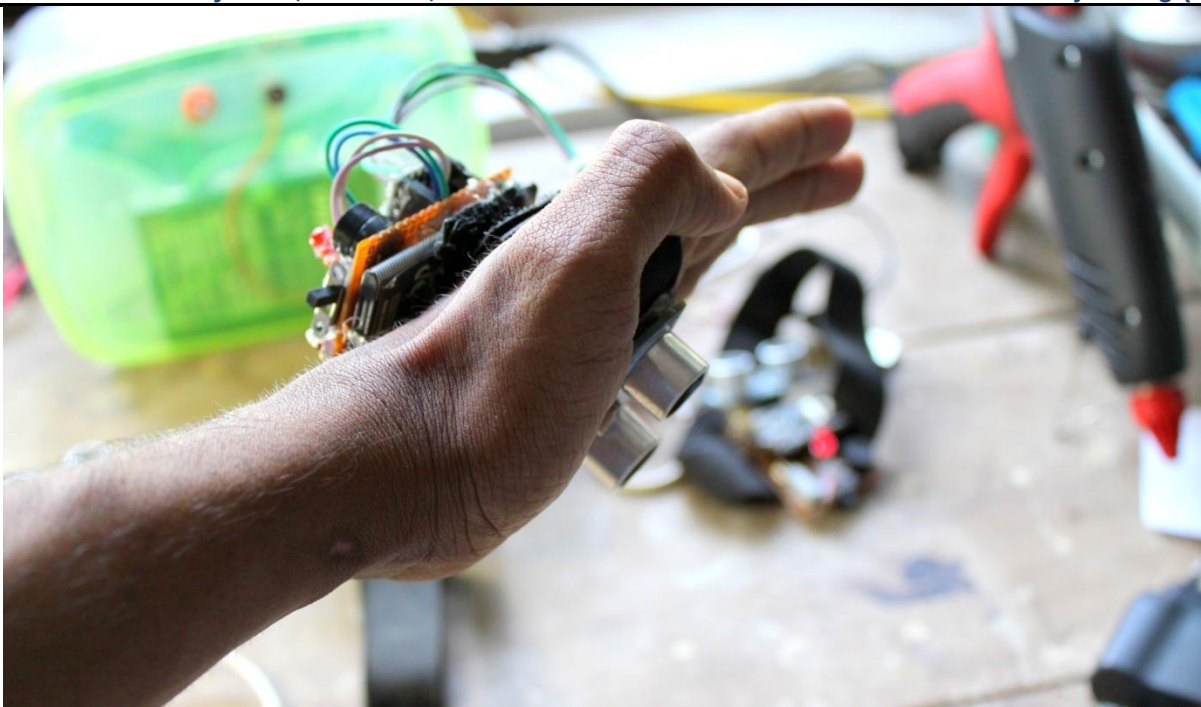
* Common Disadvantages (Including the smart devices) **Cannot be carried easily**, needs a lot of training to use...

1.3 THIRD EYE FOR BLINDS AS A SOLUTION

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.



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 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.



Chapter 2

Literature Review

2.1 SONAR

Principle

Sonar uses the Principle of Sending Ultrasound waves (Sound Frequency above 20,000Hz) and the Sensing the reflected waves and thereby detecting objects and their Distance.

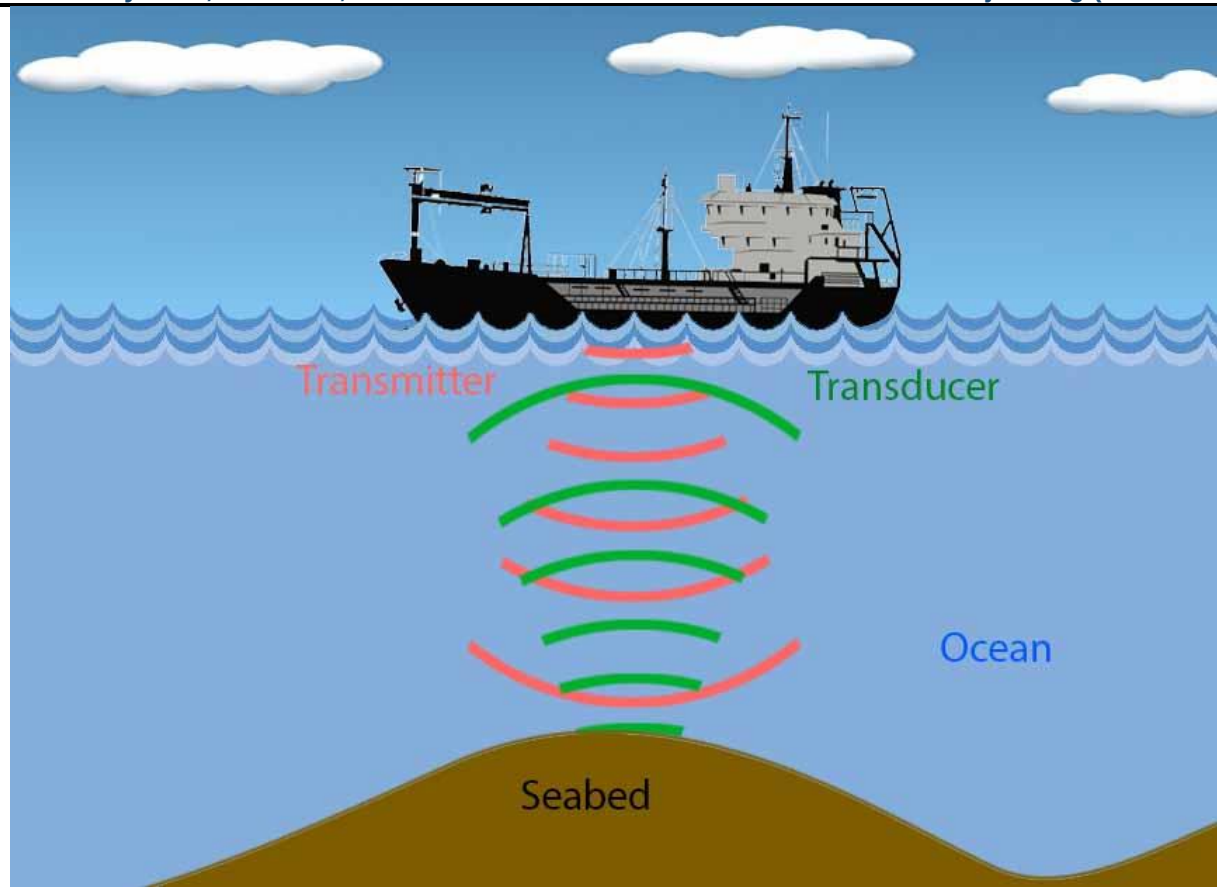
History

Sonar was first proposed as a means of detecting icebergs. Interest in sonar was heightened by the threat posed by submarine warfare in World War I. An early passive system, consisting of towed lines of microphones, was used to detect submarines by 1916, and by 1918 an operational active system had been built by British and U.S. scientists. Subsequent developments included the echo sounder, or depth detector, rapid-scanning sonar, side-scan sonar, and WPESS (within-pulse electronic-sector-scanning) sonar.

The uses of sonar are now many. In the military field are a large number of systems that detect, identify, and locate submarines. Sonar is also used in acoustic homing torpedoes, in acoustic mines, and in mine detection. Nonmilitary uses of sonar include fish finding, depth sounding, mapping of the sea bottom, Doppler navigation, and acoustic locating for divers.

A major step in the development of sonar systems was the invention of the acoustic transducer and the design of efficient acoustic projectors. These utilize piezoelectric crystals (e.g., quartz or tourmaline), magnetostrictive materials (e.g., iron or nickel), or electrostrictive crystals (e.g., barium titanate). These materials change shape when subjected to electric or magnetic fields, thus converting electrical energy to acoustic energy. Suitably mounted in an oil-filled housing, they produce beams of acoustic energy over a wide range of frequencies.

In active systems the projector may be deployed from an air-launched sonobuoy, hull-mounted on a vessel, or suspended in the sea from a helicopter. Usually the receiving and transmitting transducers are the same. Passive systems are usually hull-mounted, deployed from sonobuoys, or towed behind a ship. Some passive systems are placed on the seabed, often in large arrays, to provide continuous surveillance.



SONAR SYSTEM

2.2 ARDUINO

What is Arduino?

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

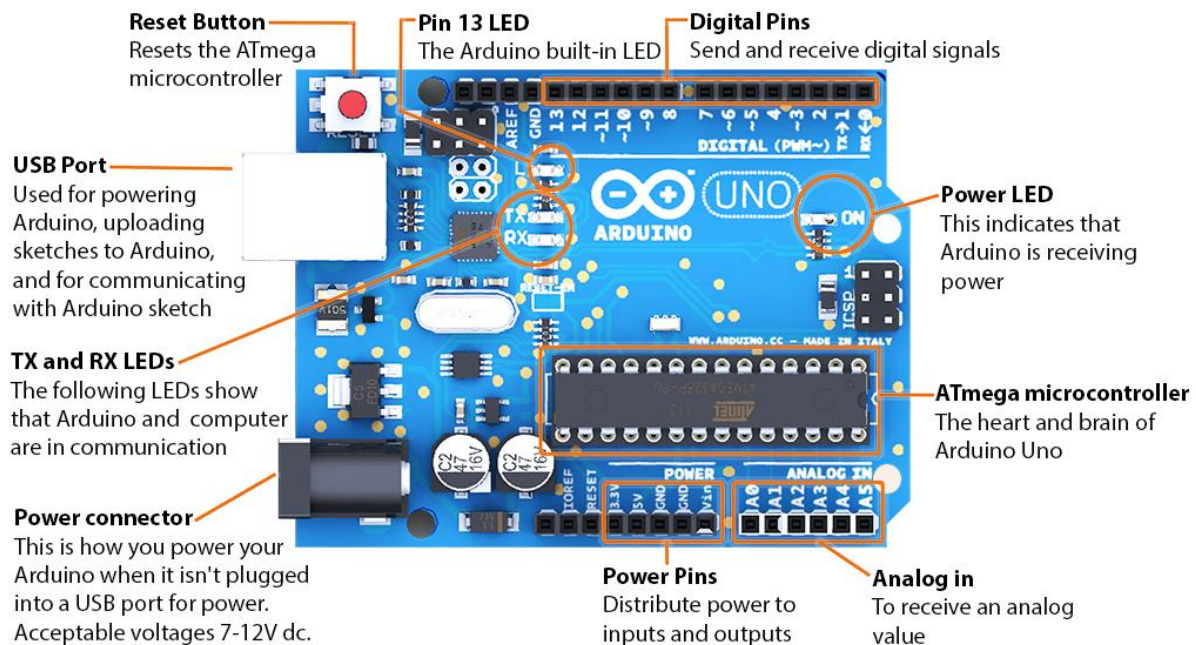
Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.

Why Arduino?

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other systems:

- Inexpensive - Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and even the pre-assembled Arduino modules cost less than Rs 1000
- Cross-platform - The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.
- Simple, clear programming environment - The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.
- Open source and extensible software - The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add AVR-C code directly into your Arduino programs if you want to.
- Open source and extensible hardware - The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.



ARDUINO UNO R3

2.3 What's on the board?

There are many varieties of Arduino boards (explained on the next page) that can be used for different purposes. Some boards look a bit different from the one below, but most Arduinos have the majority of these components in common:

1.Power (USB / Barrel Jack)

Every Arduino board needs a way to be connected to a power source. The Arduino UNO can be powered from a USB cable coming from your computer or a wall power supply (like this) that is terminated in a barrel jack. In the picture above the USB connection is labeled (1) and the barrel jack is labeled (2).

The USB connection is also how you will load code onto your Arduino board. More on how to program with Arduino can be found in our Installing and Programming Arduino tutorial.

NOTE: Do NOT use a power supply greater than 20 Volts as you will overpower (and thereby destroy) your Arduino. The recommended voltage for most Arduino models is between 6 and 12 Volts.

2.Pins (5V, 3.3V, GND, Analog, Digital, PWM, AREF)

The pins on your Arduino are the places where you connect wires to construct a circuit (probably in conjunction with a breadboard and some wire. They usually have black plastic 'headers' that allow you to just plug a wire right into the board. The Arduino has several different kinds of pins, each of which is labeled on the board and used for different functions.

GND (3): Short for 'Ground'. There are several GND pins on the Arduino, any of which can be used to ground your circuit.

5V (4) & 3.3V (5): As you might guess, the 5V pin supplies 5 volts of power, and the 3.3V pin supplies 3.3 volts of power. Most of the simple components used with the Arduino run happily off of 5 or 3.3 volts.

Analog (6): The area of pins under the 'Analog In' label (A0 through A5 on the UNO) are Analog In pins. These pins can read the signal from an analog sensor (like a temperature sensor) and convert it into a digital value that we can read.

Digital (7): Across from the analog pins are the digital pins (0 through 13 on the UNO). These pins can be used for both digital input (like telling if a button is pushed) and digital output (like powering an LED).

PWM (8): You may have noticed the tilde (~) next to some of the digital pins (3, 5, 6, 9, 10, and 11 on the UNO). These pins act as normal digital pins, but can also be used for something called Pulse-Width Modulation (PWM). We have a tutorial on PWM, but for now, think of these pins as being able to simulate analog output (like fading an LED in and out).

AREF (9): Stands for Analog Reference. Most of the time you can leave this pin alone. It is sometimes used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input.

3.Reset Button

Just like the original Nintendo, the Arduino has a reset button. Pushing it will temporarily connect the reset pin to ground and restart any code that is loaded on the Arduino. This can be very useful if your code doesn't repeat, but you want to test it multiple times. Unlike the original Nintendo however, blowing on the Arduino doesn't usually fix any problems.

4.Power LED Indicator

Just beneath and to the right of the word "UNO" on your circuit board, there's a tiny LED next to the word 'ON' (11). This LED should light up whenever you plug your Arduino into a power source. If this light doesn't turn on, there's a good chance something is wrong. Time to re-check your circuit!

5.TX RX LEDs

TX is short for transmit, RX is short for receive. These markings appear quite a bit in electronics to indicate the pins responsible for serial communication. In our case, there are two places on the Arduino UNO where TX and RX appear -- once by digital pins 0 and 1, and a second time next to the TX and RX indicator LEDs (12). These LEDs will give us some nice visual indications whenever our Arduino is receiving or transmitting data (like when we're loading a new program onto the board).

6.Main IC

The black thing with all the metal legs is an IC, or Integrated Circuit (13). Think of it as the brains of our Arduino. The main IC on the Arduino is slightly different from board type to board type, but is usually from the ATmega line of IC's from the ATMEL company. This can be important, as you may need to know the IC type (along with your board type) before loading up a new program from the Arduino software. This information can usually be found in writing on the top side of the IC. If you want to know more about the difference between various IC's, reading the datasheets is often a good idea.

7.Voltage Regulator

The voltage regulator (14) is not actually something you can (or should) interact with on the Arduino. But it is potentially useful to know that it is there and what it's for. The voltage regulator does exactly what it says -- it controls the amount of voltage that is let into the Arduino board. Think of it as a kind of gatekeeper; it will turn away an extra voltage that might harm the circuit. Of course, it has its limits, so don't hook up your Arduino to anything greater than 20 volts.

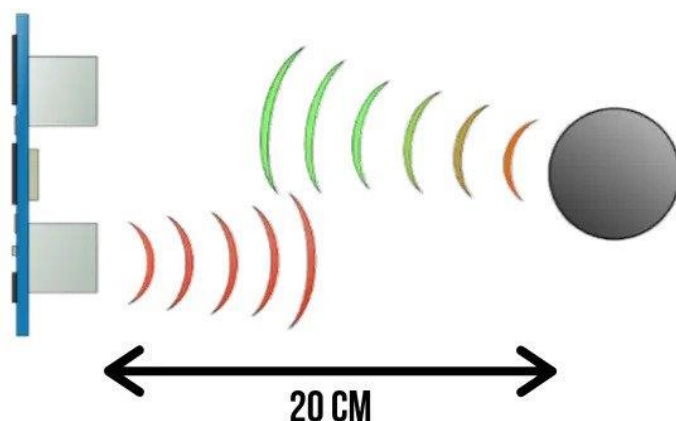
Chapter 3

Principle

3.1 Working Principle

Ultrasonic Sensor HC-SR04 is a sensor that can measure distance. It emits an ultrasound at 40 000 Hz (40kHz) which travels through the air and if there is an object or obstacle on its path It will bounce back to the module. Considering the travel time and the speed of the sound you can calculate the distance.

Based on the Distance, the buzzer will Beep Accordingly and help the person determine the distance of the Object



SPEED OF SOUND:

$$v = 340 \text{ m/s}$$

$$v = 0.034 \text{ m/s}$$

TIME = DISTANCE/SPEED

$$t = s/v = 20/0.034$$

$$= 588 \text{ us}$$

$$s = t \times 0.034/2$$

Chapter 4

Methodology

4.1 COMPONENTS USED

Sr no	Components	Qty
1.	Arduino UNO	1
2.	Ultrasonic Sensor	1
3.	Buzzer Jumper Cables	1
4.	Battery 9v Dc	1
5.	Gloves	1
6.	Velcro for assembling	1
7.	Arduino Protection Cover	1

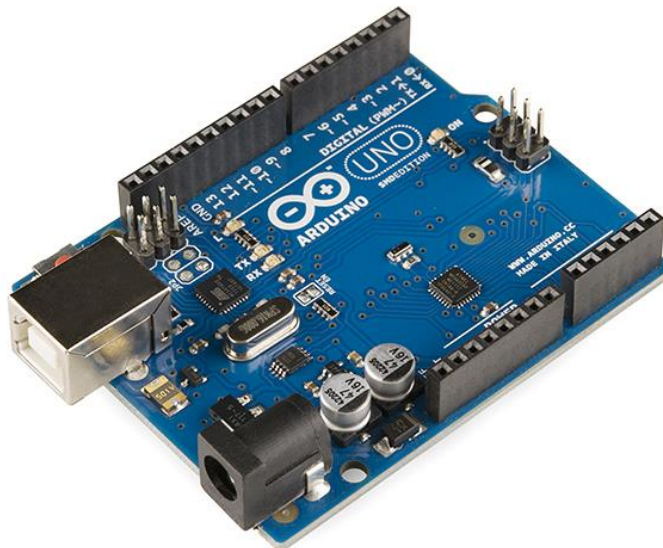
Table 4.1

4.2 TOOLS USED

1. Adhesives
2. Laptop (For Programming Arduino)
3. Arduino IDE (For Coding)
4. Wire Stripper
5. Insulation Tape
6. Soldering Iron
7. Soldering Wire
8. USB A-B cable

4.3 CONSTRUCTION AND ASSEMBLY

1. Arduino UNO



Since, Arduino is a MicroProcessor, it is used as the Brain of the Project. It is Programmed by us to work as per our Needs. All the Sensors (Ultrasonic) and Feedback Device (Buzzer) will be Connected to Arduino.

2. UltraSonic Sensor



Ultrasonic Sensor senses the Distance of the Objects by sending and Receiving Ultrasound.

3. Buzzer



For Producing Feedback Sound

4. Jumper Cables



5. Battery



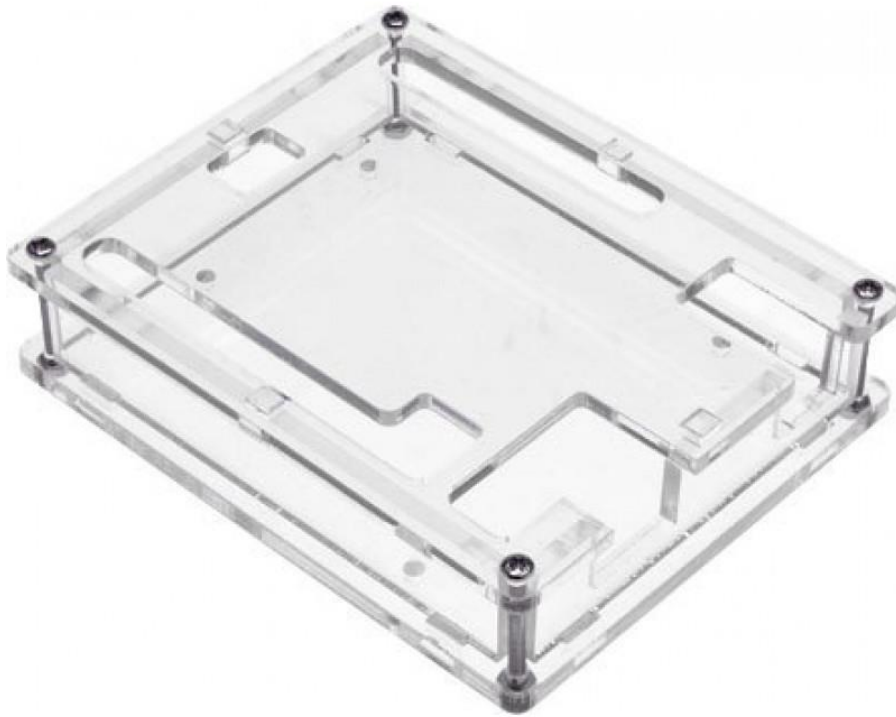
6. Gloves



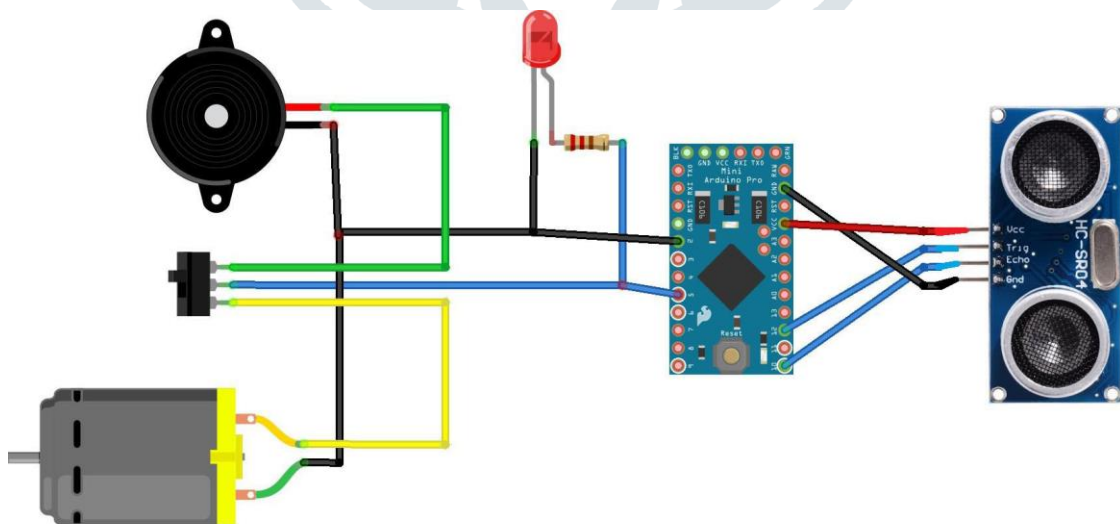
7. Velcro



8. Arduino Protection Case



CIRCUIT DIAGRAM



4.4 PROGRAM 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;
}
```

4.5 WORKING

1. One can wear the Glove in Hand and Straps in Shoulder and Legs, Since we have made a working model, we have made a single kit.
2. After Wearing, One can direct hand towards the direction the person wants to Move.
3. When the Arduino Starts, it Runs the Program in loop
4. The Ultrasonic sensor sends Ultrasonic sound, and waits to detect the reflected waves
5. Once the waves are Detected by the sensor, it Highs (5v) echo pin
6. Through Code, Arduino calculates the Distance of the Object
7. If the Object is far, it does not Trigger the buzzer.
8. If the Object is Nearby, it triggers the beep.
9. As the buzzer beeps, one can know that the object is nearby and may collide and hence change the Direction Accordingly.

4.6 COSTING (FOR SINGLE KIT)

No	Component	Qty	Price
1.	Arduino UNO	1	850
2.	Ultrasonic Sensor	1	150
3.	Gloves	1 Pair	200
4.	Buzzer	1	40
5.	Battery	1	40
6.	Arduino Case	1	50
7.	Velcro	1	50
8.	Jumper Cables	1 Pack	150
9.	USB A-B cable	1	100
10.	Miscellaneous	-	200

Table 4.2

Chapter 5

Conclusion

5.1 CONCLUSION

In Conclusion, this Project has the capability and help Blind People Navigate without the need of expensive tech or Dog or Sticks a.

This system can be paired with 4 other units and used as whole body kit for the Blind people by wearing one in hand, Two in Shoulders and Two on knees.

Moreover, a Similar Project has been tested on Blind People and have generated Successful Positive Results. This Project can help transform Blind People's lives in Positive way.

5.2 Future improvements

The entire project can be made in the form of jacket, so that the device doesn't need to be wear one by one.

Use of specially designed boards instead of arduino and high quality ultrasonic sensors makes faster response which make the device capable of working in crowded places more efficiently.

5.3 References

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