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(Wani) Institute of Management
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"Arduino Based Third Eye for blind people"

Submitted to the

Savitribai Phule Pune University

In partial fulfillment for the award of the Degree of

Bachelor of Engineering

in

Electronics & Telecommunication

By

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CERTIFICATE

This is to certify that the project-based learning report entitled **"Arduino Based Third Eye for blind people"** is being submitted by **Gayatri, Swaroop, Aniket, Maheshwari, RollNo:20,31,33,35 Division : A** is a record of bonafide work carried out by us under the supervision and guidance of **MrR.K.Patil** in partial fulfillment of the requirement for S**E(E&TC) 2019 course** of Savitribai Phule Pune University,Pune in the academic year2022-23.

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I would like to acknowledge the open-source community and the Arduino platform, which provided the necessary tools and resources to realize this project. The collaborative nature of the Arduino community has been instrumental in fostering innovation and enabling developers to create impactful solutions.

Thank you.

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ABSTRACT

Arduino based third eye or extra vision for blind people have a project which include both hardware and the software work and it helps the person to recognize the object by the help of ultrasonic waves which comes from ultrasonic sensor with a vibration which is generated bythe buzzer. This Project is influenced by the Stick which is used by the blind people while walking for long term carry the stick is measure issue for weak people. So, this is the wearable invention for the weak and blind people they don't need to carrying anything in hand while walking they should only wear our invention and used to get walking easily. The Arduino is a software device which include. coding as a software function and Ultrasonic sensor, buzzer, Battery and more things as a hardware function, Ultrasonic sensor has a workto recognize the object near them and providing the signal via buzzer to the user which help the person to reach properly at their destination. Main Term: Arduino Uno module, Vibration,Ultrasonic sense

Chapter-01

1.INTRODUCTION

1.1 Introduction to project :

Arduino Bases third eye or extra vision for blind people have an instrument which is use to navigate the object while walking. This technology is the first hand, cap, dress wearable technology of blind people which try to solve all the problem while walking inside the house or somewhere indoor the object detection work is done by the ultrasonic sensor and the Arduino where we program for sensor and also buzzer vibration helps to walk freely without colliding. Generally, this project is wearable with the help of Gloves, rubber band etc. and PCB materials helps to build all the hardware object in it ,PCB helps to build good connection between parts, and the main part of this instrument is it is very cheap in cost and easy to carrys o it will drastically benefit the community.

SUPPORTSYSTEM

The support system helps with the effective and proper obstacle detection around gadget which covert the large area of detection.
There are various components which helps to make it complete.

1. Arduino Uno R3
2. Ultrasonicsensor
3. Buzzer
4. VibratorMotor
5. Battery
6. JumperWires
7. Stick

1. Arduino Uno

Figure 1: Arduino UNO

Is a microcontroller board ,developed by Arduino.cc ,based on the Atmega328 microcontroller and is marked as the first Arduino board developed (UNO means "one" in Italian).

- The software used for writing, compiling & uploading code to Arduino boards is called arduinouno (Integrated Development Environment), which is free to download from Arduino Official Site.

1. Ultrasonic Sensor:

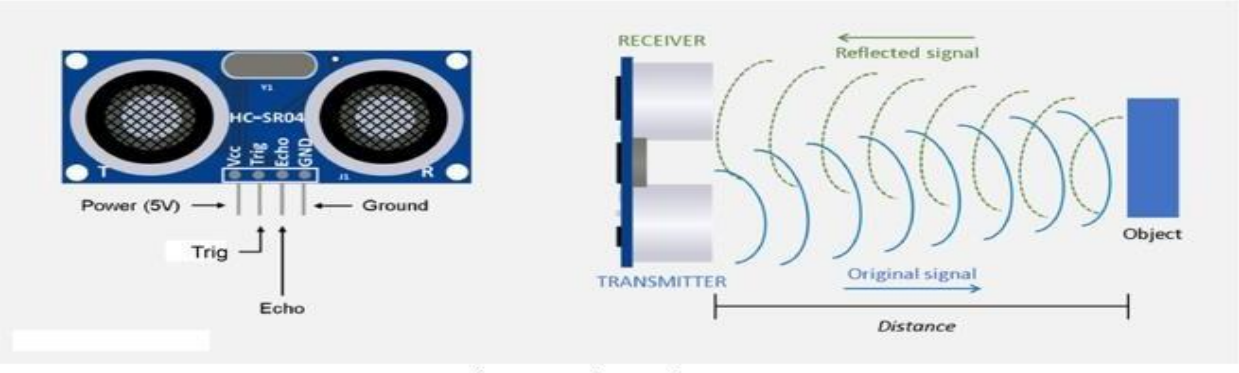


Figure2: Ultrasonic Sensor

The Ultrasonic sensor is made up of three component Transistor Receiver, Transceiver. The transistor takes

electronic signal to give sound waves, receiver convert sound waves which will comes from the obstacle into electrical signal and transceiver which is generally receiver object do both the transistor and receiver work. Basically, it helps to measure the distance of an obstacle by emitting sound waves

1. Buzzer:

Figure3 : Buzzer

A buzzer is look like an electronics instrument which create sound signal to the channel, buzzer can be of any type mechanical, electromechanical or piezoelectric. It is a sound creating device which convert audio signal into sound signal.

2. Vibrator Motor:

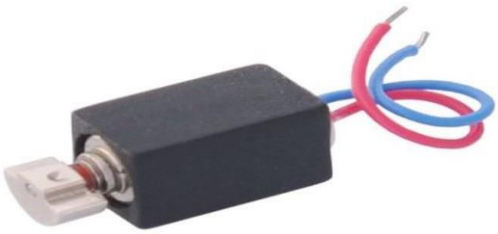


Figure 4:Vibrator Motor

This tiny DC motor produces vibrations by spinning an eccentric shaft atover 10,000 RPM when powered at 3 V. Motors like this are commonly found in cell phones and other devices

that use vibration for tactile feedback, and its small size (11.6 × 4.6 × 4.8 mm) and light weight (0.8 g) make it easy to integrate into systems with tight space constraints. The motor has1.5″ leads and is encased in a removable rubber sleeve that give it flat surfaces for mounting and prevents it from chattering against whatever it is mounted to. It is intended for operation around 3V(2.4Vto3.5Vrecommended),and polarity is not important.

1.1.2 Motivation behind project topic:

1.1.2.1 Blindness is a challenging condition that affects millions of people worldwide, and it can severely limit their ability to perform daily tasks independently.

1.1.2.2 Arduino- based third eye for blind people is to provide them with a tool that can enhance their ability to navigate their environment and improve their overall quality of life.

1.1.3 Aim:

1.1.3.1 The aim of an Arduino-based third eye for blind people is to provide a low-cost, portable, and reliable device that can help visually impaired individuals navigate their surroundings with greater independence and safety.

1.1.4 Objective of the work:

1. Tocreateawearabledevicethatislightweightandcomfortableforvisuallyimpairedindividualsto wearforextendedperiods of time.

2. To design a device that can accurately detect obstacles in the user's path using ultrasonic sensors.

3. To provide haptic feedback to the user through a series of vibrations that correspond to the distance of the detected obstacle.

4. Toincorporateanaudibletonethatcorrespondstothedistanceofthedetectedobstacle,providing additional feedback to the user.

5. To develop a user-friendly interface for adjusting the sensitivity of the sensors and the intensity of the haptic feedback and audible tones.

6. To implement are chargeable battery system hat provides extended usage time and easy recharging.

7. To ensure the device is affordable and accessible for visually impaired individuals in developing countries.

8. To test and refine the device in collaboration with visually impaired individuals to ensure it meets their needs and expectations.

9. To document the project and share the design ,code ,and instructions with the open-source community to promote accessibility and innovation in assistive technology.

1.2Purpose of the project:

The purpose behind the Arduino-based Third Eye for Blind People project is to develop an affordable and accessible wearable device that can help visually impaired individuals navigate their surroundings more effectively. The device uses ultrasonic sensors to detect obstacles in the user's path and provides haptic feedback and audible to nest alert the user to the presence of these obstacles.

The project aims to address the challenges faced by visually impaired individuals in navigating their environments, particularly in crowded or un familiar settings. By providing real-time feedback about obstacles in the user's path, the device can improve the user's safety and confidence when traveling independently

1.3Existing System and Disadvantages:

- The existing system of the project consists of an ultrasonic sensor, a buzzer, and a vibrating motor connected to an Arduino board. The ultrasonic sensor detects obstacles in the user's path and sends the data to the Arduino board. The board then activates the buzzer and vibrating motor to alert the user to the obstacle's presence and distance.
- One of the main disadvantages of the existing system is that it relies solely on the ultrasonic sensor to detect obstacles. This means that the device may not be able to detect certain types of obstacles, such as clear glass doors or low-hanging branches. Additionally, the range of the ultrasonic sensor may be limited, making it less effective e in detecting obstacles at longer distances.
- Another disadvantage of the existing system is that it may not provide enough information about the obstacles to the user. The device only provides feedback on the presence and distance of the obstacle but does not provide any information on the obstacle's shape or size. This may make it difficult for users to navigate around certainty of obstacles.
- Finally, the existing system may be too cumbersome or uncomfortable for some users to wear. The device is currently designed to be worn on the user's head, which maybe uncomfortable or impractical for some users.
- Overall, while the Arduino-based Third Eye for Blind People project is a promising assistive technology, there are still some limitations and disadvantages that need to be addressed in order to make the device more effective and practical for everyday use.

1.4 Proposed System with Features :

A proposed system for the Arduino-based Third Eye for Blind People project could incorporate additional features to address the limitations of the existing system. Some of the potential features that could be included in the proposed system are:

1. Multiple sensors: To overcome the limitations of relying solely on an ultrasonic sensor, the proposed system could incorporate additional sensors such as infrared or radar sensors. This would help the device detect a wider range of obstacles, including transparent or reflective objects.

2. Object recognition: To provide more information about the obstacles detected, the proposed system could incorporate object recognition technology. This would allow the device to identify the shape and size of the obstacle and provide more detailed feedback to the user.

Chapter – 02

2. LITERATURE SURVEY

Sr no	Title of the paper	Description	Author
1.	Design and Implementation of a Portable Assistive Device for Visually Impaired People"	His research paper presents the design and implementation of a portable assistive device based on Arduino that helps visually impaired people navigate indoor and outdoor environments.	By C.M. Fariasetal.
2	"Smart Assistance Device for Visually Impaired People"	his article describes the development of a smart assistance device using Arduino that assists visually impaired people in detecting obstacles and navigating their surroundings.	By N.U.Khanetal.
3	"Design and Implementation of an Obstacle Detection and Avoidance System for the Blind"	His research paper presents the design and implementation of an obstacle detection and avoidance system for the blind that uses Arduino	By D. D.Daramola etal.
4	"Development of a Low-Cost Obstacle Detection System for Visually Impaired People	This article describes the development of a low-cost obstacle detection system using Arduino for visually impaired people.	By A.R.Khanetal.
5	Arduino-based Smart Cane for the Blind	This research paper presents the development of an Arduino-based smart cane for the blind that helps them navigate and avoid obstacles.	by S. S. Sutaretal
6	Smart walking stick or visually impaired people.	In this paper they have design a smart stick for blind people in which they have use different sensors like temperature sensor and humidity sensors.	Dada Emmanuel Gbenga Arhyel Ibrahim Shani

			Adebimpe LateefAde kunle.
7	"Assistive Technology for the Blind and Visually Impaired	This article provides an overview of various assistive technologies available for blind and visually impaired people	by J. A.Glazierand S. S. Shaikh

Chapter - 03

3. SYSTEM REQUIREMENTS SPECIFICATIONS

The Arduino-based Third Eye for Blind People project system requirements specification outlines the functional and non-functional requirements for the proposed system. The following is a list of some of the key requirements that should be included in the specification:

3.1 Functional requirements:

Obstacle detection: The device must be able to detect obstacles in the user's path and provide feedback to the user.

Object recognition: The device should be able to recognize the shape and size of the obstacle and provide more detailed feedback to the user.

Battery life: The device should have a long battery life to ensure that it can be used for extended periods of time.

3.2 Non-functional requirements:

Accuracy: The device must be accurate in detecting obstacles and providing feedback to the user.

Reliability: The device must be reliable and function consistently under different environmental conditions.

Usability: The device must be easy to use and operate for visually impaired individuals.
Comfort: The device must be comfortable to wear for extended periods of time.
Durability: The device must be durable and able to withstand daily wear and tear.

~ The Arduino-based Third Eye for Blind People is a project aimed at helping visually impaired individuals navigate their surroundings using ultrasonic sensors and a vibrational

feedback system. The project can be divided into two main parts: hardware and software.

3.3 Hardware Requirements:

- Arduino board (such as Arduino UNO or Nano)
- Ultrasonic sensors(suchasHC-SR04)
- Vibrating motors(such as in vibration motors)
- Battery(such as 9V battery or power bank)

3.4 Software Requirements:

Arduino IDE(Integrated Development Environment)

Thinker CAD for designing and simulating the hardware layout and components

The software is responsible for controlling the ultrasonic sensors and the vibrating motors. It uses the ultrasonic sensors to detect objects in the environment and then sends feedback to the user via the vibrating motors. The Arduino board acts as the central processing unit and is responsible for executing the software.

To get started with this project, you can use the Thinker CAD software to design and simulate the hardware layout and components. This will help you to visualize the final product and make necessary changes before you begin prototyping. Once you have the design ready, you can begin assembling the hardware by connecting the ultrasonic sensors and the vibrating motors to the Arduino board.

Finally, you can use the Arduino IDE to upload the software code to the board and test the system. With the completed hardware and software, the device can be used by a visually impaired individual to detect objects in their environment and receive feedback via vibrations to navigate safely.

Chapter – 04

4. SYSTEMDESIGN

4.1 System Block Diagram:

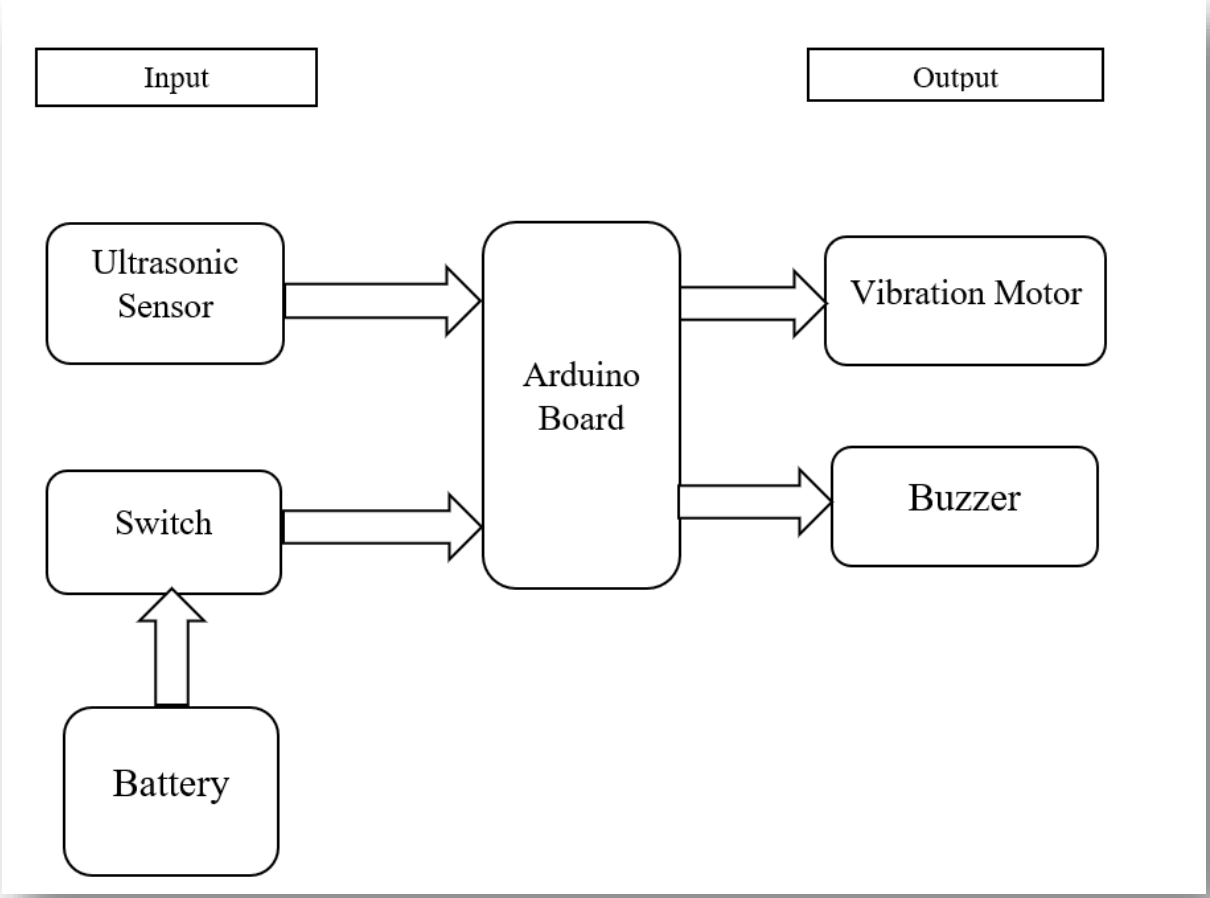


Figure 5 : Block diagram of Arduino based third eye project

4.2 Simulation Procedure & Schematic Photographs:

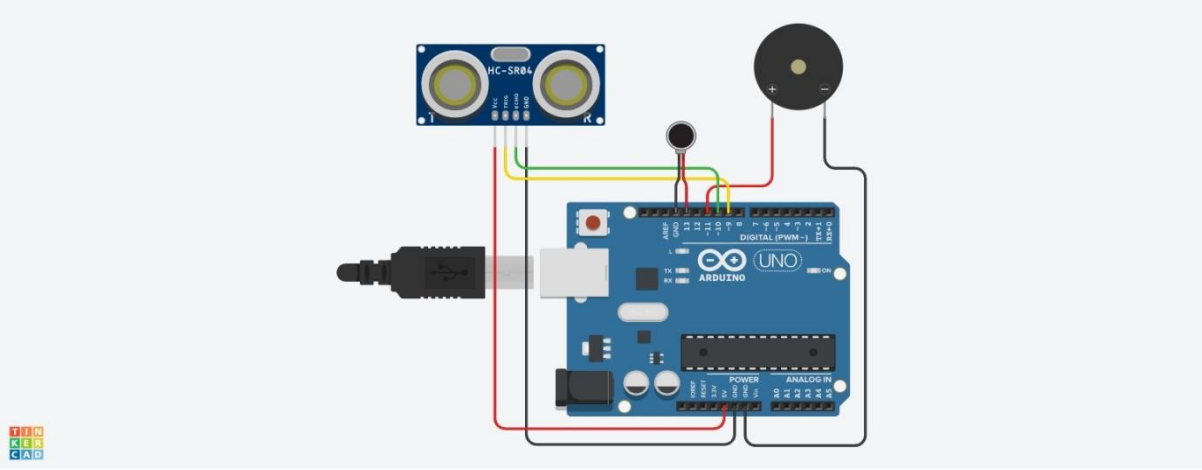


Figure 6 :Simulation on Thinker Cad

Simulation Procedure:

To simulate an Arduino-based third eye for blind people on Tinker cad ,you can follow these steps:

1. Open Tinker cad: Go to the Tinker cad website and login to your account. If you don't have an account, you can sign up for a free one.
2. Create a new project: Click on the "Create new design" button and select" Circuits" from the drop down menu.
3. Add components: Click on the "Components" panel on the right-hand side of the screen and search for the components you need ,such as an Arduino board , ultrasonic sensors, and vibration motors. Drag and drop the components on to the work plane.
4. Connect components: Use the "Wires" tool to connect the components as needed. For example, connect the ultrasonic sensors to the Arduino board and the vibration motors to the appropriate pins on the board.
5. Write code: Click on the "Code" panel and select the Arduino board you're using. Write the code to read the sensor data and trigger the vibration motors when an obstacle is detected. You can use the Tinker cad Code blocks or the Arduino IDE.
6. Test the simulation: Click on the "Start Simulation" button to test your design. Move the virtual sensors around to simulate obstacles in the environment and see if the vibration motors are triggered appropriately. You can also check the serial monitor

to see the sensor readings.

7. Refine the design: Based on the simulation results, refine your design as needed. You can adjust the sensor placement, modify the code, or change the components used.
8. Repeat steps 6 and 7 until the simulation is working satisfactorily.

4.3Flow Chart:

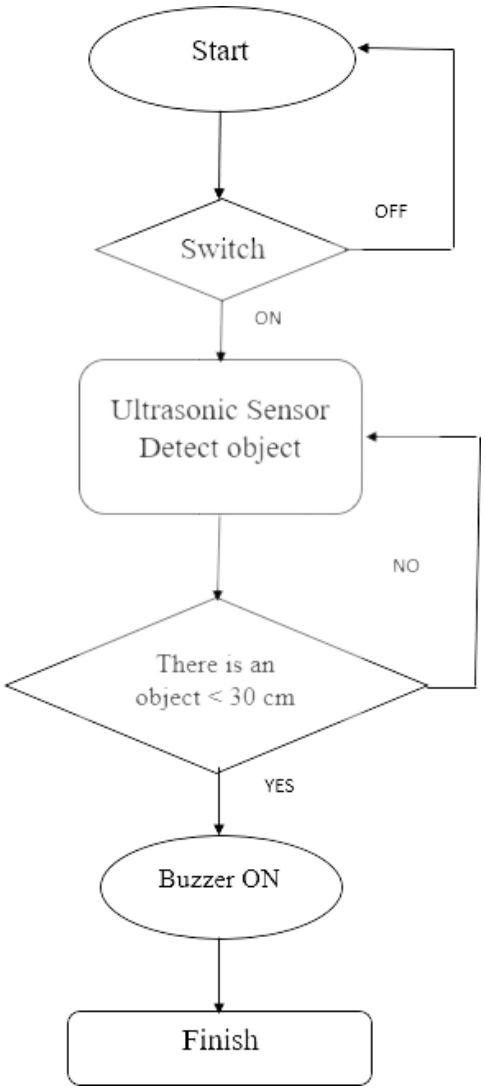


Figure 7:Flow of the program use for the project

Chapter – 05

5. GRAPHICAL USER INTERFACE

5.1 Photographs while Mounting components:

Figure 8: Testing

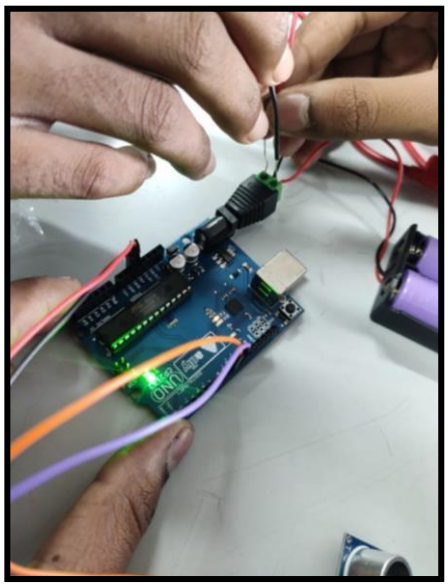


Fig.01

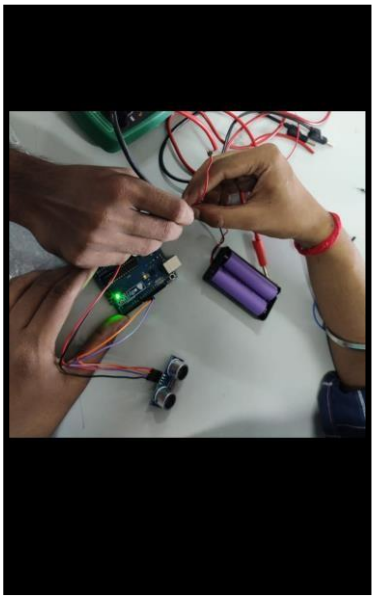


Fig.02

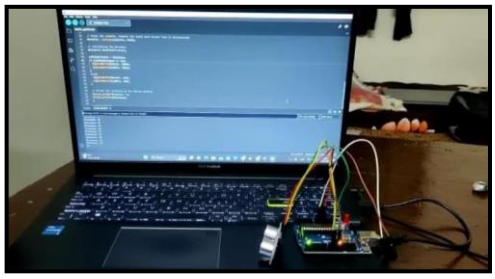


Fig.03

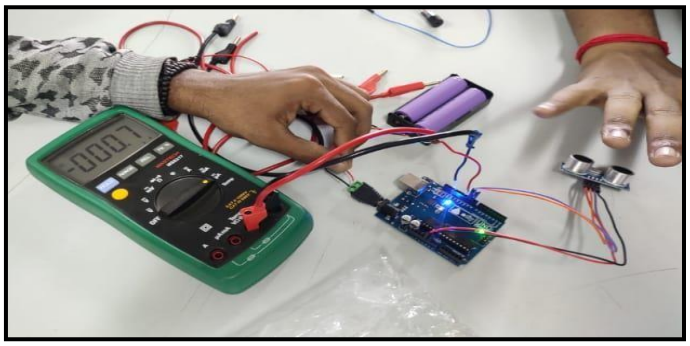
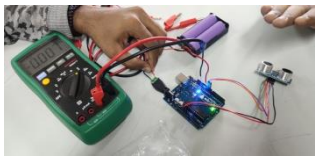
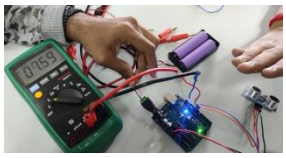
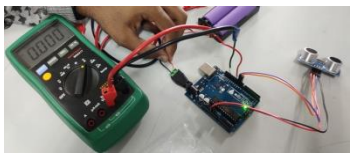
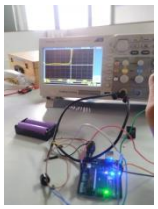
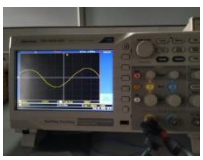


Fig .04

Testing Report :

Sr.No	Component Name	Component Testing Parameters (Digital Multimeter and DSO/CRO)	Testing Photographs
1.	Battery	**1.** Voltage - **7.58 v** 2. Current - **0.058 A**	Voltage : 
2.	Arduino	On Pin No. 11,13 1. Current – **0.013 A**	
3.	Ultrasonic Sensor	Readings of Sensor With Obstacles 1. Voltage - **7.59 v** 2. Current - **0.7 µA**	Current :  Voltage : 
4.	Ultrasonic Sensor	Readings of Sensor without obstacles **1.** Voltage – **0.002v** 2. Current – **0.001 µA**	Voltage :  Current : 
5.	Arduino	Testing Of signals on DSO	 

Chapter -06

6. FUTURE ENHANCEMENTS

The Arduino-based third eye device for blind people has the potential for many future enhancements. Some possible improvements include:

1. **Improved sensors**: The device currently uses ultrasonic sensors to detect obstacles, but other types of sensors like infrared or lidar sensors could be added to increase the device's accuracy and range.
2. **Better haptic feedback**: The device currently provides haptic feedback in the form of vibrations, but more sophisticated haptic feedback systems like piezoelectric actuators or force feedback could be used to provide more detailed feedback to the user.
3. **Integration with other devices**: The device could be integrated with other wearable devices like smart watches or fitness trackers to provide additional information to the user.
4. **Navigation and mapping**: The device could be enhanced with GPS and mapping capabilities to provide the user with more context about their surroundings and to help them navigate more easily.
5. **Machine learning**: The device could be trained using machine learning algorithms to better recognize and classify obstacles, and to adapt to the user's specific needs and preferences.

Chapter – 07

7. CONCLUSION

Thus, this project which is built by our group is totally tells us about the architecture and model of Arduino based third eye or extra vision for blind people. A simple architecture device, efficient in use, cheap in cost, easy to carry with us, easy configurable, easy to handle electronic guidance system with proper and easy usages guidance and various effective hardware helps to provides the amazing properties so that it helps the needy blind people. So, talking about this project it has the feature to detect the distance of objects that's are major issue for blind people after detecting the object distance they also told us about the direction where object was detected like left, right, top, bottom. This all feature helps the blind person to easy walk in any direction without colliding with obstacle. With our given project instruction if it is made as accurate as we were showing in our research paper that helps the blind people to move in any direction without taking the third person help it also makes someone independent from the others and if they have some work so they do by itself. Our project is successfully removing the problem of existing navigation techniques like carry the stick with us while walking, use of another person while moving one place to another and many more issue was successfully resolved by this project. This project, if used on a wider scale and distributed to all the blind people it really makes a bigger impact to the society and the community.

7. REFERENCES

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2. https://create.arduino.cc/projecthub/muhammedazhar/third-eye-for-the-blind-8c246d
3. https://www.arduino.cc/en/Guide/Introduction
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5. https://www.instructables.com/THIRD-EYE-FOR-BLINDS-an-Innovative-Wearable- Techno/
6. https://en.wikipedia.org/wiki/Arduino
7. https://cdn.sparkfun.com/datasheets/Sensors/Proximity/HCSR04.pdf
8. https://datasheet.octopart.com/A000066-Arduino-datasheet-38879526.pdf
9. https://www.farnell.com/datasheets/2171929.pdf
10. https://data.energizer.com/pdfs/e91.pdf

8. Datasheets:

1. Arduino UNO

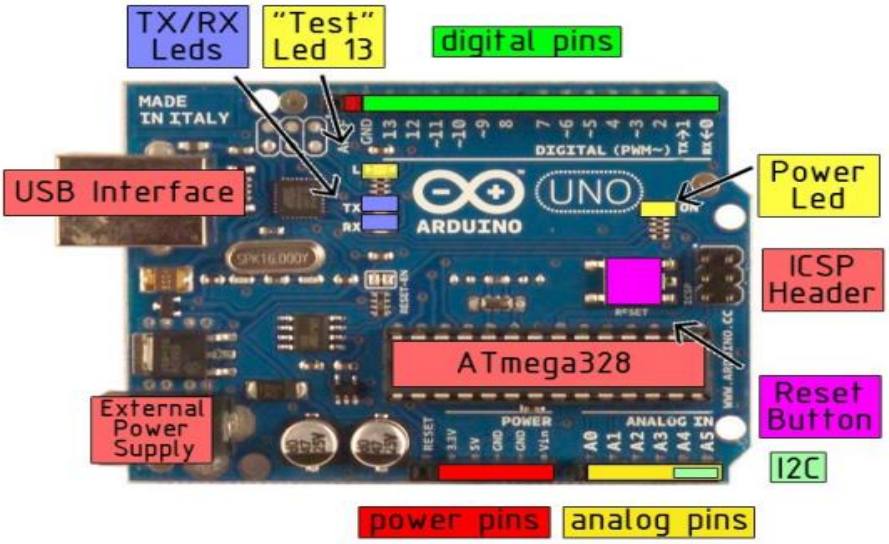
Technical Specification

EAGLE files: arduino-duemilanove-uno-design.zip Schematic: arduino-uno-schematic.pdf

Summary

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

the board



2. Ultrasonic-sensor

Tech Support: services@elecfreaks.com

Ultrasonic Ranging Module HC - SR04

Product features:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:
(1) Using IO trigger for at least 10us high level signal,
(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.
Test distance = (high level time×velocity of sound (340M/S) / 2,

Wire connecting direct as following:

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

Electric Parameter

Working Voltage	**DC 5 V**
Working Current	**15mA**
Working Frequency	**40Hz**
Max Range	**4m**
Min Range	**2cm**
MeasuringAngle	**15 degree**
Trigger Input Signal	**10uS TTL pulse**
Echo Output Signal	**Input TTL lever signal and the range in proportion**
Dimension	**45*20*15mm**

3. Buzzer

Buzzer

pro-SIGNAL

RoHS Compliant

Features

- Black in colour
- With internal drive circuit
- Sealed structure
- Wave solderable and washable
- Housing material: Noryl

Applications

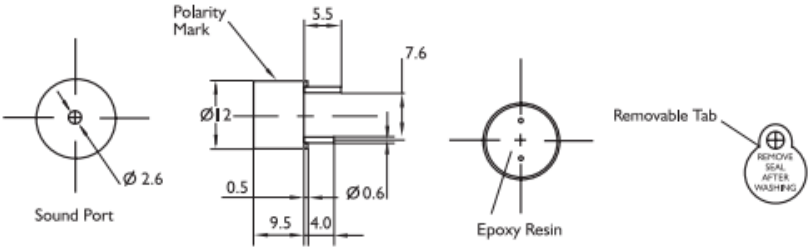
- Computer and peripherals
- Communications equipment
- Portable equipment
- Automobile electronics
- POS system
- Electronic cash register

Specifications:

Rated Voltage	: 6V DC
Operating Voltage	: 4 to 8V DC
Rated Current*	: ≤30mA
Sound Output at 10cm*	: ≥85dB
Resonant Frequency	: 2300 ±300Hz
Tone	: Continuous
Operating Temperature	: -25°C to +80°C
Storage Temperature	: -30°C to +85°C
Weight	: 2g

*Value applying at rated voltage (DC)

Diagram



Dimensions : Millimetres
Tolerance : ±0.5mm

Part Number Table

Description	Part Number
Buzzer, Electromech, 6V DC	ABI-009-RC

4.Battery

PRODUCT DATASHEET

Energizer

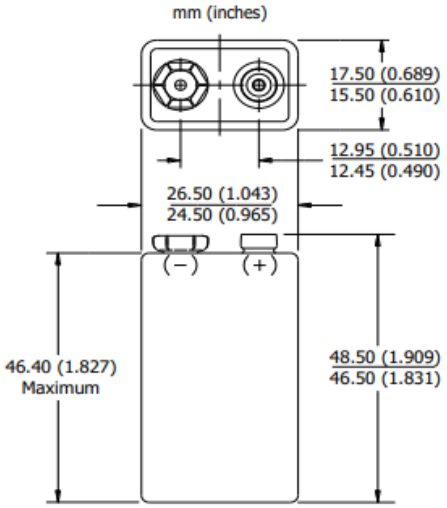
ENERGIZER 522

9V

Specifications

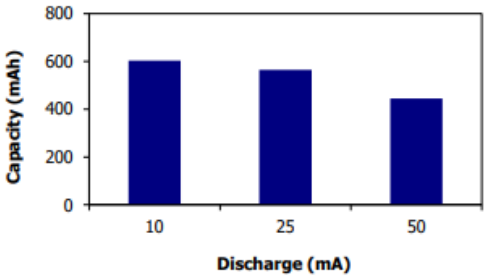
Classification:	Alkaline
Chemical System:	Zinc-Manganese Dioxide (Zn/MnO_2) No added mercury or cadmium
Designation:	ANSI 1604A, IEC-6LF22 or 6LR61
Nominal Voltage:	9.0 volts
Operating Temp:	-18°C to 55°C
Typical Weight:	45 grams
Typical Volume:	21 cubic centimeters
Shelf Life:	5 years at 21°C
Terminal:	Miniature Snap

Industry Standard Dimensions



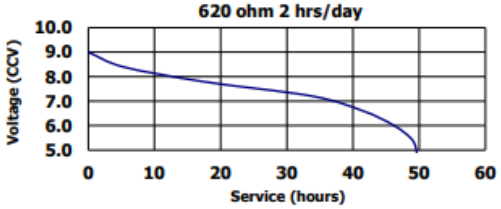
Milliamp-Hours Capacity

Continuous discharge to 4.8 volts at 21°C

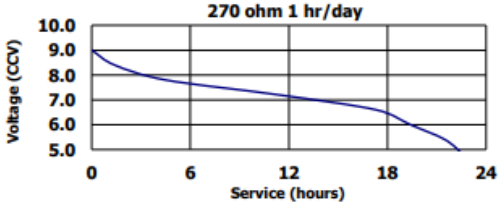


Industry Standard Tests (21°C)

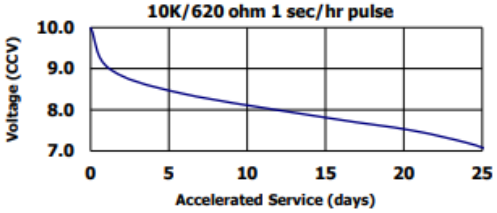
RADIO
620 ohm 2 hrs/day



TOY
270 ohm 1 hr/day



ACCELERATED SMOKE DETECTOR
10K/620 ohm 1 sec/hr pulse



Important Notice

This data sheet contains typical information specific to products manufactured at the time of its publication.
Contents herein do not constitute a warranty and are for reference only.

Form No. 522GL1019

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