ALTERNATE EYES FOR BLIND

Submitted in partial fulfilment of the requirements for the degree of

Bachelor of Technology

in

CSE(IoT)

by

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November, 2022

DECLARATION

We hereby declare that the thesis entitled "**Alternate eyes for blind**" submitted by us (Jayasri Jallipalli, Gajula Padmatej, Sujith Reddy C),for the award of the degree of Bachelor of Technology in Programme to VIT is a record of bonafide work carried out by us under the supervision of **Prof.Dr.S.Jafar Ali Ibrahim.**

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Place: Vellore

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This is to certify that the thesis entitled "**Alternate eyes for blind**" submitted by Jayasri Jallipalli(20BCT0285);Gajula Padmatej(20BCT0208); Sujithreddy C(20BCT056), for the award of the degree of Bachelor of Technology in Programme, is a record of bonafide work carried out by him/her under my supervision during the period July 2022 – November 2022 , to per the VIT code of academic and research ethics.

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Date: 07-11-2022 **Signature of the Guide**

Internal Examiner **External Examiner**

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ACKNOWLEDGEMENTS

We express our wholehearted appreciation and gratitude to Professor "**Dr.S.Jafar Ali Ibrahim**," assistant professor, Vellore Institute of Technology, Vellore, for his advice, consent, encouragement, and unwavering supervision.

We would like to thank the Head of the Department, Computer Science and Engineering Department, Vellore Institute of Technology, Vellore. For their extremely valuable recommendations, crucial times, and meetings we had with them while working together.

We are also grateful to the lecturers of our department for their helpful cooperation throughout our studies.

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Executive Summary

According to the WHO, 39 million people worldwide are expected to be blind. In their daily lives, they face numerous challenges. For many years, those affected had to rely on the traditional white cane, which is useful but has several disadvantages. The main problem with dazed people is figuring out how to get from one place to another.

This project aims to help the visually impaired overcome their blindness by utilising other senses such as sound and touch. The framework also includes a buzzer to provide a warning sound and vibration signals. To warn the customer of impending problems, the project implements sound and vibration signals. This framework offers a low-cost, robust, compact, low-force-use, and strong solution for routes that require obvious quick reaction times.

The third eye for the blind is a technological advancement that combines several disciplines, including software engineering, hardware design, and science, to enable visually impaired individuals to see and explore the world with self-esteem by diagnosing nearby objects with ultrasonic waves and notifying the user with a beep ring or vibration. This technology has the potential to transform the lives of the blind. In this, an ultrasonic sensor is built into a module. The user can travel more efficiently and see nearby items by using this sensor-module. When an object is detected, this sensor alerts the user by beeping or vibrating in any area.

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List of Abbreviations

USB	-	Universal Serial Bus
GPIO	-	General Purpose Input Output
PCB	-	Printed Circuit Board

ABSTRACT:

According to WHO, 39 million individuals worldwide are predicted to be blind. They face numerous challenges in their daily lives. For many years, those affected have needed to rely on the traditional white cane, which is useful, but has a number of drawbacks.The primary challenge with dazed people is figuring out how to get everywhere they need to go. This project aims to help the visually handicapped overcome their lack of vision by leveraging other senses such as sound and touch. A buzzer is also included in the framework to provide a warning sound and vibration signals. The framework employs sound and vibration signals to warn the customer of impending problems. The recurrence of both the sound and vibration signals increases as the distance between the glove and the obstacle decreases. As a result, the framework aids in the facilitation of the poor's routing cycle. This framework provides a low-cost, robust, compact, low-force use, and strong solution for routes with obvious quick reaction times.

Keywords:

Blind person; Arduino Nano; Ultrasonic sensor(HC-SR04); Vibrating motor; Wearable device; Independent; Obstacle; Language.

1. INTRODUCTION

1.1 OBJECTIVE:

The WHO estimates that there are 39 million blind persons globally. They deal with a lot of hardship on a daily basis. The traditional white cane, however helpful, has numerous drawbacks, and has been used by those who are affected for a long time. Another option is to keep a dog as a pet, although this is very expensive. Therefore, the project's goal is to provide an affordable and more effective method of assisting visually impaired people to travel with more ease, quickness, and confidence.

1.2 MOTIVATION:

Vision is the most exquisite and significant gift that God has given to all of his creatures, notably humans. Unfortunately, some people are unable to appreciate the beauty of the world with their own eyes because they lack it. So the main idea behind this project is to provide virtual vision for blind people. The third eye for blind is a technological advancement that integrates several disciplines, including software engineering, hardware design, and science, and it allows visually impaired people to see and explore the world with confidence and independence by

detecting nearby objects with ultrasonic waves and alerting the user with a beep ring or vibration. This technology could be a game changer for the blind. An ultrasonic sensor is incorporated into a module in this. Using this sensor-module, the user can travel more efficiently and see close items. When it detects an object, this sensor warns the user by beeping or vibrating at any area. In this sense, it becomes a computerised gadget. As a result, the blind will benefit greatly from this technology, which will give them the confidence to roam freely.

1.3 BACKGROUND:

A third eye for the blind is a technological advancement that enables blind persons to navigate with confidence and speed by employing ultrasonic waves to identify surrounding impediments and alert the user with a buzzer sound or vibration. They just need to wear it as a bracelet or piece of clothing.

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

2. LITERATURE REVIEW:

Table 1: Existing systems

S.no	Title	Author	Year of publication	Description
1	Third Eye for Visually challenged Using Echolocation Technology	M. V. S. Arvitha, A. G. Biradar, and M. Chandana	2021	It is essentially an integrated framework with two ultrasonic sensors and two infrared sensors to detect obstacles in the way, stairs, and puddles of water. The sensors collect continuous or real-time data and transmit it to the Arduino UNO board for processing. After processing, the Arduino UNO board plays the message, which is regarded as a warning, through a headphone. A power bank powers the entire system.

				The main oddity of this development is that it is accessible to anyone
2	Design, Simulation, and Implementation of connected IoT for Disabled People	H. Hesham, L. Khalil, A. Hafez, and M. Hussein	2022	It is a connected framework in IoT-Healthcare for persons with disabilities, which can be n easily monitored and managed via a flexible application and coordinated wearable devices. The combination of the application and wearable technology will make it possible to record a variety of information about the patient's vitals, support the Alzheimer's community, and help those who are visually, verbally, and audibly impaired
3	Third Eye: An Eye for the Blind to Identify Objects Using Human-Powered Technology	L. Albraheem et al	2015	It is an application that uses accessibility capabilities in smart phones and a built-in camera, along with human resources, to provide descriptions of all the images or videos that visually impaired persons have taken. In reality, a lot of work goes into choosing the best technology that can be applied to the creation of the suggested application. In order to help blind persons, identify objects, a thorough assessment of assistive technology is being produced.
4	Electroactive elastomeric actuators for biomedical and bioinspired systems	F. Carpi, G. Frediani, and D. De Rossi,	2012	The article demonstrates how combining fluid-based hydrostatic transmission with dielectric elastomer actuation can be a useful way to create novel devices that enable biomedical and

				bioinspired systems that would be unattainable with existing technologies. They showed and discussed three examples of applications that our lab is currently working on.
5	Virtual-Blind-Road Following-Based Wearable Navigation Device for Blind People	Jinqiang Bai; Shiguo Lian; Zhaoxiang Liu; Kai Wang; Dijun Liu	2018	In this a navigation gadget is created. The basic parts of a navigation system are locating, wayfinding, route following, and obstacle avoiding modules, but it is still difficult to take obstacle avoiding into account during route following because the indoor environment is complicated, variable, and maybe filled with dynamic items. To solve this problem, they have used a novel method that simultaneously directs users to their objective and helps them avoid barriers by employing a dynamic subgoal selection mechanism. This plan is the main element of a comprehensive navigation system that is mounted on a set of wearable optical see-through glasses for the convenience of blind individuals on their everyday walks
6	Methodology to Build a Wearable System for Assisting Blind People in Purposeful Navigation	Andres A Diaz	2020	a wearable device with eyesight that helps the blind in navigational challenges in ambiguous indoor settings. The suggested system can recognize objects, barriers, and walkable areas of interest, including, among others, doors, chairs, stairs, and computers planning a

				route that enables the user to get to the others, and achieving goals safely (purposeful navigation). The device includes six modules, including one for floor segmentation, one for building a grid for occupancy, for avoiding obstacles, for identifying objects of interest, for route planning, and to provide the user with haptic feedback

3. PROJECT GOALS

The main goal is to develop a advanced wearable device for blind people that fixes all the issues with earlier models. There are many tools and technological advancements available today to help the blind and visually impaired navigate, but many of them are bulky and require extensive training to use. The key distinction of this invention is that it is accessible to everyone. It should greatly help the community when implemented on a big scale and with enhancements to the prototype. The project's goal is to provide an affordable and more effective method of assisting visually impaired people to travel with more ease, quickness, and confidence.

4. TECHNICAL SPECIFICATIONS

Hardware used:

Arduino nano: The Arduino is an electronic device that combines hardware and software to create an electronic Arduino-based project. Arduino is a type of microcontroller that has additional features such as [11] a USB connector and GPIO pins.

Fig 1 . Arduino Nano

2.Ultrasonic sensor (HC-SR04): The ultrasonic sensor is made up of three parts: a transistor receiver, a transceiver, and a transmitter. The transistor converts electrical signals into soundwaves, the receiver converts soundwaves from the obstacle into electrical signals, and the transceiver, which is generally the receiving item, does both the transistor and receiver job. It basically aids in measuring the distance to an obstacle by producing sound waves.

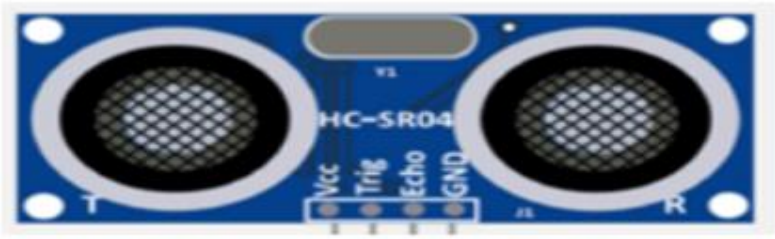

Fig 2. Ultrasonic sensor

3. Perf Board*:* Perf board, also known as DOT PCB, is a material used for formed of a thin, stiff sheet with suitable drilled at equal intervals of area. A drilled dot is preferable over a square area. It allows for the simple coupling of electronic circuits.

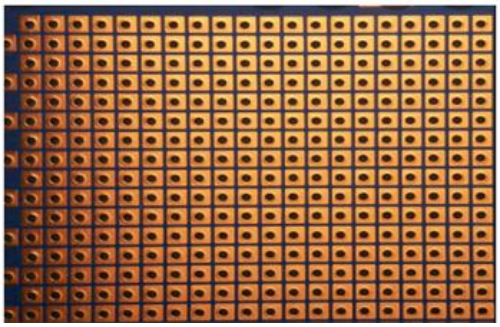

Fig3 . Perf Board

4 .*Buzzer:* A buzzer resembles an electrical instrument that sends a sound signal to a channel. A buzzer can be mechanical, electromechanical, or piezoelectric. It is a device that converts audio signals into sound signals

Fig 4. Buzzer

5. Battery: When a battery is supplying power, the positive terminal is referred to as the cathode, and the negative end is referred to as the anode. The negative terminal is the source of electrons that will flow to the positive terminal via an external electric circuit. When a battery is linked to an external electric load, a redox reaction occurs, converting high-energy reactants to lower-energy products and delivering the free-energy difference to the external circuit as electrical energy. Historically, the term "battery" referred to a device made up of numerous cells; however, the phrase has come to apply to devices made up of a single.

Software used:

Arduino software: Arduino UNO is one of the greatest programming software for all of the above-mentioned operations that complete the total project. The Arduino software is written in the C++ programming language, with some extra unique functions and methods added.

5. DESIGN APPROACH AND DETAILS

5.1 Design Approach

The Arduino nano is made to connect to the ultrasonic sensor. The input signal from the ultrasonic sensor is carried to Arduino which has some coding instructions to perform the next actions. The output of the Arduino is connected to a buzzer which helps the blind person recognize the obstacles near him or her. LED, battery and jump wires are included in the system design of the device. These jump wires help to connect various hardware components of the prototype like an ultrasonic sensor, buzzer and an LED.

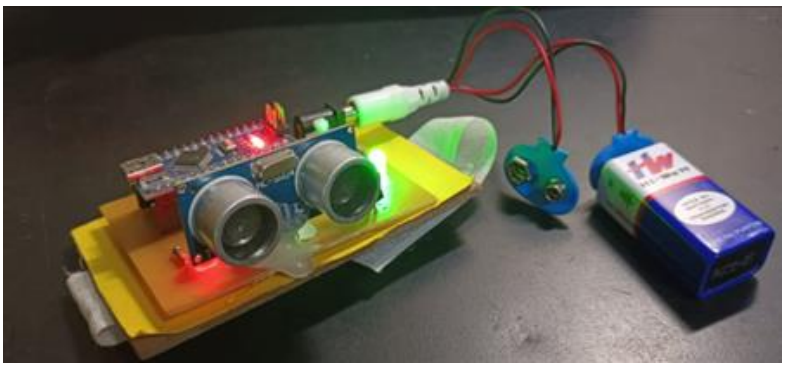

Fig 5. Prototype

5.2 Code:

```
#define button1 2 // this button use for only Alarm mode
#define button2 3 // this button use for Alarm & Vibrator mode
#define button3 4 // this button use for only Vibrator mode

#define buzzer 5 // this pin use for Alarm
#define motor  6 // this pin use for Vibrator Motor

#define echopin 7 // echo pin
#define trigpin 8 // Trigger pin

int Alarm=1, Vibrator=1;
int cm; // Duration used to calculate distance

void setup(){ // put your setup code here, to run once
Serial.begin(9600);// initialize serial communication at 9600 bits per second:

pinMode(button1, INPUT_PULLUP);
pinMode(button2, INPUT_PULLUP);
pinMode(button3, INPUT_PULLUP);

pinMode(buzzer, OUTPUT); //declare buzzer as output
pinMode(motor, OUTPUT); //declare vibrator Motor as output

pinMode(trigpin, OUTPUT); // declare ultrasonic sensor Echo pin as input
pinMode(echopin, INPUT);  // declare ultrasonic sensor Trigger pin as Output

delay(100);
}

void loop(){

if(digitalRead(button1)==0) Alarm=1, Vibrator=0; //only Alarm mode
```

```
if(digitalRead(button2)==0) Alarm=1, Vibrator=1; //Alarm & Vibrator mode
if(digitalRead(button3)==0) Alarm=0, Vibrator=1; //only Vibrator mode

// Write a pulse to the HC-SR04 Trigger Pin
digitalWrite(trigpin, LOW);
delayMicroseconds(2);
digitalWrite(trigpin, HIGH);
delayMicroseconds(10);

// Measure the response from the HC-SR04 Echo Pin
long ultra_time = pulseIn (echopin, HIGH);
  // Determine distance from duration
  // Use 343 metres per second as speed of sound
cm =  ultra_time / 29 / 2;

Serial.print("cm:");Serial.println(cm);

if(cm>=20 && cm<=100){
int d = map(cm, 20, 100, 20, 2000);
if(Alarm==1)digitalWrite(buzzer, HIGH);   // Turn on Buzzer
if(Vibrator==1)digitalWrite(motor, HIGH); // Turn on Vibrator
delay(100);
digitalWrite(buzzer, LOW); // Turn off Buzzer
digitalWrite(motor, LOW);  // Turn off Vibrator
delay(d);
}
if(cm<20){
if(Alarm==1)digitalWrite(buzzer, HIGH);   // Turn on Buzzer
if(Vibrator==1)digitalWrite(motor, HIGH); // Turn on Vibrator
}

if(cm>100){
digitalWrite(buzzer, LOW); // Turn off Buzzer
digitalWrite(motor, LOW);  // Turn off Vibrator
}
```

delay(10);

}

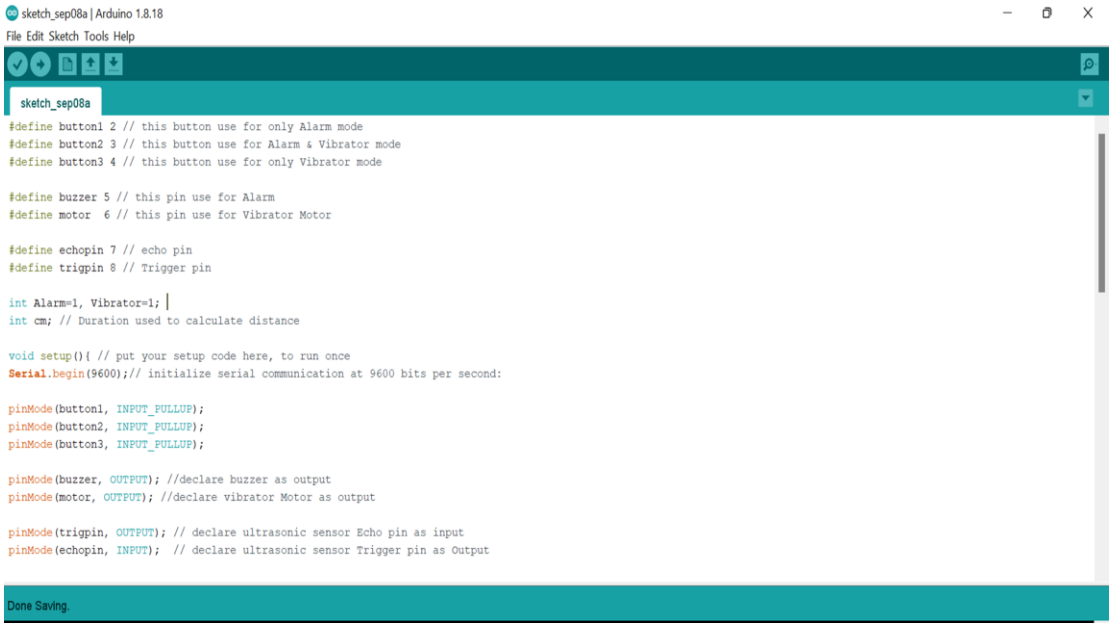

Fig 6a Demonstration of code

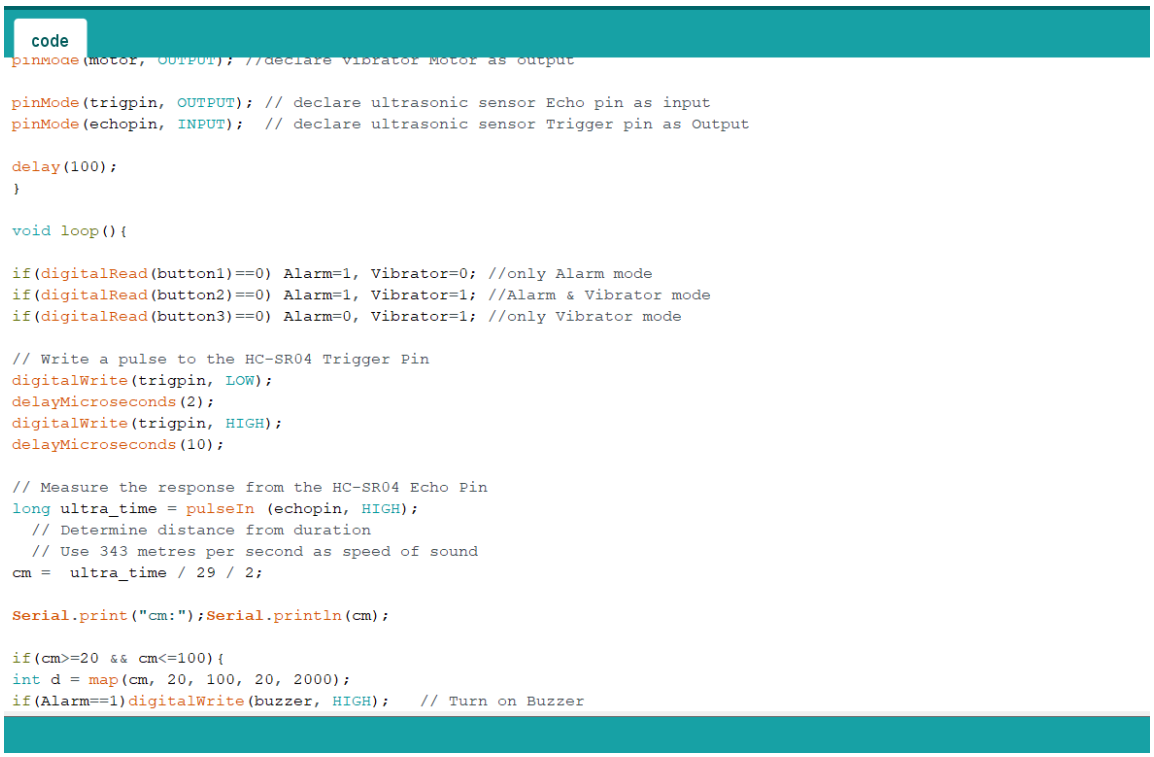

Fig 6b Demonstration of code

```
if(Alarm==1)digitalWrite(buzzer, HIGH);   // Turn on Buzzer
if(Vibrator==1)digitalWrite(motor, HIGH); // Turn on Vibrator
delay(100);
digitalWrite(buzzer, LOW); // Turn off Buzzer
digitalWrite(motor, LOW);  // Turn off Vibrator
delay(d);
}
if(cm<20){
if(Alarm==1)digitalWrite(buzzer, HIGH);   // Turn on Buzzer
if(Vibrator==1)digitalWrite(motor, HIGH); // Turn on Vibrator
}

if(cm>100){
digitalWrite(buzzer, LOW); // Turn off Buzzer
digitalWrite(motor, LOW);  // Turn off Vibrator
}

delay(10);
}
```

Fig 6c Demonstration of code

5.3 Standards:

We have tested this code using the Arduino IDE program

6. SYSTEM ARCHITECTURE

The Arduino nano is ready to connect with the ultrasonic sensor, and the input signal from the ultrasonic sensor is going to the Arduino, which has proper coding input that will perform the required or necessary actions, and the output from the Arduino goes to the buzzer, which helps the blind person identify the obstacle. The system architecture of the Arduino-based third eye of blind people also includes a led bulb, a battery, and jumper wires that allow different parts of the body. Among them, two for both shoulders, another two for both knees and one for the hand. Using the five ultrasonic sensors, blind people can detect the objects in a five-dimensional view around them and can easily travel anywhere. When the ultrasonic sensor detects an 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.

The Arduino Nano is prepared to connect to the ultrasonic sensor. The input signal from the ultrasonic sensor is sent to the Arduino, which has the appropriate coding input to carry out the necessary actions. The output of the Arduino is sent to the buzzer, which aids the blind person in recognizing the obstacle. A led light, a battery, and jumper wires are also included in the system design of the Arduino-based third eye of the blind.

Arduino to be connected to various hardware such as an ultrasonic sensor, a buzzer, a led, and so on.

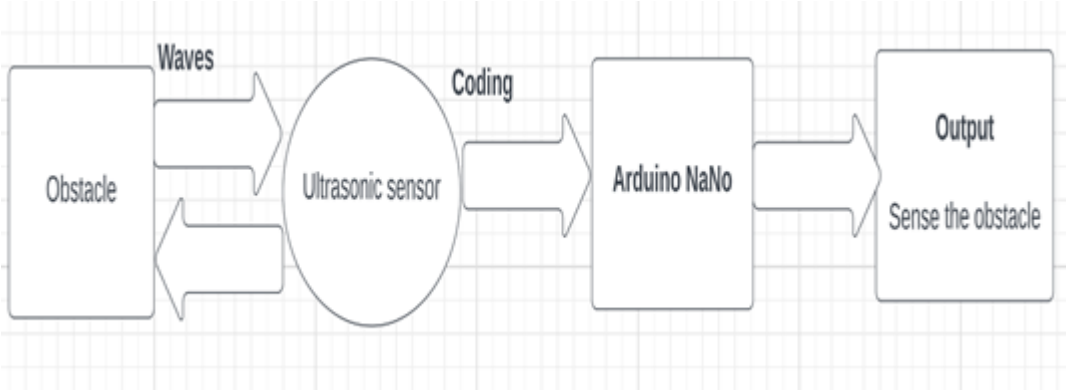

Fig 7. Architecture diagram

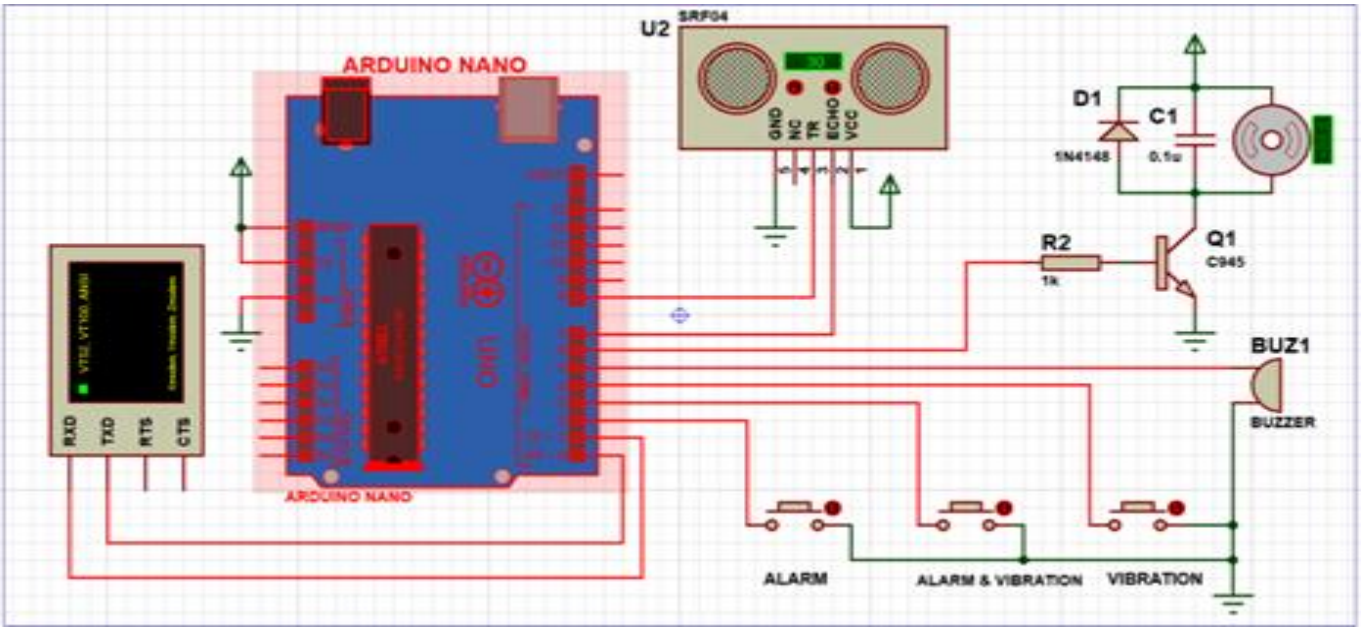

Fig 8. Simulated circuit

7. RESULTS AND DISCUSSIONS& COST ANALYSIS:

Results:

The Arduino Nano is interfaced with an ultrasonic sensor, which is tested individually. According to the person's age, the findings that are required for the suggested system are seen and recorded. Through the buzzer sound, an audio signal is activated to alert the user. The prototype changes the intensity of the audio output when it detects a potential objection. Overall, the proposed system can meet the needs of those with visual impairments

Table 2: Statistical Analysis

Statistical Analysis	Precision	Recall	Accuracy	F_Measure
Methodology to Build a Wearable System for Assisting Blind People in Purposeful Navigation, [Andrés Alejandro Diaz Toro, Sixto Enrique Campaña Bastidas et al]	91%	90%	94%	90.80%
Virtual-Blind-Road Following-Based Wearable Navigation Device for Blind People [Jinqiang Ba, Shiguo Lian et al]	92.30%	91.40%	92.10%	91.50%
Electroactive elastomeric actuators for biomedical and bioinspired systems [F. Carpi, G. Frediani, and D. De Rossi et al]	93%	91%	92.70%	91%

Third Eye: An Eye for the Blind to Identify Objects Using Human-Powered Technology [L. Albraheem et al]	92.00%	91.00%	95.00%	91.00%
Alternate Eyes for Blind [Our Proposed Research]	**97.10%**	**98.70%**	**96.50%**	**98.40%**

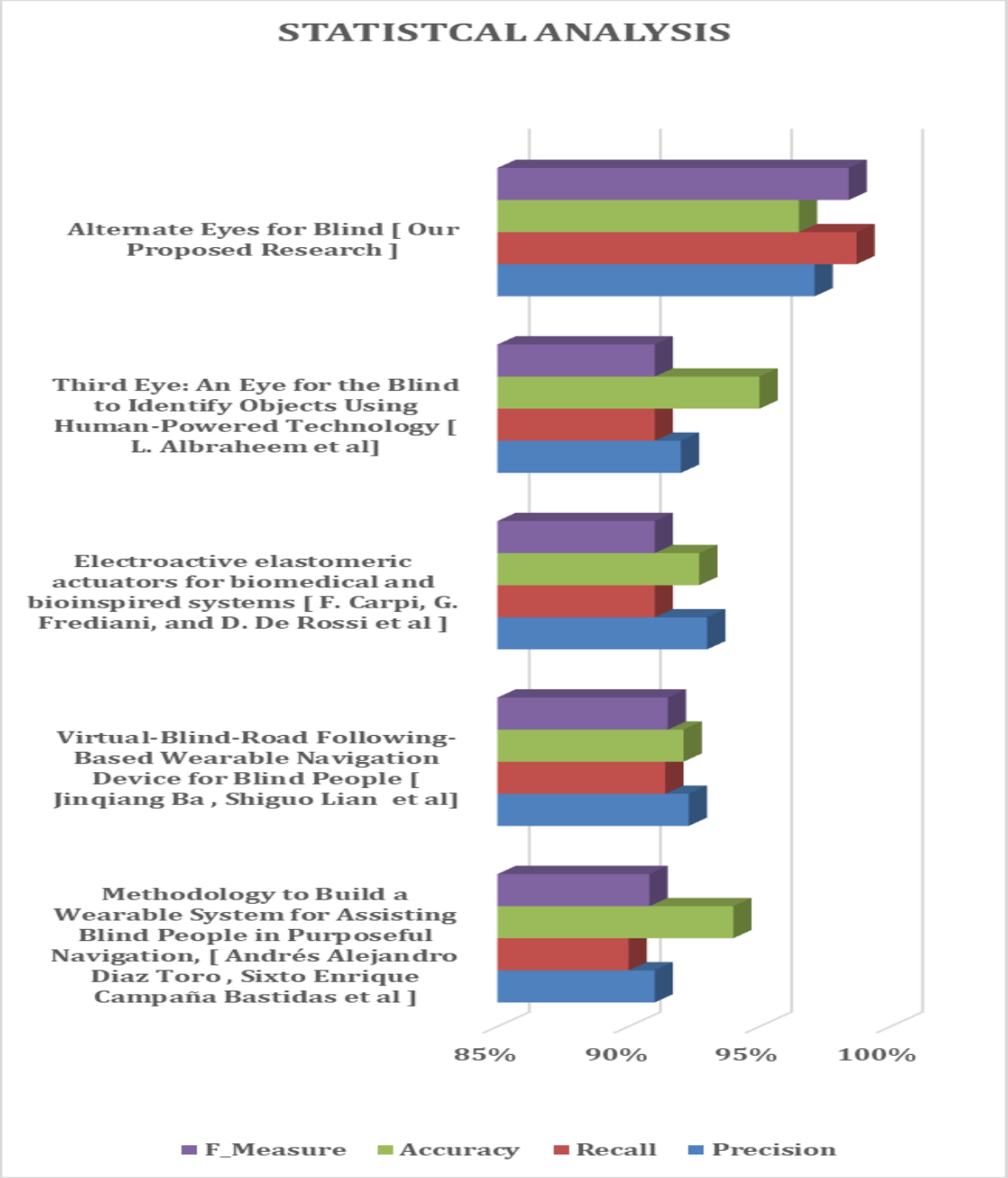

Fig 9. Statistical Analysis

COST ANALYSIS:

- **Arduino Nano** - ₹ 760
- **Perf board** - ₹ 170
- **Battery** - ₹ 20
- **Connecting wires** - ₹ 50

- **Ultra-sonic sensor** - ₹ 130

8. CONCLUSION:

As a result, the project that our team created completely explains the model and architecture of an Arduino-based third eye or additional vision for blind persons. An electronic guidance system with proper and simple usage guidance, easy configuration, and manageable hardware helps to provide the amazing properties so that it helps the needy blind people. Its simple architecture, effectiveness in use, affordability, portability, and ease of handling makes it a great device. Speaking of this project, it has a feature to measure object distance, which is a significant problem for blind people. As distance decreases, intensity of sound increases. With our given task guidance assuming it is made as exact as we were appearing in our examination paper that helps the visually impaired individuals to move toward any path without taking the third individual assistance it additionally makes somebody autonomous from the others and in the event that they have some work so they do without help from anyone else. Our undertaking is effectively eliminating the issue of existing route procedures like convey the stick with us while strolling, utilization of someone else while moving one spot to one more and a lot more issue was effectively settled by this task. This task, whenever utilized on a more extensive scale and conveyed to every one of the visually impaired individuals it truly has a greater effect to the general public also, the local area.

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ALTERNATE EYES FOR BLIND

--Manuscript Draft--

Manuscript Number:	TELER-D-22-00294
Full Title:	ALTERNATE EYES FOR BLIND
Article Type:	Full Length Article
Keywords:	- Wearables; Obstacle and Object detection; Vibration detection; Machine Learning techniques
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Abstract:	According to WHO, 39 million individuals worldwide are predicted to be blind. They face numerous challenges in their daily lives. The primary challenge with dazed people is figuring out how to get everywhere they need to go. This research aims to help the visually impaired to defeat their lack of vision by leveraging senses such as audio along with sense. The framework employs audio and signals of vibration to intimate the user regarding forthcoming problems. The intensity of vibration and intensity of audio increases as the distance between device and the obstacle decreases. This framework provides a low-cost, robust, compact, low-force use, and strong solution for routes with obvious quick reaction times.
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To complete your submission you must select a statement which best reflects the availability of your research data/code. IMPORTANT: this statement will be published alongside your article. If you have selected "Other", the explanation text will be published verbatim in your article (online and in the PDF). (If you have not shared data/code and wish to do so, you can still return to Attach Files. Sharing or referencing research data and code helps other researchers to evaluate your findings, and increases trust in your article. Find a list of supported data repositories in Author Resources, including the free-to-use multidisciplinary open Mendeley Data Repository.)	No data was used for the research described in the article.

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Prof. Dr. S. Jafar Ali Ibrahim B.Tech., M.Tech., PhD
Assistant Professor – Senior Grade 1
Department of IoT, School of Computer Science and Engineering

Thursday, November 10, 2022

To

Editor in Chief

Computers in Human Behavior (0747-5632)

Elsevier Publishers.

Sub: Submission of Manuscript - Reg

Dear Sir / Madam,

I am pleased to submit a manuscript (research article) titled "**ALTERNATE EYES FOR BLIND ~ advanced wearable for visually impaired people ~**" for possible publication in your Computers in Human Behavior journal. I want to undertake that the manuscript mentioned above has not been published elsewhere, accepted for publication elsewhere, or under editorial review for publication elsewhere. The submitted manuscript is a research article that discussed the issues of Blind people and their vision improvement using an IoT-enabled wearable device and also detects the obstacles using the wrist-type of the prototype model. Once the data is captured from the environment, it senses the object and notifies the blind people with haptic methods.

This paper is significant because it provides insight into the unique design aspect and creative model which is environment friendly and inexpensive user-friendly device which will resolve an important societal problem statement for Blind people. We choose this research problem because the entire world moving towards sustainable development with society. We believe that due to the interdisciplinary

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nature of this work, which brings together Healthcare Informatics, Environmental Engineering, the Internet of Things, Wearable Computing, and Machine Learning, Sustainable Development, the Computers in Human Behavior journal is an appropriate journal for its publication, knowing that it has a diverse readership. We sincerely hope that the article becomes an exciting and valuable addition to the library of theElsevier publications. We have no conflicts of interest to disclose.

Thank you for your consideration of this manuscript.

Kindly do the needful in this regard, sir.

Thanks, and Best Regards

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Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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ALTERNATE EYES FOR BLIND

~ advanced wearable for visually impaired people ~

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Abstract-*According to WHO, 39 million individuals worldwide are predicted to be blind. They face numerous challenges in their daily lives. The primary challenge with dazed people is figuring out how to get everywhere they need to go. This research aims to help the visually impaired to defeat their lack of vision by leveraging senses such as audio along with sense. The framework employs audio and signals of vibration to intimate the user regarding forthcoming problems. The intensity of vibration and intensity of audio increases as the distance between device and the obstacle decreases. This framework provides a low-cost, robust, compact, low-force use, and strong solution for routes with obvious quick reaction times.*

Keywords- Wearables, Obstacle and Object detection, Vibration detection, Machine Learning techniques

INTRODUCTION

For many years, visually impaired have needed to rely on the traditional white cane, which is useful, but has a number of drawbacks. There are many smart technologies and instruments available for blind people for navigation these recent days, but maximum of devices are too much expensive, difficult for usage and transport and need a lot of training to use them. The main feature of this innovation is that the device is inexpensive to everyone and cost less than $25 (1500INR).No device in market is made that can be worn like watch, inexpensive and easy to use it.

This prototype will greatly benefit to community if this innovation is implemented in big scale with some minute changes to prototype.. The third eye for dazzle is a wearable device that can let outwardly disabled people move around on their own in an indoor environment. People who are visually challenged can go from one location to another unaided. This device is very beneficial when the individual has to walk around a house or some indoor areas alone the distance of the obstacle in this device is determined by an Ultrasonic module and a [13] Microcontroller. The obstacle distance is measured and notified to the outwardly obstructed individual in the form of buzzer and sound. Using this, they can move in different directions and avoid collisions. The eventual result of the job would be glove with a wearable band attached to the gloves, with each segment connected on a PCB that functions with extreme precision and consistency

ALTERNATE EYES FOR BLIND

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II. MOTIVATION

Vision is the most exquisite and significant gift that God has given to all of his creatures, notably humans. Unfortunately, some people are unable to appreciate the beauty of the world with their own eyes because they lack it. So, the main idea behind this project is to provide [19] virtual vision for blind people. The third eye for blind is a technological advancement that integrates several disciplines, including software engineering, hardware design, and science, and it allows visually impaired people to see and explore the world with confidence and independence by detecting nearby objects with [15] ultrasonic waves and alerting the user with a beep ring or vibration.

This technology could be a game changer for the blind. An ultrasonic sensor is incorporated into a module in this. Using this [12] sensor-module, the user can travel more

efficiently and see close items. When it detects an object, this sensor warns the user by beeping or vibrating at any area. In this sense, it becomes a computerized gadget. As a result, the blind will benefit greatly from this technology, which will give them the confidence to roam freely.

III.LITERATURE REVIEW

MVS Arvitha et al suggested system [1] is a specialized invention that, to some level, solves the concerns that are present in previously present methodologies. It is an integrated design with two ultrasonic sensors and two infrared sensors to recognize objects in the way, staircase, and water-pits. Sensors will gather data frequently and transfer it to Arduino UNO board for processing of data. Then after processing is done Arduino UNO board plays message which is a type of notification via a headphone. Whole source of energy for entire system is a power bank. Main advantage of this technology is that it is accessible to everyone. The technology which is existing can't be worn as easily as headset. It enables them to simply move anyplace by assisting them in identifying any obstacles in their path. Water and impediments can be found with the Third Eye for Visually impaired.

H Hesham et al. proposed system [2] is a connected framework in IoT-Healthcare for persons with disabilities, which can be easily observed and run via a flexible application and coordinated wearable devices. The combination of the application and wearable technology will make it possible to record a variety of information about the patient's vitals, supports the Alzheimer's community, and help those who are visually, verbally, and audibly impaired. Using an [14] Atmega 32 processor, Google Firebase as a database, and Android as the operating system, a proof-of-concept solution was shown. Initial findings indicate the system's potential to assist those with disabilities. Future research will make this contribution applicable to actual patient cases with particular settings.

L. Albraheem et al proposed approach [3] in this study is to create an application that uses accessibility capabilities in smart phones and a built-in camera, along with human resources, to provide descriptions of all the images or videos that visually impaired persons have taken. In reality, a lot of work goes into choosing the best technology that can be applied to the creation of the suggested application. In order to help blind persons, identify objects, a thorough assessment of assistive technology is being produced. The previously written study can be used as a springboard for further investigation into the creation of effective assistive software that can support visually impaired persons in recognizing nearby things.

F. Carpi et al [4] discussed about set of electroactive polymers for electro mechanical transduction, also known as electro-mechanically active polymers, are materials that respond mechanically to an electrical stimulus while also being light in weight, mechanically compliant, compact in size, simple in structure, acoustically silent in operation, and inexpensive. The article demonstrates how combining fluid-based hydrostatic transmission with dielectric elastomer actuation can be a useful way to create novel devices that enable biomedical and bioinspired systems that would be unattainable with existing technologies. They showed and discussed three examples of applications that our lab is currently working on.

Jinqiang Bai et al proposed system [5] a navigation gadget is given. The basic parts of a navigation system are locating, wayfinding, route following, and obstacle avoiding modules, but it is still difficult to take

obstacle avoiding into account during route following because the indoor environment is complicated, variable, and maybe filled with dynamic items. To solve this problem, they have used a novel method that simultaneously directs users to their objective and helps them avoid barriers by employing a dynamic subgoal selection mechanism. This plan is the main element of a comprehensive navigation system that is mounted on a set of wearable optical see-through glasses for the convenience of blind individuals on their everyday walks.The proposed navigation tool has been put to the test on a variety of people and has shown to be successful at activities requiring indoor navigation.

Andres A Diaz et al proposed system [6] construction process for a wearable device with eyesight that helps the blind in navigational challenges in ambiguous indoor settings. The suggested system can recognize objects, barriers, and walkable areas of interest, including, among others, doors, chairs, stairs, and computers planning a route that enables the user to get to the others, and achieving goals safely (purposeful navigation). The device includes six modules, including one for floor segmentation, one for building a grid for occupancy, for avoiding obstacles, for identifying objects of interest, for route planning, and to provide the user with haptic feedback

IV. PROPOSED SYSTEM

This paper's main objective is to use [9] Arduino Nano to help the visually impaired people walk without constraints. For this, Arduino programming is employed. Ultrasonic sensor has also been used to sense the signals. Velcro tape has been used to make it a band (i.e., wearable).

Buzzer has been employed to alarm or intimate the user about any obstacle near him. Additionally, as the distance between obstacle and user decreases intensity of buzzer increases

A. Hardware Components

There are various components which helps to make it complete.

Components Used

- Arduino Nano
- Ultrasonic Sensor (HC-SR04)
- Battery
- Switches
- Hot Glue
- LED Light (green and red)
- Pref Board
- Buzzer sound
- Male Female header pins
- Velcro tape

1.Arduino nano: Arduino is a open source electronic device platform. It is a type of microcontroller with attributes including [11] GPIO pins and a USB connector.

Fig 2:Arduino nano

2.Ultrasonic sensor (HC-SR04):

The ultrasonic sensor is made up:

Transistor -- The transistor converts electrical signals into soundwaves

Receiver – The receiver converts soundwaves from the obstacle into electrical signals

Transceiver – The transceiver, which is generally the receiving item, does both the transistor and receiver job.

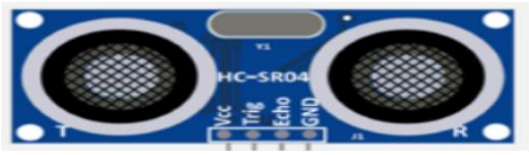


Fig 3: Ultrasonic sensor

3. Perf Board: Perf board, also known as DOT PCB, is a material used for formed of a thin, stiff sheet with suitable drilled at equal intervals of area. A drilled dot is preferable over a square area. It allows for the simple coupling of electronic circuits.

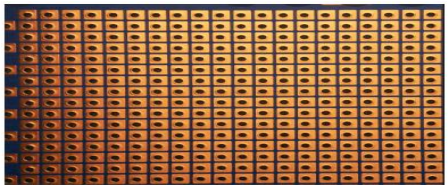


Fig 4: Perf Board

4. Buzzer. It converts audio signals to sound signals. Buzzer can be mechanical, electromechanical or [17] piezoelectric

Fig 5: Buzzer

5. Battery: A battery is the power source of our prototype. In battery chemical energy is converted to electric energy by means of electrochemical oxidation. Positive terminal is cathode and negative terminal is referred as anode. In our prototype we use HW battery.

Fig 6: Battery

6*. Arduino software:* Arduino UNO is one of the programming software that we used for the project. Software is written in C++ programming language with some added unique functions.

V. SYSTEM ARCHITECTURE

The [18] Arduino nano is made to connect to the ultrasonic sensor. The input signal from the ultrasonic sensor is carried to Arduino which has some coding instructions to perform the next actions. the output of Arduino is connected to a buzzer which helps the blind person recognize the obstacles near him or her. LED, battery and jump wires are included in the system design of the device. These jump wires helps to connect various hardware components of the prototype like an ultrasonic sensor, buzzer and an LED.

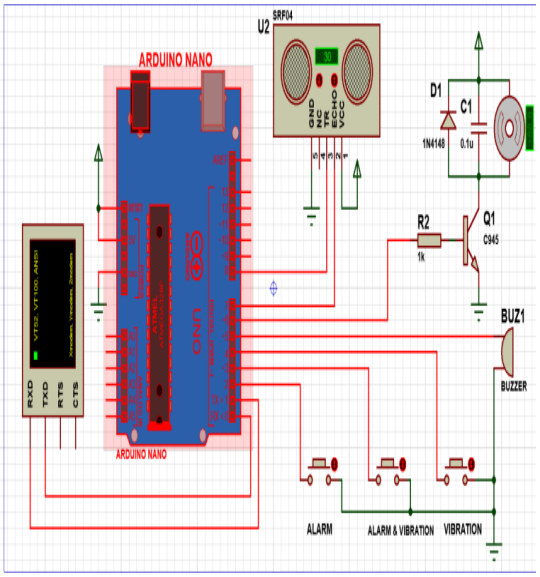


Fig 6: Simulated circuit

VI. WORKING PRINCIPLE

Our whole project is designed with ultra-sonic sensors. Five prototypes are made which are connected to different parts of the body such as 2 for shoulders, 2 for knees and 1 for hand. Visually impaired people can use our device for moving around and to detect objects in five-dimensional environment. When the person wearing device nears any obstacle. He/she is notified by vibrations and sound beeps.

The ultrasonic sensor includes a transmitter, receiver and circuit board. Transmitter sends out a ultra-sonic wave of 40 kilo hertz. Pulse is reflected by surrounding objects and received by microphones i.e receiver on the sensors. Then the buzzer is turned on and beep sound will be started along with vibration. As the distance between obstacle and device decrease intensity of sound increase.

VII. RESULTS & DISCUSSIONS

The [10] Arduino Nano is interfaced with an ultrasonic sensor, which is tested individually. According to the person's age, the findings that are required for the suggested system are seen and recorded. Through the buzzer sound, an audio signal is activated to alert the user. The prototype changes the intensity of the audio output when it detects a potential objection. Overall, the proposed system can meet the
needs of those with visual impairments.

The third eye for blind is a technological advancement that integrates several disciplines, including software engineering, hardware design, and science, and it allows visually impaired people to see and explore the world with confidence and independence

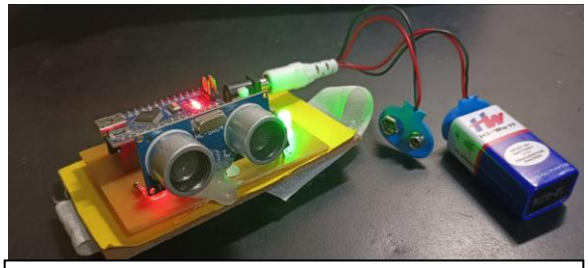
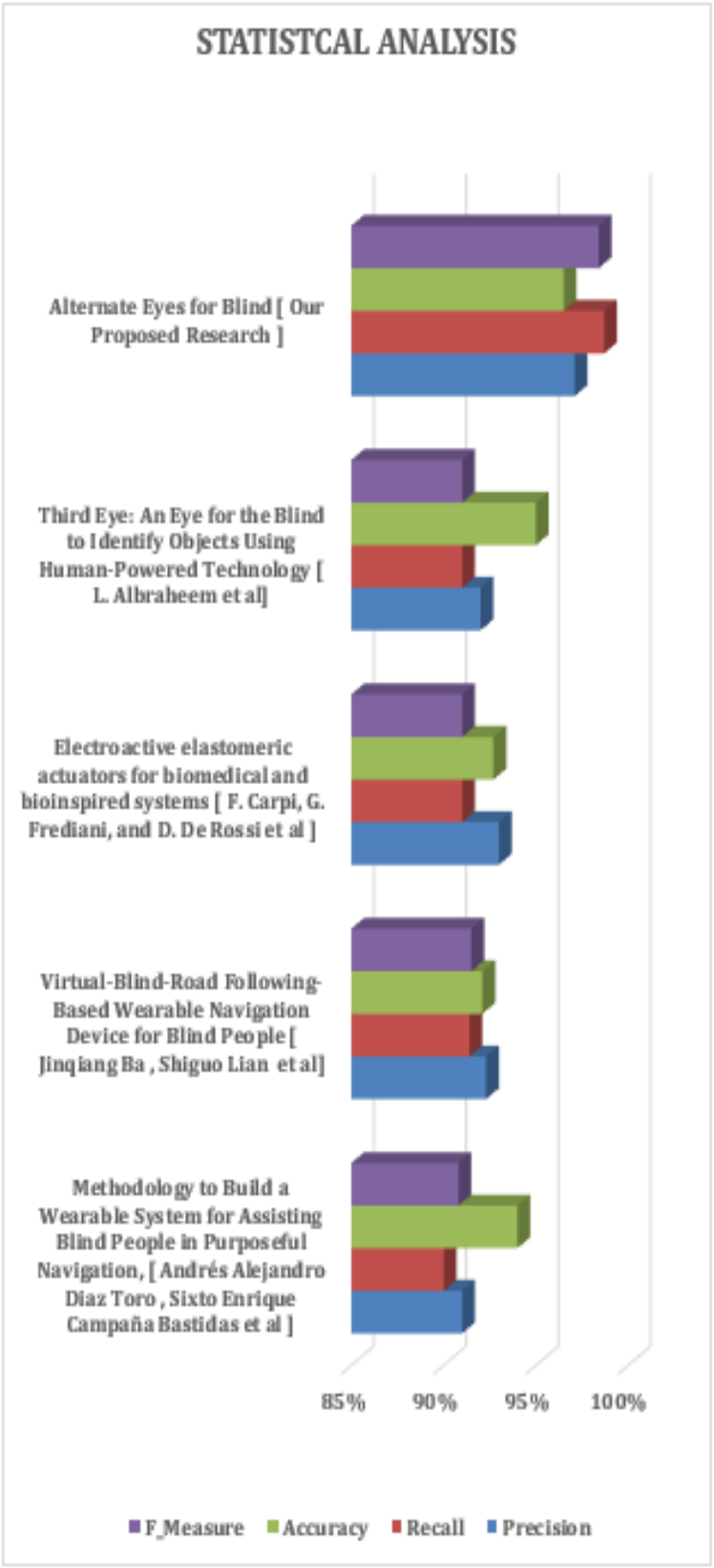


Fig 7: Our implementation

VIII. STATISTICAL ANALYSIS

Statistical Analysis	Precision	Recall	Accuracy	F_Measure
Methodology- to Build - Wearable System for Assisting Blind-People in Purposeful-Navigation, [Andrés Alejandro Diaz Toro, Sixto Enrique Campaña Bastidas et al]	91%	90%	94%	90.80%
Virtual-Blind-Road Following-Based Wearable Navigation Device for Blind People [Jinqiang Ba, Shiguo Lian et al]	92.30%	91.40%	92.10%	91.50%
Electroactive elastomeric actuators for biomedical a-bioinspired systems [F. Carpi, G. Frediani, and D. De Rossi et al]	93.00%	91.00%	92.70%	91.00%
Third Eye: An Eye for the-Blind to Identify Objects Using Human-Powered Technology [L. Albraheem et al]	92.00%	91.00%	95.00%	91.00%
Alternate Eyes for Blind [Our Proposed Research]	**97.10%**	**98.70%**	**96.50%**	**98.40%**



IX. CONCLUSION

As a result, the project that our team created completely explains the model and architecture of an Arduino-based third eye or additional vision for blind persons. An electronic guidance system with proper and simple usage guidance, easy configuration, and manageable hardware helps to provide the amazing properties so that it helps the needy blind people. Its simple architecture, effectiveness in use, affordability, portability, and ease of handling makes it a great device. Speaking of this project, it has a feature to measure object distance, which is a significant problem for blind people. As distance decreases, intensity of sound increases. With our given task guidance assuming it is made as exact as we were appearing in our examination paper that helps the visually impaired individuals to move toward any path without taking the third individual assistance it additionally makes somebody autonomous from the others and in the event that they have some work so they do without help from anyone else. Our undertaking is effectively eliminating the issue of existing route procedures like convey the stick with us while strolling, utilization of someone else while moving one spot to one more and a lot more issue was effectively settled by this task. This task, whenever utilized on a more extensive scale and conveyed to every one of the visually impaired individuals it truly has a greater effect to the general public also, the local area.

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ALTERNATE EYES FOR BLIND

~ advanced wearable for visually impaired people ~

Abstract-*According to WHO, 39 million individuals worldwide are predicted to be blind. They face numerous challenges in their daily lives. The primary challenge with dazed people is figuring out how to get everywhere they need to go. This research aims to help the visually impaired to defeat their lack of vision by leveraging senses such as audio along with sense. The framework employs audio and signals of vibration to intimate the user regarding forthcoming problems. The intensity of vibration and intensity of audio increases as the distance between device and the obstacle decreases. This framework provides a low-cost, robust, compact, low-force use, and strong solution for routes with obvious quick reaction times.*

Keywords- Wearables, Obstacle and Object detection, Vibration detection, Machine Learning techniques