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## BOUNDLESS SIGHT: NAVIGATING BLINDNESS WITH THIRD EYE TECH

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### ABSTRACT

Third eye for the blind is an innovation with the help of the multi discipline 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 peculiarities 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.

**Keywords:** Arduino, Wearable Band, Buzzer, Blind, People, Compact, Ultrasonic Sensor (US Sensor), Obstacles.

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### I. INTRODUCTION

The Third Eye for the Blind project's goal is to create a product that will be extremely helpful to those who are blind or frequently need to rely on others. With the aid of a wearable band that emits ultrasonic waves and vibrates or buzzes to alert wearers to impending obstacles, the Third Eye for Blind project is an invention that enables visually impaired people to move around and go from one place to another quickly and confidently. By identifying obstacles, it enables users who are visually impaired to move freely. All they have to do is wear this device on their body as a band or piece of cloth. For many years, people with physical disabilities have relied on the traditional method of using a white cane, which has many drawbacks and limitations despite its effectiveness. Keeping a pet, like a dog, is another option, but it is highly costly. Consequently, the goal of the Third Eye for the Blind project is to create a low-cost, more effective method of assisting blind individuals in navigating with increased ease, confidence, and speed. This wearable technology for blinds helps to fix every issue with the current technologies. One of this innovation's key features is that it is inexpensive for everyone, with a total cost of less than 1500 INR. The community of blind or visually impaired people will greatly benefit from it. The walking cane is a basic mechanical device that uses tactile force feedback to identify obstacles on the ground, uneven surfaces, holes in the ground, and steps that are either static or constantly present. This device is small, light, and not intended for dynamic obstacle detection due to its limitations in terms of size. These gadgets function similarly to radars, and their system makes use of ultrasonic waves to determine an object's height, direction, and speed. The wave's travel time provides a measure of the distance between the subject and the obstruction. However, all the existing systems inform the blind the presence of the object at a specific distance in front of or near to him.

### II. LITERATURE SURVEY

Till the last few years, there are many new technologies have been developed for visually challenged peoples. But, there are a lot of limitations and restrictions on those new inventions. Shovel proposed a method for blind people. He proposed two different types of sounds. The major drawback of his work is to identification of round. The blind people cannot differentiate the sounds. Yuan introduced concept of active triangulation that was used in his proposed device. It will detect the object. The main disadvantage of this work is, it can only detects the object at the rate of 15 measurement/ second and also faces a surface discontinuities.

J M Benjamin proposed a three direction detectable laser cane. The direction is 45 degrees over and parallel to the ground and with sharp deepness. It is basically a hit and trial method it is used only in indoor systems. The

main disadvantage in his system is it is not suitable for outdoor activities. R Sabarish proposed a system which is similar to our project nearly, but has a some vibration in his device. Till it is not successful.

MA. Espinosa S. Ungar introduced an idea, that was more costlier than the normal one. He did not consider the poor peoples who cannot buy those things. Pooja Sharma created a device for blind people. In that case the object has been detected but within a certain range. only within that range the object can be identified. This was the major limitation in this paper. All the above existing system cannot satisfy the exact needs of the blind peoples. They use a white cane and pet dogs which is very costlier and difficult to maintain. To overcome those limitations this project will help. Nowadays there is a lot of technologies available for the visually challenged but our project is cheaper among them.

### III. SYSTEM ARCHITECTURE

The device or the wearable band is circuited with the Arduino. The LEDs and the buzzer are connected to the Arduino and similarly the ultrasonic sensors are also connected to the Arduino board. The soldering is done according in the Arduino and the connections are established.

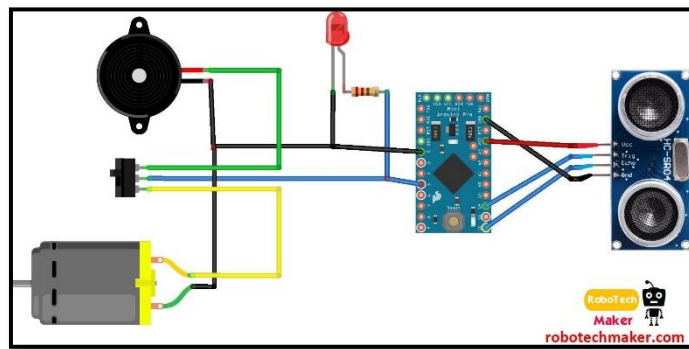


Figure 1: Circuit Diagram.

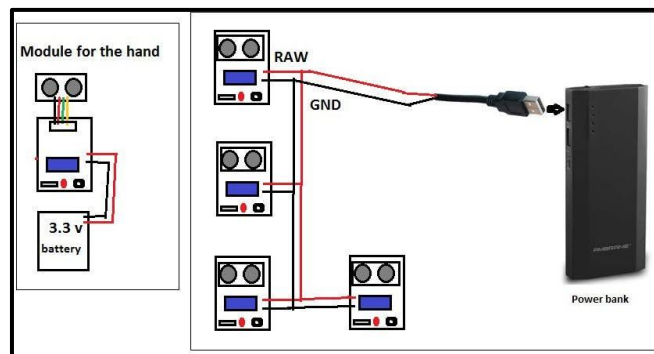


Figure 2: Detail Circuit Diagram

### IV. PROPOSED SYSTEM

The proposed system deals with the cheaper and effective obstacle detection with a wide range of coverage. The device includes the following components:

- Arduino UNO
- Ultrasonic sensor
- Bread board
- Buzzer
- 5 mm LED: Red
- Slide Switch
- Female Header
- Male Header
- Jumper wires
- Power bank

- Some elastics and stickers

Let us see about the components in brief:

### ARDUINO UNO

The Arduino is an open source hardware and software that can make a user to do effective operation in it. The Arduino is a micro-controller. These micro-controller devices help in sensing and controlling the objects in the real-time situations and environment. These boards are available cheaper in the market. There are a number of inventions performed in it and still it is going on.

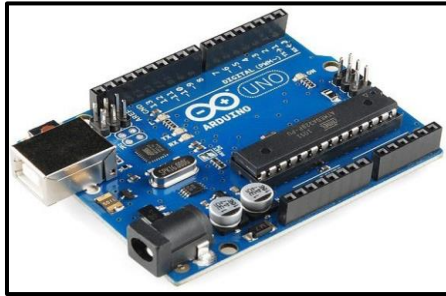


Figure 3: Arduino Uno

### ULTRASONIC SENSOR

The ultrasonic sensor consists of transmitter, receiver and transceiver. The transmitter convert electrical signal into sound waves. The receiver converts the sound waves into electrical signal again. The transceiver performs both the receiver and transmitter operations. It also has crystal oscillators in it. It will perform the stabilization operation in the ultrasonic sensor.

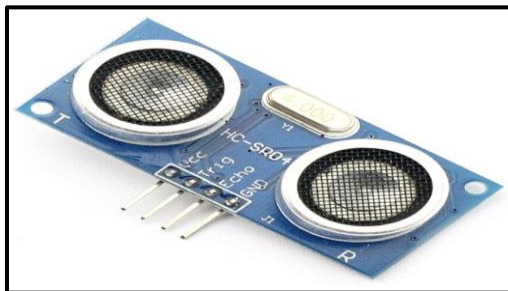


Figure 4: Ultrasonic Sensor

### JUMPER WIRES

The jump wires are also known as jumper wire used to connect devices. Without soldering we can make an easier connection with devices. These are available as a set of wire that has the pin on both sides. These wires are used as making their one end connecting to the corresponding device and another end to the breadboard.

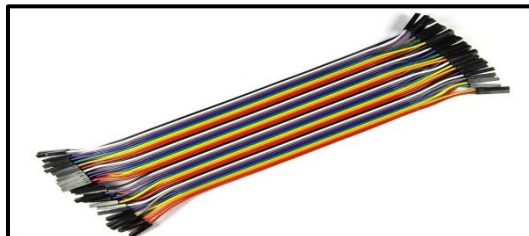


Figure 5: Jumper Wires

### PIEZO BUZZER

The piezo buzzer is an electronic device which generates sound through it. The buzzer is used as an indication to the user. It is used in the car reversing system and braking system as an indication. It is based on the principle of piezoelectric discovered in 1880 by Jacques and Pierre Curie.



**Figure 6:** Piezo Buzzer

**ARDUINO SOFTWARE**

The Arduino is the most used programming software to perform the above-mentioned operation. Using some program in the software we can do every operation.

**V. WORKING OPERATION**

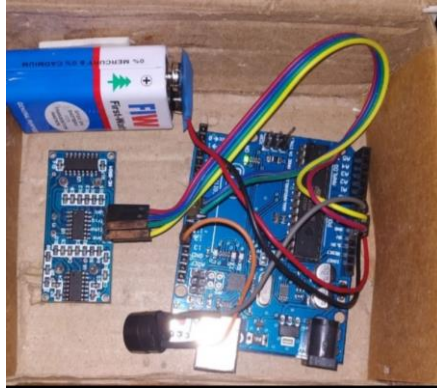
The components of this proposed system include an Arduino Mini Pro, an ultrasonic sensor, a pref board, a vibrating motor, buzzers to detect obstacles and alert the user to them, red LEDs, switches, a jumper cable, a power bank, male and female header pins, an old, unused 3.3 volt mobile battery, some elastic, and stickers to turn the device into a band that users can wear. The device is wired in the manner described below. The Arduino's GND is connected to the buzzer, vibration motor, and LED's ground. Pin 5 of the Arduino is connected to the middle leg of the switch and the +ve of the LED. The first leg of the switch is connected to the +ve of the buzzer, while the third leg is connected to the +ve of the vibration motor. The wiring of the ultrasonic sensor is appropriate. The Arduino pins that are connected to the ultrasonic sensor pins are as follows: pin VCC is connected to the Arduino pin; pin GND is connected to the Arduino pin; pin Trig is connected to pin 12; and pin Echo is connected to pin 12. Here, the switch is used to choose the mode. (Vibrating or buzzer mode.) The pref board is first cut to a 5 X 3 cm size, and the female headers for the Arduino are soldered to the board. Following that, the buzzer is soldered. Next, solder the wires to the vibrating motor and attach it using the glue. After that, the LED is connected. After that, connect the switch. Attach the header pins for the battery input and ultrasonic sensors. The Arduino and ultrasonic sensor should then be connected to the board by soldering everything together. Additionally, attach the elastic band to each module. Use four jumper cables to connect the ultrasonic sensor to the board in order to create the hand module. Next, link this module to a 3.7 volt mobile battery. After that, fasten the elastic band. After connecting every component to the Arduino board, upload the code to each board and use a power bank to supply power to the remaining four modules. The US sensor functions as a transducer and transceiver when paired. When obstacles are in the way of the US waves that the transmitter is emitting, the waves bounce off of them and return to the transmitter. The receiver then receives the reflected wave. One transmitter and one receiver are combined to form the US sensor. The distance between the sensor and the obstruction is determined by measuring the time interval between sending and receiving the US signal. The equation for the distance calculation between the sensor and the object is as follows:  $D = (HPTW * SV)/2$  Where, D = Distance in cm. HPTW = High time of pulse width. SV = Sound velocity in cm/s. In order to assist the blind and make it simple for them to move around without difficulty, the goal is to use ultrasonic sensors to detect obstacles across a large angle. As a result, the sensor detects, the distance is computed, and the process of making the buzz sound audible to the user is executed. Consequently, in this manner Being a wearable technology, Third Eye for Blind will be especially useful for those who are blind or visually impaired, making travel and obstacle detection while walking much easier.



**Figure 7:** Model for Hand

## VI. OUR PROJECT

The project which is given below is the project which we have made in the pandemic time. This is the project which helps the blind people. In this we have use buzzer, Arduino, jumper wires, sensor and 9V battery. It is cheap and can be affordable. The cost we required to make this project is around 1200 RS. As shown in figure 8.



**Figure 8:** Project made by us

## VII. RESULT AND DECLARATION

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.

## VIII. 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.

## IX. REFERENCES

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