

SAFETY DEVICE FOR BLIND

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Technology degree in
Information Technology

By

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**DEPARTMENT OF INFORMATION TECHNOLOGY SCHOOL
OF COMPUTING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by
AICTE**

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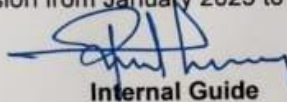
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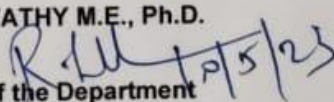
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Srivalli E (Reg.No - 39120028)** who carried out the Project Phase-2 entitled "**SAFETY DEVICE FOR BLIND**" under my supervision from January 2023 to May 2023.


Internal Guide

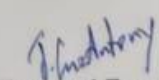
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DECLARATION

I, **Srivalli E (Reg.No- 39120028)**, hereby declare that the Project Phase-2 Report entitled "**SAFETY DEVICE FOR BLIND**" done by me under the guidance of **Dr. S. REVATHY M.E., Ph. D** is submitted in partial fulfillment of the requirements for the award Bachelor of Technology degree in Information Technology.

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ABSTRACT

Safety device 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.

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CHAPTER 1

INTRODUCTION

With the improvement of the living standards of the people, we have become so materialistic that we have forgotten how the physically disabled people live a tough life. They undergo rigorous, apathetic, and indifferent behavior towards them for being physically disabled. They become dependent on other people in a way for their day-to-day routine chores. Blind and impaired persons always depend on other people for their locomotion. Eye are prime sense of organ in perceiving the outside environment; dysfunction of such prime sense organ severely effects the knowledge perceiving capability of the outside environment. Therefore, going around to places in such environment is a very big challenge because the blind people cannot depend on their own eyes and thus face many difficulties. The objective of this project The Safety device for the Blind is to design a product which is very much useful to those people who are visually impaired and those who often must rely on others. Third eye for Blind project is an innovation which helps the visually impaired people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with buzz sound or vibrations. It allows the user those who are visually impaired to walk freely by detecting the obstacles. They only need to wear this device as a band or cloth on their body. According to WHO or the World Health Organization, 39 million people are estimated as blinds worldwide. They are suffering a lot of hardship in their daily life. The physically disabled ones have been using the traditional way that is the white cane for many years which although being effective, still has a lot of disadvantages and limitations. Another way is, having a pet animal such as a dog, but it is expensive. Thus, the aim of the project Third eye for the Blind is to develop a cheap, affordable, and more efficient way to help the blind people to navigate with greater comfort, speed, and confidence. This is the wearable technology for the blinds which helps resolve all the problems of the existing technologies. it is affordable for everyone, the total cost being less than \$25 or~1500 INR. There are no such devices available in the market that can be worn like a

cloth and having such a low cost and simplicity. With the use of this improvised device in a large scale, with improvements in the prototype, it will drastically benefit the community of the visually impaired or the blind people. The walking cane is a simple and purely mechanical device dedicated to detect the static or the constant obstacles on the ground, uneven surfaces, holes, and steps via simple tactile-force feedback. This device is light, portable but limited to its size and it is not used for dynamic obstacle detection [4]. These devices operate like the radar and the system of the device uses the ultrasonic waves fascicle to identify the height, direction, and the speed of the objects. The distance between the person and the obstacle is measured by the time of the wave travel. However, all the existing systems inform the blind the presence of the object at a specific distance in front of or near to him. These details help the user or the blind people in detecting the obstacles and thus change the way and walk accordingly. A person who is visually impaired is referred to as being blind, per the definition. Blind people are unable to see anything. We have come to the point where, while battling for the various degrees of comfort for the general populace, we have begun to entirely disregard those whose lives are wretched because they lack eyesight. In their daily lives, they encounter several difficulties. Because to their physical impairments, they live very different lives from those of normal people and are treated with cold indifference. To get from one place to another, they depend on other people. As sight is the primary sense of living, having this ailment makes it extremely difficult for a person to move around.

Information about the objects and their place in the way of the walking like an obstacle and their characteristics can create additional knowledge to enhance the space manifestation and memory of the blind or the visually impaired people. To overcome, the above-mentioned limitations this work offers a simple, efficient, configurable virtual for the blind. This task's intended audience—blind people or those who are visually impaired—will receive a device that will benefit both them and others who rely on others because they are blind. While wearing a band that emits ultrasonic waves that alert the wearer with a beep sound or vibration, a safety gadget for blind people can be an invention that gives

them the confidence to travel from one place to another and between different locations. It can enable someone who is unable to move or recognise obstacles due to visual loss. Having a dog as a pet is the second strategy, which is expensive but beneficial. In order to enable the blind person travel with confidence and greater interest, this task—the development of a safety gadget for blind people—will be undertaken in a reasonable but extremely effective manner. The gadget serves as a blinds invention that helps to address any problem. Several of these technologies have helped blind individuals with their problems, but they have numerous drawbacks and need a lot of preparation and upkeep. At the moment, there are vast approaches and creative innovations.

CHAPTER 2

LITERATURE SURVEY

A literature review is the identification and examining of the existing research work in the chosen field to gain valuable information [1]. Literature review was performed to understand the existing learning algorithms and to choose the suitable method for image classification. When conducting research, a literature review is an essential part of the project because it covers all previous research done on the relative problem statements and sets the platform on which the current research is based. As the study was made to compare algorithms, the literature review was performed to identify the most efficient algorithm of each kind. The algorithms identified were further used in experimentation.

2.1 INFERENCES FROM LITREATURE SURVEY

The aim of this project is to provide an obstacle identifier to blind persons so that they can be able to overcome the problems in addition to a walking stick. If the speed of sound in the medium is known and the time taken for the sound waves to travel the distance from the source to the subject and back to the source is measured, the space from the source to the topic are often computed accurately. Here the middling for the sound waves is air, and the sound waves used are ultrasonic and it is out of earshot to humans. [1] The ultrasonic sensor used here is a transceiver. The ultrasonic waves are emitted by the transmitter when the objects are detected. Both the transmitter and receiver are present inside the ultrasonic sensor. We can calculate the time interval between the transmitted and received signal. The distance between the object and sensor is calculated using this. When we increase the distance between the object and the sensor the coverage angle will decrease. The sensor has a coverage of 60 degrees. Thus, the objective is to cover a wide-angle to detect the obstacles with the help of ultrasonic sensors to help the blind and make it easy for them to move around easily without any hassle. Ultrasonic sensors work on the principle of echo, studying its reflection on different obstacles is very important. The measurement cycle starts with the micro controller transmitting the high-level pulse to the sensor trigger pin to start ranging, then the sensor

will send out an ultrasonic signal and then wait to capture the rising edge output by echo port, depending on the measured distance. In case of no obstacle i.e. (no signal reflected), it waits for some time before it restarts transmission. Ultrasonic distance sensor uses the time of flight (TOF) to detect obstacles - the output is a digital pulse, whereas length is the time taken for the sound to reach the target and return before the beep is heard.[3] This research paper explains how the user controls electronic components like LED not in a standard way but using text by speech. This system is flexible with a variety of devices that can be controlled and is of low cost. Text by speech is achieved without using any external modules. The system comprises two segments, first, one to process signals which are received by a microphone, and the second segment is to interpret the processed signal. The system recognizes voice commands and converts them to desired data coordination and data transmission via a micro controller (Arduino Uno). This research work has presented a model of a voicerecognized system for electronic devices. This solution is provided without using any external voice recognition modules.[4] Researchers used voice commands in the form of voice recognition with the hope that the smart home prototype being developed can have a better level of security. This is because voice recognition identifies the user's voice-based on intonation, accent, or speech style consistent with the stored voice. They focused more on developing research on the success of the system in capturing words uttered by users due to each accent and sensitivity of the system to be better. [5] The speaker is that the output device that provides the specified speech when an obstacle is detected within the navigation path of the user of the walking stick or when help is required by the user of the cane. There are two types of speakers on this stick; the earphone that is constantly worn by the user, which gives the output when an obstacle is detected in the path of the user, and the loudspeaker which also gives the voice output when configured to do so but mainly used to give a voice output (alert) in case of emergency like when the walking stick falls. [6]A person who can write can provide the input to the text to speech module using a keyboard and the module recites the written input provided by the person. This system changes normal text written into speech and allows the system to speak out the text in a human voice. [7] This article discusses the planning of a colored object follower robot. The colored object used features a simple shape. For the detection process, a wheeled robot

that uses sensors supported digital images of Pixy 2. Pixy2 can learn to detect objects that you simply teach it, just by pressing a button. Additionally, Pixy2 has new algorithms that detect and track lines to be used with line-following robots. Pixy2 camera can recognize and track all objects whose color has been memorized. [8] This paper focuses on tracking systems based on image processing and is widely used in various fields. It aims at the matter of image blurring while photographing during a vibration environment. The project helps in stabilizing the video or image captured via a camera in a vibration environment using a color detection algorithm. This technique learns the environment then stabilizes the camera consistent with the vibration environment. [9] Color tracking technique is based on surface area of the target of interest and brightness from the background. The method used is via color tracking system using Pixy CMUcam5 sensor, Arduino MEGA micro controller, ultrasonic sensors, servo motor, motor driver and transaxle motor. Pixy CMUcam5 sensor is used to perform color tracking on target of interest.

2.2 OPEN PROBLEMS IN EXISTING SYSTEM

When The system which was developed before was a moderate budget navigational aid for visually impaired people. Following were the limitations of the project:

- Requirement of power source. Bulky to carry. Does not protect from obstacles at torso and face level. Due to use of electronic components, any malfunction will be difficult for a blind person to identify or repair on the spot. It is not waterproof. The figure 2.2 shows the existing systems.



Fig.2.2:Existing Systems

White cane - May easily crack/break, The stick may get stuck at pavement cracks of different objects.

* Pet dog - huge cost. (~\$42,000 / 280000Rs)

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

CHAPTER 3

REQUIREMENT ANALYSIS

3.1 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT

3.1.1. ARDUINO NANO

The figure 3.1 shows the Arduino Nano. It is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a micro controller like Atmega328. This micro controller is also used in Arduino UNO. It is a small size board and flexible with a wide variety of applications.

This board has many functions and features like an Arduino Demilune board. However, this Nano board is different in packaging. It does not have any DC jack so that the power supply can be given using a small USB port otherwise straightly connected to

the pins like VCC & GND. This board can be supplied with 6 to 20volts using a mini-USB port on the board.

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

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

The Arduino Nano has several facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Nano's digital pins. The ATmega328 also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus. To use the SPI communication, please see ATmega328 datasheet.

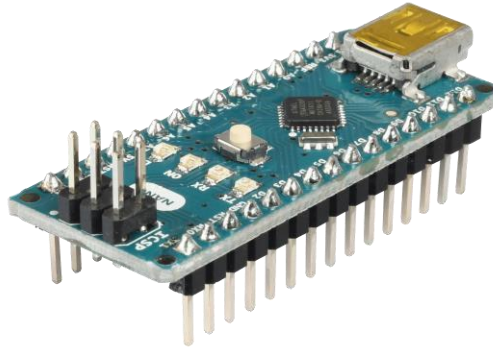


Fig.3.1: Arduino Nano

3.1.2. Arduino Nano Pinout

Arduino nano pin configuration is shown below and each pin functionality is discussed below. Arduino Nano has several facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328P provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino software) provide a virtual COM port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Nano's digital pins. The ATmega328P also supports I²C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I²C bus. To use the SPI communication, please see ATmega328P datasheet. The following figure 3.2 shows the Arduino Nano pinout.

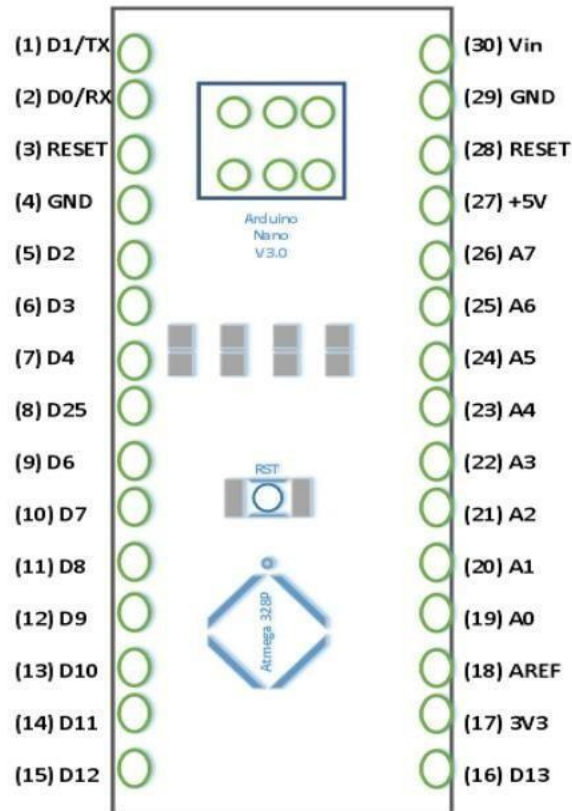


Fig.3.2: Arduino Nano Input

Power Pin (Vin, 3.3V, 5V, GND): These pins are power pins

Vin is the input voltage of the board, and it is used when an external power source is used from 7V to 12V.

5V is the regulated power supply voltage of the nano board and it is used to give the supply to the board as well as components.

3.3V is the minimum voltage which is generated from the voltage regulator on the board.

GND is the ground pin of the board

RST Pin (Reset): This pin is used to reset the micro controller

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

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

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

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

PWM (3, 5, 6, 9, 11): These pins are used to provide 8-bit of PW limit for the analog pin

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

3.1.3. ULTRASONIC SENSOR

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

Ultrasonic sensor works on the principle of SONAR and RADAR system which is used to determine the distance to an object. An ultrasonic sensor generates the high frequency sound (ultrasound) waves. When this ultrasound hits the object, it reflects as echo which is sensed by the receiver. Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear.

They then wait for the sound to be reflected, calculating distance based on the time required. This is like how radar measures the time it takes a radio wave to return after hitting an object.

While some sensors use a separate sound emitter and receiver, it is also possible to combine these into one. The figure 3.3 shows the ultrasonic sensor. The following are the advantages and disadvantages of the ultrasonic sensor.

ADVANTAGES:

This sensor could have easily sensed the nature, shape and orientation of that specific object which is within the area of these sensors so sensing capability to sense all the material types. These sensors have greater accuracy than another method for measuring the thickness and depth of the parallel surface.

This sensor easily interfaces with a micro controller or any type of controller.

This sensor has high frequency, high sensitivity, and high penetrating power; therefore, it can easily detect the external or deep object.

It can work in any adverse conditions.

Their sensor is easy to use, not dangerous during operation for nearby object person, equipment, or material.

This sensor is not affected due to atmospheric dust, rain, and snow.

It provides a good reading in sensing large-sized objects with hard surfaces.

It has a higher sensing distance compare to inductive or capacitive proximity sensor types.

DISADVANTAGES:

It is very sensitive to variation in the temperature.

It has more difficulties in reading reflections from soft, curved, and thin as well as a small object.

These sensors have a base detecting distance.

It required careful attention for an experienced technician.

Change in nature for example temperature, airborne particles, weight, air turbulence, influence ultrasonic reaction.

In this sensor, the main focuses of low thickness like froth fabric tend to assimilate sound vitality these materials may be hard to sense at long range.

When these sensors are interfaced with a micro controller or any controller then experienced person or programmer is required.

When these sensors are used for inspection purpose then these could be waterresistive otherwise they could be damaged.



Fig.3.3: Ultra Sonic Sensor

3.1.4 BUZZER

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

By changing the frequency of the buzzer, the speed of the vibration's changes, which changes the pitch of the resulting sound.

Piezo buzzers are simple devices that can generate basic beeps and tones. They work by using a piezo crystal, a special material that changes shape when voltage is applied to it. If the crystal pushes against a diaphragm, like a tiny speaker cone, it can generate a pressure wave which the human ear picks up as sound Operating voltage: Normally, the operating voltage for a magnetic buzzer is from 1.5V to 24V, for a piezo buzzer is from 3V to 220V.

The **Piezoelectric Buzzer** is a small and efficient component to add to your system or project if you want to produce any sound feedback or sound an alarm. Its two-pin compact structure allows it to be easily used with a breadboard, perf-board, or even PCBs piezoelectric buzzer has 23mm diameter and 30mm spaced mount holes. It produces a 3.3kHz tone at an 85dB sound level when activated drawing a current less than 15mA. Supplied with a 100mm lead, it is designed for a 3 - 20V power supply but it is advisable to use a stable supply in this range. It is very popular among hobbyists and portable electronics due to its small size and easy to use. The following figure 3.4 shows the buzzer.



Fig.3.4:Buzzer

3.1.5. ZERO PCB:

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

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

A printed circuit board, or PCB, is used to mechanically support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive substrate. The figure 3.5 shows the zero PCB.

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

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

Zero Printed Circuit Board refers to an all-purpose & conventional PCB that embeds the circuits arbitrarily to ensure the continuous functioning of the hardware. The layers of general-purpose circuit board are coated with copper as to allow appropriate soldering of the components of PCB. Thus, it reduces the chances of any short circuit.

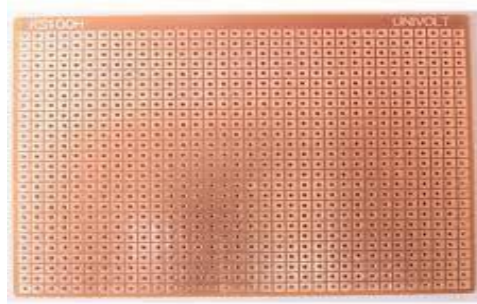


Fig. 3.5: Zero PCB

3.1.6 VIBRATION SENSOR:

Shear mode accelerometer (vibration sensor) designs feature sensing crystals attached between a center post and a seismic mass. ... Under acceleration, the mass causes a shear stress to be applied to the sensing crystals. This stress results in a proportional electrical output by the piezoelectric material.

The figure 3.6 shows the vibration sensor. Vibration sensors are sensors for measuring, displaying, and analyzing linear velocity, displacement and proximity, or acceleration. Vibration however subtle and unnoticed by human senses is a telltale sign of machine condition.

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

In a standard application (50g range), the sensitivity of a typical vibration sensor is 100mV/g, while in low vibration applications (10g) the sensitivity is 500mV/G vibration is most measured using a ceramic piezoelectric sensor or accelerometer. An accelerometer is a sensor that measures the dynamic acceleration of a physical device as a voltage.

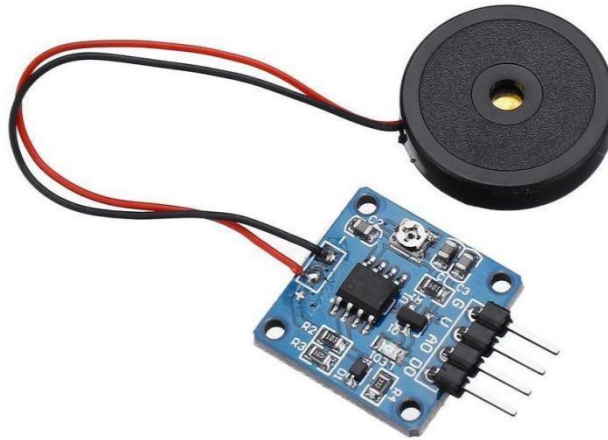


Fig. 3.6: Vibration Sensor

3.1.7. BATTERY CAP: -

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

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

For dry cells, the holder must also make electrical contact with the battery terminals. For wet cells, cables are often connected to the battery terminals, as is found in automobiles or emergency lighting equipment. The purpose of the vent caps is to allow for the escape of gases formed when the battery is charging. In addition, the vent caps allow water and acid levels of the battery to be checked during maintenance. Lead-acid batteries can produce explosive mixtures of hydrogen and oxygen gases when they are being charged. The figure 3.7 shows the battery cap.

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

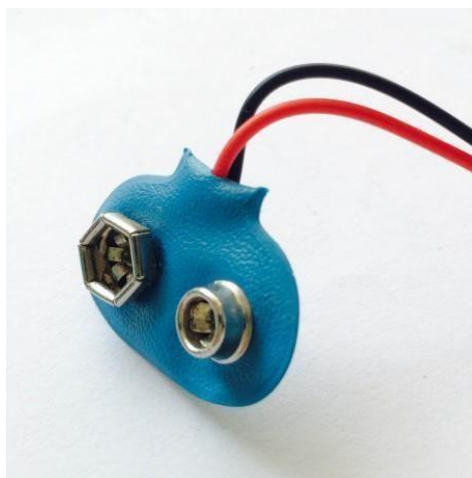


Fig. 3.7: Battery cap

3.1.8. VOLT BATTERY: -

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

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

A battery is a device consisting of one or more electro chemical cells with external connections for powering electrical devices such a flash lights, mobile phones, and https://en.wikipedia.org/wiki/Electric_car electric cars, When a battery is supplying electric power, its positive terminal is the <https://en.wikipedia.org/wiki/Cathode> cathode and its negative terminal is the <https://en.wikipedia.org/wiki/Anode> anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free energy difference is delivered to the external circuit as electrical energy. The following figure 3.8 shows the volt battery.



Fig. 3.8: Volt battery

3.1.9. SOLDER WIRE: -

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

Solder is commonly used in, electronics, heating, air conditioning, mechanical, fire sprinkler and other similar systems as well as radiator manufacturing, repair, and sheet metal work. It is also used in jewellery and stained-glass work. Solder must be strong enough to hold metal pieces together but must also be resistant to oxidization and other types of corrosion that can occur over time. Furthermore, solder must have a low melting point that allows it to be melted with a soldering gun or torch while also being sufficiently malleable for maximum effectiveness. For this reason, the most widely used wire solder offering the above attributes is lead and tin alloy.

Solder specifically, in the use of assembly and repair of plumbing applications is commonly void of the lead metal, as North American regulations call for lead-free solders. Canada Metal supplies Lead Free solder that meets the following Standards and Regulations; ASTM B32-04 B 813-00, B-819, B 828-02. Our Lead-Free Silver Solder meets NSF Standards, which establishes minimum requirements for the control of potential adverse health effects from products which contact drinking water. Professional plumbers demand Canada Metal lead-free solder.

The choice of solder is important depending on its use. For example, solder that is used in electrical applications, such as for electrical components, must also have features that meet electrical requirements. Choosing the right solder will generally depend on the material being soldered together, the size and weight of the soldered parts, the flux (which is meant to facilitate the flow of solder and bonding in solder joints), and any health and safety issues that might pertain to the soldering.

Solders that are used for electronics generally fall into three categories: lead alloy solder, lead-free solder, and silver-alloy solder. Lead-alloy solder is a tin-lead alloy, though it might also consist of other metals. Tin is combined with lead for this type of solder because it produces an alloy with a lower melting temperature, and electronic components tend to be very sensitive to heat. The figure 3.9 shows the solder wire.

Canada Metal (Canada Metal North America) is a **wire solder supplier** and manufacturer that provides solder to meet most requirements. Among the company's many products and services, Canada Metal offers a wide range of pure tin, silver, copper and antimony-based solder, lead-based and tin-based solder products, as well as and other alloy compositions. Custom alloys are also available upon request.

Canada Metal has a history of over 100 years supplying industries that include construction, mining, oil and gas, hospital/medical, commercial marine, aerospace, and Défense. Canada Metal has industry-leading qualifications and capabilities that include product and service excellence and reliability, while meeting all the rigors of industry demands and client product specifications. Canada Metal welcomes all inquiries.



Fig. 3.9: Solder Wire

3.1.10. SOLDERING IRON: -

A soldering iron is a hand tool used in soldering. It supplies heat to melt solder so that it can flow into the joint between two workpieces. A soldering iron is composed of a heated metal tip and an insulated handle. The basic purpose of a soldering iron is to create a bond between two workpieces using electronically heated soft metal (i.e., the solder). The soldering iron supplies heat to the soldering tip, which is used to melt the solder. The melted solder forms a bond in the joint between two workpieces. The figure 3.10 shows the soldering iron.

A soldering iron is a **hand tool used to heat solder**, usually from an electrical supply at high temperatures above the melting point of the metal alloy. This allows for the solder to flow between the workpieces needing to be joined.

This soldering tool is made up of an insulated handle and a heated pointed metal iron tip. Good soldering is influenced by how clean the tip of your soldering iron is. To maintain cleanliness, a user will hold the soldering iron and use a wet sponge to clean the soldering iron tip prior to soldering components or making soldered connections.

In addition to the soldering iron, solder suckers are an important part of the soldering setup. If excessive solder is applied, these small tools are used to remove the solder, leaving only that desired.



Fig .3.10: Soldering iron

3.1.11. CONNECTING WIRE: -

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum. Copper is cheap and good conductivity. The figure 3.11 shows the connecting wire.

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

Most wires in computers and electronic components are made of copper or aluminium. Copper is cheap and electrically conductive. Silver has higher conductivity but is far more expensive.

In a basic circuit, the wire comes from one terminal of a power source, such as a battery. It then connects to a switch that determines whether the circuit is open or closed. The wire then connects to the device that is drawing power, allowing it to draw electricity and

perform its task. Finally, the wire connects the load back to the opposite terminal of the power source.

Before a current can travel through the wire, the circuit must be closed; in other words, there cannot be any breaks in the path. Electricity cannot easily travel through air, and if it does there is a risk of stray current leaking into the surroundings and causing damage or failing to power the appliance.

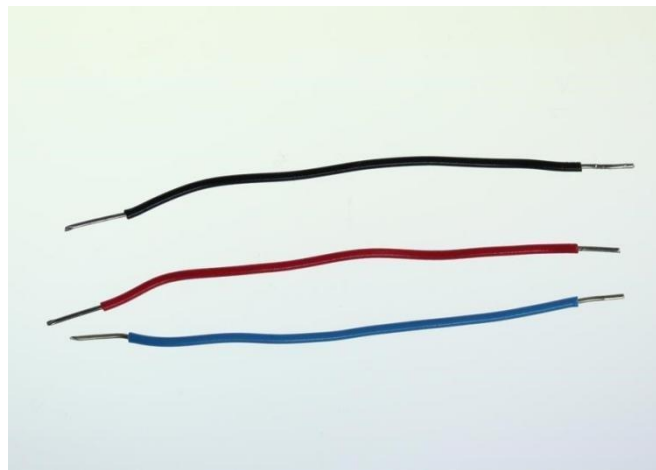


Fig. 3.11: Connecting wire

3.2 SOFTWARE REQUIREMENTS SPECIFICATION DOCUMENT

HARDWARE CONFIGURATION

Processor: Processor Intel CORE i3 and above

Internet Connection: Existing telephone lines, Data card, Fiber net

RAM: 8GB

SOFTWARE CONFIGURATION

Operating System: Windows

Language: C, C++

GUI: Tinker cad, Arduino IDE

3.3 System use case

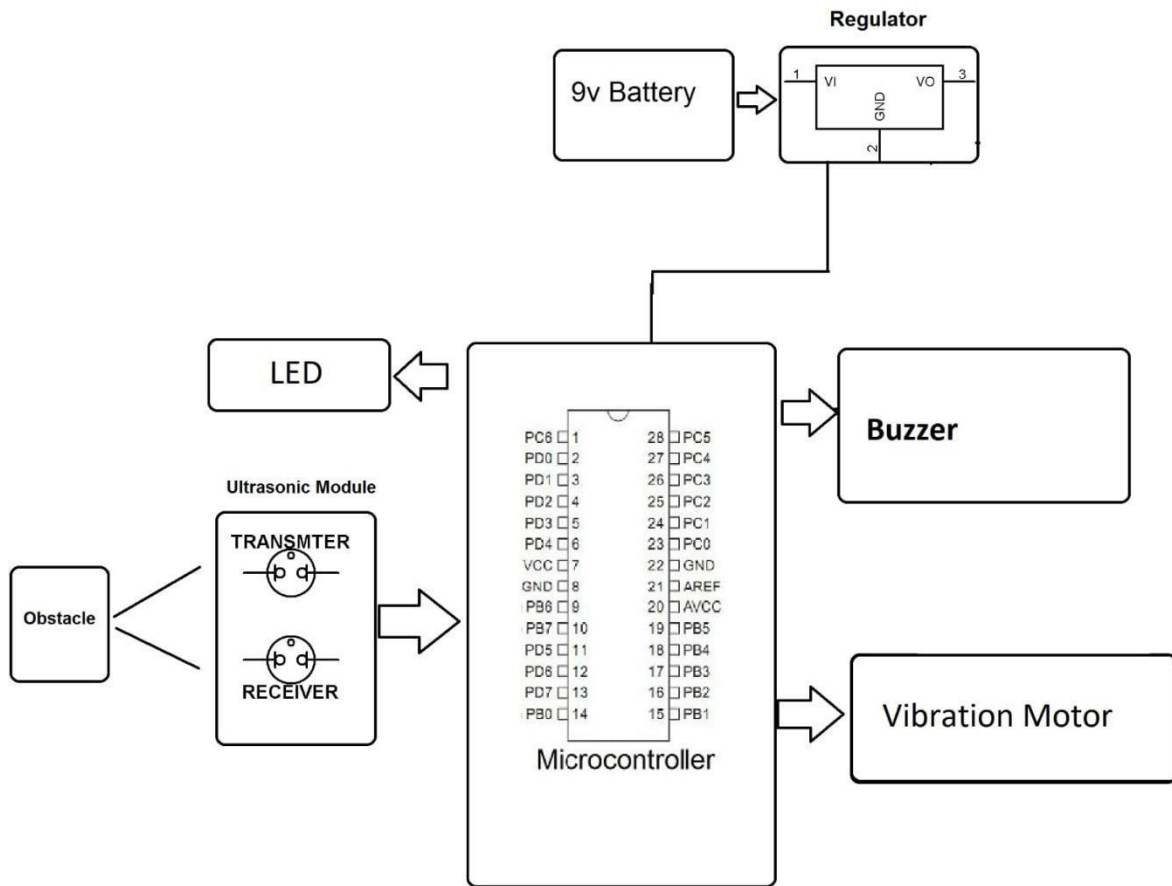


Fig.3.3.1:Circuit design

When the user starts this device by tying it on the wrist, this device transmits ultrasonic waves through the ultrasonic sensor inside it. Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer. Also, the vibration device

installed in the third eye device gives information to the user. The user can then turn off the alarm on this device upon receipt of a notification. The figure 3.3 shows the circuit design of the system.

CHAPTER 4 DESCRIPTION OF PROPOSED SYSTEM

Safety device for people who are blind is an innovation which helps the blind people to navigate with speed and confidence by detecting the nearby obstacles using the help of ultrasonic waves and notify them with buzzer sound or vibration. They only need to wear this device as a band or cloth. The safety device for blind people is a technological advancement that allows blind individuals to navigate with speed and confidence by detecting surrounding impediments using ultrasonic waves and alerting them with a buzzer sound or vibration.

The safety tool for the blind has vibration buzzers, sensors, and ultrasonic sensors. The suggested device will use ultrasonic waves to identify impending impediments in the way of blind people. The ultrasonic sensor HC SR-04 is used in the system, which operates on the idea of ultrasonic waves. In essence, it transmits ultrasonic waves from one node and receives them from another node. It determines the object's distance by computing the duration between those reflecting waves.

When the user starts this device by tying it to the wrist, this device transmits ultrasonic waves through the ultrasonic sensor inside it. Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer.

4.1 ARCHITECTURE OF PROPOSED SYSTEM

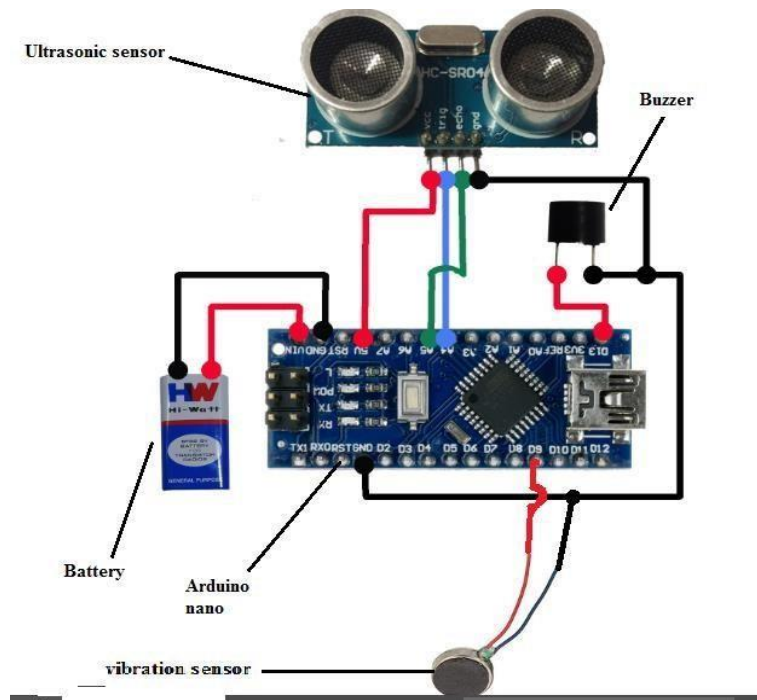


Fig 4.2: Design

It works on the principle of ultrasonic waves using ultrasonic sensor HC SR-04. Basically, it emits ultrasonic waves from one node and absorbs that waves from another node. By calculating the time interval of those reflecting waves it calculates the distance of the object. When the user starts this device by tying it on the wrist, this device transmits ultrasonic waves through the ultrasonic sensor inside it. The figure 4.2 shows the design.

Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer. Also, the vibration device installed in the third eye device gives information to the user. The user can then turn off the alarm on this device upon receipt of a notification.

4.2 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED MODEL/SYSTEM

To implement this model, execution of program is done through Tinker cad or Arduino IDE. Necessary libraries must be installed to perform certain functions. We need to create the product and we need to detect it by connecting wires to the Arduino.

The Arduino Integrated Development Environment - or Arduino Software (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

. Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer. Also, the vibration device installed in the safety device gives information to the user. The user can then turn off the alarm on this device upon receipt of the notification

When the user starts this device by tying it to the hand, this device transmits ultrasonic waves through the ultrasonic sensor inside it. Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer. Arduino is an opensource electronics platform with straightforward hardware and software. An Arduino board can take inputs like a light on a sensor, a finger on a button, or a tweet and transform them into outputs like starting a motor, turning on an LED, or publishing anything online. Your board may be made to do a certain action by sending a set of instructions to its micro controller. A micro controller called the Arduino helps with object recognition and control in real-time environments and situations. It still remains despite the fact that it has been the focus of various advancements.

CHAPTER 5 IMPLEMENTATION DETAILS

5.1 SELECTED METHODOLOGY OR PROCESS MODEL

The aim is to provide help for the blinds with the third type of aid. It works on the principle of ultrasonic waves using ultrasonic sensor HC SR-04. Basically, it emits ultrasonic waves from one node and absorbs that wave from another node. By calculating the time interval of those reflecting waves, it calculates the distance of the object.

The proposed system will detect the upcoming obstacles in the path of blind person using ultrasonic waves. Our purpose to use this ultrasonic sensor, Arduino, buzzer is because they are light in weight, user-friendly behavior, easy to use and understand, flexible and cost reductive.

The concept is based on a unique wearable gadget that uses an Arduino board and may be worn as a band or a fabric for blinds. Five modules that make up the device's five ultrasonic sensors are each attached to a different section of the body. There were four of them—two for the hand, two for the knees, and two for each set of shoulders. A person who is blind has two options: they can use one band or put it anywhere on their body that feels comfortable. In this project, we make use of handheld gloves or wearable bands.

The safety tool for the blind has vibration buzzers, sensors, and ultrasonic sensors. The suggested device will use ultrasonic waves to identify impending impediments in the way of blind people. The ultrasonic sensor HC SR-04 is used in the system, which operates on the idea of ultrasonic waves. In essence, it transmits ultrasonic waves from one node and receives them from another node. It determines the object's distance by computing the duration between those reflecting waves.

When the user starts this device by tying it to the wrist, this device transmits ultrasonic waves through the ultrasonic sensor inside it. Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound

starts coming through the speaker from the buzzer. The figure 5.1 shows proposed architecture.

Moreover, the device's vibration component provides information to the user. When receiving the notice, the user can utilise this gadget to switch off the alarm. A sensor that measures distance is called an ultrasonic sensor (HC-SR04).

$$\text{Time} = \text{Distance}/\text{Speed}$$

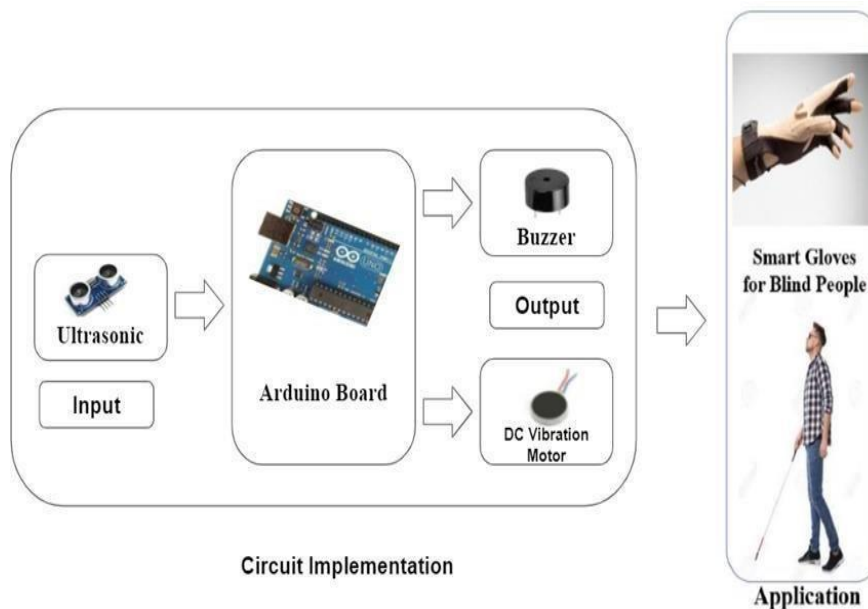


Fig 5.1: Proposed Architecture

5.2 ALGORITHMS

STEP 1: Select the Arduino Nano device.

STEP 2: VCC pin of HC-SR04 is connected to a 5-volt pin of the Arduino

STEP 3: Trigger pin of HC-SR04 is connected to D12 of Arduino

STEP 4: Echo pin of HC-SR04 is connected to the GND pin of the Arduino

STEP 5: The positive terminal of the 9-volt battery is connected to the Vin pin of Arduino and the negative terminal is connected to the GND pin of Arduino.

STEP 6: A buzzer is connected between the D9 pin of Arduino and the GND pin.

5.3 Methodology

When the user starts this device by tying it on the wrist, this device transmits ultrasonic waves through the ultrasonic sensor in it. It works on the principle of ultrasonic waves using the ultrasonic sensor HC SR-04. Basically, it emits ultrasonic waves from one node and absorbs those waves from another node. By calculating the time interval of those reflecting waves, it calculates the distance from the object. The following figure 5.3 shows the speed calculation of the device.

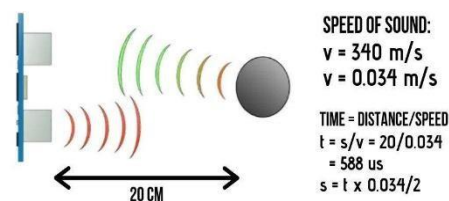


Fig 5.3: Speed calculation

Ultrasonic Sensor HC-SR04 is a sensor that can measure distance. It emits ultrasound at 40000 Hz (40 kHz) which travels through the air and if there is an object or obstacle on its path. It will bounce back to the module. Considering travel time and the speed of the sound we can calculate the distance. Based on the distance, the buzzer will beep accordingly and help the person determine the distance of the object. Ultrasonic rays are transmitted along the path in front of the person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer. Also, the vibration device installed in the safety device gives information to the user. The user can then turn off the alarm on this device upon receipt of the notification.

5.4 TESTING

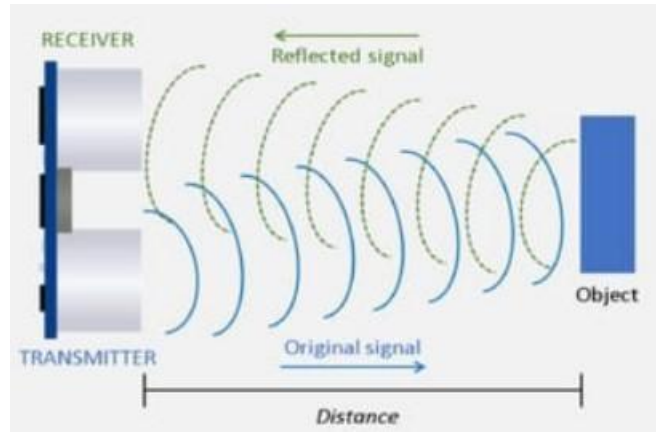


Fig.5.4.1: Distance Calculation

In figure 5.4.1 it shows the distance calculation of the device. When the ultrasonic sensors contain transmitter and a receiver. When if any obstacle or object comes Infront of the blind people then the transmitter observes, and the receiver receives the signal, and the buzzer will vibrate. The maximum accuracy is 300cm .



Fig.5.4.2: Tested successfully with the help of impaired person

CHAPTER 6 RESULTS AND DISCUSSIONS

The proposed safety device system was designed using components like Arduino Nano, ultrasonic sensor, Buzzer, Vibration sensor, 9v battery, soldering wire, and connecting wires. The working principle behind this project is when an ultrasonic sensor detects an obstacle. The emitted waves sent from the ultrasonic sensor get reflected by

the sensor, and by this, the waves get sensed; the distance can be measured based on the range then the reflected waves get captured by the buzzer. The trigger pin present in the ultrasonic sensor triggers the sound pulses or signals up to a certain distance. The signals are received by Arduino Nano, which acts as a mediator. It is used to read the inputs. Now the working buzzer takes place if any obstacle came then it vibrates or gives a buzzer sound.

With the improvement of the living standards of the people, we have become so materialistic that we have forgotten how physically disabled people live tough life. They undergo rigorous, indifferent behavior towards them for being physically disabled. They become dependent on other people in a way for their day-to-day routine chores. Blind and impaired persons always depend on other people for their regular activities. The eyes are responsible for observing and listen the outside environment; the dysfunction of such a prime sense organ severely affects the knowledge-perceiving capability of the outside environment. Therefore, going around spaces in such an environment is a very big challenge because blind people cannot depend on their eyes and thus face many difficulties. This project will help them to overcome their obstacles and problems.

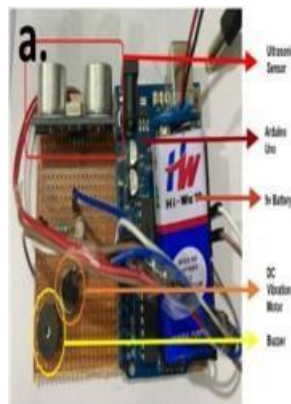


Fig.6.1: Circuit design

The figure 6.1 shows the circuit design of the safety device for blind. This is the overall design of the system. This circuit design contains all the components that are connected from each other. By inserting this device into gloves the blind people can navigate with confidence and speed.



Fig.6.2: Circuit fixed in gloves

The figure 6.2 shows the circuit fixed in gloves. This is the final device that the blind people are going to wear. By wearing this device they can navigate with speed and confidence. If any obstacle or object comes in-front of them this device notifies them and they can travel safely.



Fig.6.3: A person wearing the prototype device

The figure 6.3 shows a person wearing the device. This is how the blind people can wear that device to their hands and they can travel safely .

CHAPTER 7 CONCLUSION AND FUTURE WORK

7.1 CONCLUSION

The objective of this project is a safety device for the blind is to design a product that is very much useful to those people who are visually impaired and those who often must rely on others. The safety device for the blind project is an innovation that helps the blind person to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of wearable band or gloves which

produces ultrasonic waves which notify them with buzz sound or vibrations. It allows the user who is visually impaired to walk freely by detecting obstacles.

Thus, this project Arduino-based obstacle detector for blind people is a new method to resolve their problems. A less complex portable, cost-efficient, easy-to-manage, and effective system with many more amazing properties and advantages are proposed to provide support for the blind. The system will be very easy to find the distance between a person and an obstacle.

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 provide 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 is our 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 easily 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 issues were 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.

7.2 FUTURE WORK

The wearable technology for blinds resolves the existing technical problems. Nowadays, there are many instruments and intelligent devices for visually impaired people for navigation. Still, most of them have specific issues with carrying, and the major drawbacks are those that need a lot of training to use. One of the main peculiarities of this innovation is that it is affordable for everyone. There are no such devices available in the market that can be worn like cloth and have such a low cost and simplicity. When

used on a large scale, with improvements in the prototype, it will drastically benefit the community.

The wearable technology for blinds resolves the existing technical problems. Nowadays, there are many instruments and intelligent devices for visually impaired people for navigation. Still, most of them have specific issues with carrying, and the major drawbacks are those that need a lot of training to use. One of the main peculiarities of this innovation is that it is affordable for everyone. There are no such devices available in the market that can be worn like cloth and have such a low cost and simplicity. When used on a large scale, with improvements in the prototype, it will drastically benefit the community.

The prototype device has the following features:

It is a wearable technology for blinds.

It uses ultrasonic waves to detect obstacles.

It notifies the blocks/obstacle by vibrations and a buzzer sound.

In the future, the prototype device will be developed into a complete model using a PCB board. We plan to give this product to the National Association for the Blind for authorization. Once it gets approved by the NAB the device will be provided to blind the schools and homes related to blind people.

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APPENDIX

A. SOURCE CODE

```
int duration;
int distance;
void setup ()
{

    pinMode (13, OUTPUT) ;// led red pinMode
    (12, OUTPUT) ;// led blue pinMode (11,
    OUTPUT) ;// led green pinMode (10,
    OUTPUT) ;// piezo pinMode (9, OUTPUT) ;//
    vibrator pinMode (2, OUTPUT); // ultra-
    sonic sensor pinMode (3, INPUT);

    Serial.begin(9600);
```

```
}
```

```
void loop ()
```

```
{
```

```
    digitalWrite (2, HIGH);
```

```
    delayMicroseconds (10);
```

```
    digitalWrite (2, LOW);
```

```
    duration= pulseIn (3, HIGH);
```

```
    distance = (duration/2)/29;
```

```
    Serial.print("Distance:");
```

```
        Serial.print(distance);
```

```
        Serial.print("cm");
```

```
        Serial.print(" ");
```

```
    if(distance>320) {
```

```
        digitalWrite (11, HIGH);
```

```
        digitalWrite (10, LOW);
```

```
        digitalWrite (9, LOW);
```

```
        Serial.println("Safe");
```

```
    }
```

```
    else { digitalWrite (11, LOW);
```

```
    }
```

```
    if(distance>=150 && distance<320) {
```

```
        digitalWrite (12, HIGH);
```

```
        digitalWrite (10, HIGH);
```

```
        digitalWrite (9, HIGH);
```

```
        Serial.println("Mid-range");
```

```
        delay (2000); digitalWrite (10,
        LOW); digitalWrite (9, LOW);
    }
    else { digitalWrite (12, LOW);
        } if(distance<150) {
digitalWrite (13, HIGH); digitalWrite
(10, HIGH); digitalWrite (9, HIGH);
Serial.println("Unsafe"); delay (50);
digitalWrite (10, LOW); digitalWrite
(9, LOW);
    }
    else { digitalWrite (13, LOW);
    }
}
```

B. SCREENSHOTS

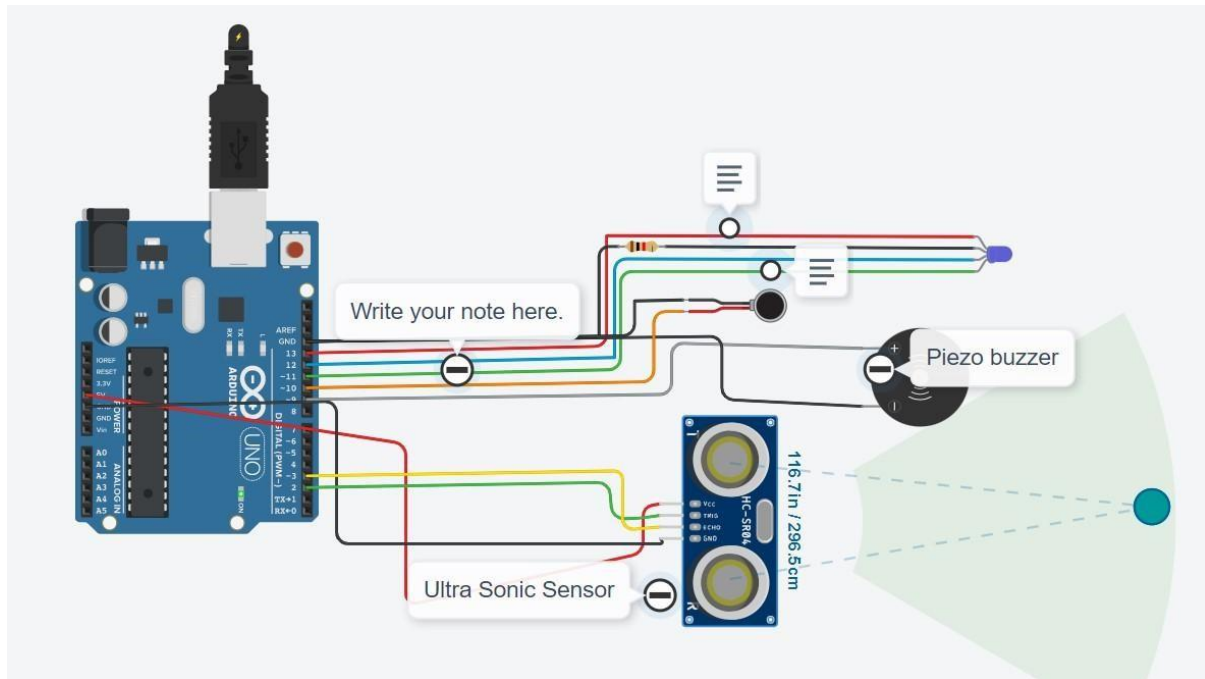


Fig.B(a) when obstacle met the ultrasonic sensor

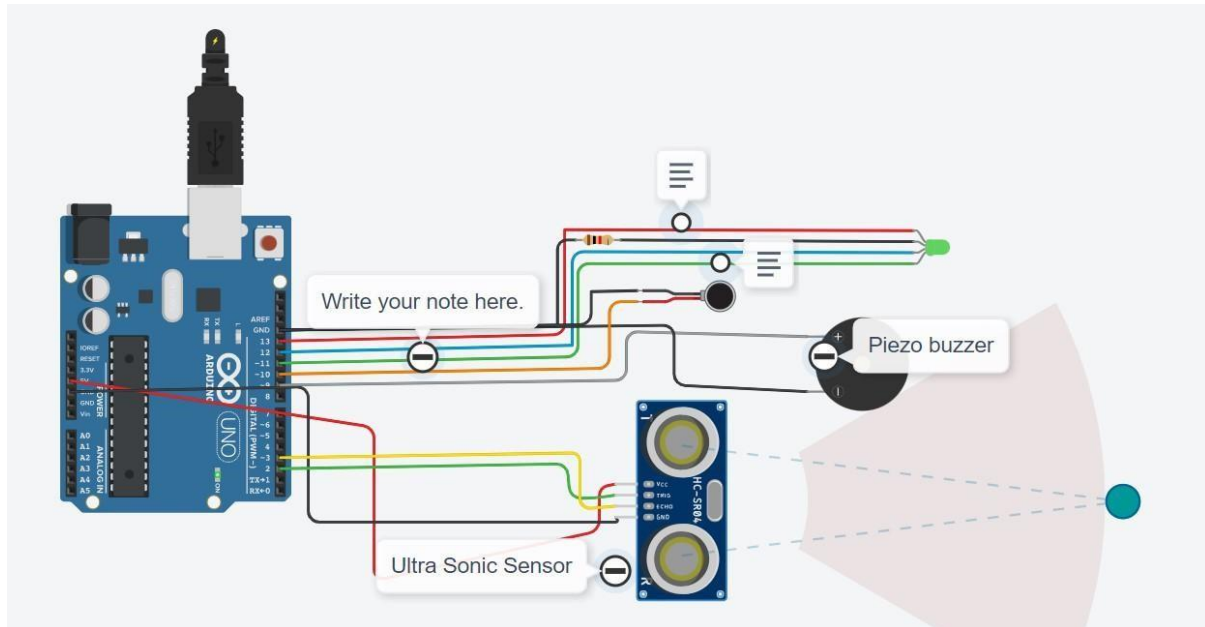


Fig.B(b) When obstacle doesn't meet the ultrasonic sensor

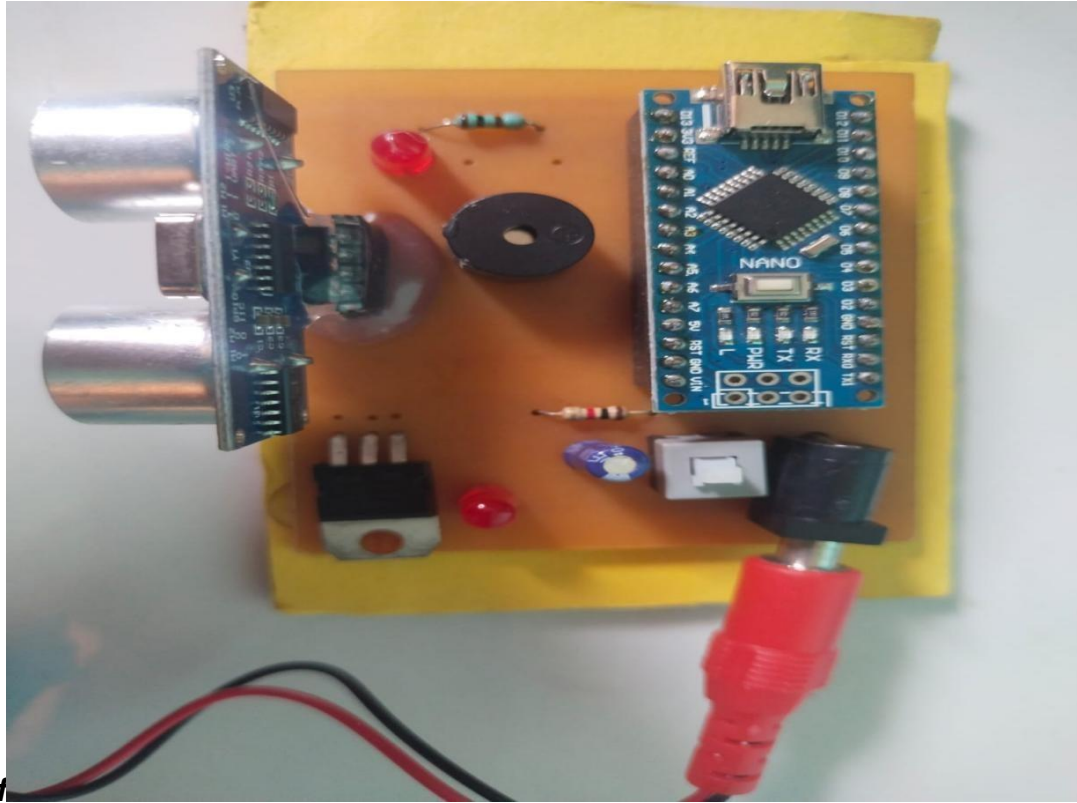


Fig.B(c): Device for the blind

C.RESERACH PAPER *Safety Device for blind*

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Abstract- Vision is the most beautiful and important gift that God has bestowed onto all of his creatures, particularly humans. Yet regrettably, some individuals lack this beauty and are unable to fully appreciate the splendour of our planet. Several academic fields, including software engineering, hardware design, and physics, went into the construction of a safety device for blind persons. It allows visually impaired people to see and explore the world with confidence and independence by using ultrasonic waves to detect nearby objects and alerting the user with a vibration or beeping sound. For those who are blind, this safety item can be a breakthrough. The board of the Arduino Pro Mini 328 is fastened using a band. This has an integrated ultrasonic sensor that consists of a module. The user may move efficiently and notice the items nearby by using this sensor module. This sensor alerts the user by beeping or vibrating at any location when it detects an item.

Key Words: Wearable band, buzzer, blind, persons, barriers, and ultrasonic.

I.INTRODUCTION

A person who is visually impaired is referred to as being blind, per the definition. Blind people are unable to see anything. We have come to the point where, while battling for the various degrees of comfort for the general populace, we have begun to entirely disregard those whose lives are wretched because they lack eyesight. In their daily lives, they encounter several difficulties. Because to their physical impairments, they live very different lives from those of normal people and are treated with cold indifference. To get from one place to another, they depend on other people. As sight is the primary sense of living, having this ailment makes it extremely difficult for a person to move around.

This task's intended audience—blind people or those who are visually impaired—will receive a device that will benefit both them and others who rely on others because they are blind. While wearing a band that emits ultrasonic waves that alert the wearer with a beep sound or vibration, a

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safety gadget for blind people can be an invention that gives them the confidence to travel from one place to another and between different locations. It can enable someone who is unable to move or recognise obstacles due to visual loss.

According to the WHO, 2.2 billion people worldwide have visual impairment. They deal with several problems on a regular basis. So, this gadget may be a breakthrough for those who are blind or physically challenged. Before to the invention of the white cane, people with physical infirmities utilised the ordinary whip, which was as effective but had several drawbacks.

Having a dog as a pet is the second strategy, which is expensive but beneficial. In order to enable the blind person travel with confidence and greater interest, this task—the development of a safety gadget for blind people—will be undertaken in a reasonable but extremely effective manner. The gadget serves as a blinds invention that helps to address any problem. Several of these technologies have helped blind individuals with their problems, but they have numerous drawbacks and need a lot of preparation and upkeep. At the moment, there are vast approaches and creative innovations accessible for physically challenged people. The proposed improvement stands out because it is equitable for all parties.

II. LITERATURE SURVEY

A variety of strategies, tools, and gadgets have been developed over the past several years to assist visually impaired persons in moving independently or freely around their environment without the need for further personal assistance. There aren't many parameters, but those that are there have certain constraints and limitations.

A computer vision-based aid for visually challenged people by N. C. Krishnan and R.

Anand [1]. This paper proposes an assistive device that uses computer vision algorithms to detect obstacles and employ tactile and audible signals in conjunction to provide the user feedback.

"A wearable obstacle detection system for the visually impaired using deep learning" by H. Tavakoli and M. N.

Shirazi[2]. This paper proposes a wearable device that uses deep learning algorithms to detect obstacles and employ a vibrationbased interface to report back to the user.

"A haptic device for mobility assistance of the visually impaired" by A. D. Kulkarni, P. S. Shinde, and P. V. Patil[3]. This paper describes a haptic device that uses ultrasound sensors to detect obstacles and provides feedback to the user through vibration patterns.

"Development of a smart cane for the visually impaired" by N. N. Nwankwo and E. A. Obot[3]. This paper presents the development of a smart cane that uses ultrasonic sensors to detect obstacles and provide the user feedback through a combination of auditory and tactile cues.

"Design and implementation of a low-cost obstacle detection and navigation system for the visually impaired" by S. K. Das and S. K. Mukhopadhyay[4]. This research suggests a low-cost obstacle detection system that employs infrared sensors and gives the user feedback using a combination of aural and tactile signals.

" Design and creation of a smart glove for visually impaired people to use for obstacle detection and navigation " by A. M. A. H. Amin and M. A. Rashid.[5] In order to identify impediments and give feedback to the user through a mix of aural and tactile cues, a smart glove that combines ultrasonic and infrared sensors is shown in this work.

"A review of wearable obstacle detection technologies for the blind" by A. R. I. Md. Nafis and M. N. Shirazi.[6] The efficiency of several wearable obstacle detection devices for the visually impaired in enhancing the mobility and safety of blind people is thoroughly examined in this research.

"A tactile navigation system for the visually impaired using a waist-mounted device" by Y.

Wang, H. Zhang, and C. Chen[7]. This paper proposes a waist-mounted device that uses vibration patterns to guide the user and provide feedback about obstacles.

"A smart cane with a pressure sensing system for the visually impaired" by A. R. A. Rahman, A. M. R. Iqbal, and S. S. Saha[8]. The smart cane described in this research employs pressure sensors to identify impediments and provide the user feedback via a combination of aural and tactile cues.

"Development of a low-cost wearable obstacle detection system for the visually impaired" by A. Ahmed, M. R. Islam, and M. N. Hossain[9]. The creation of a low-cost wearable device that employs ultrasonic sensors to identify impediments and give the user feedback via a combination of aural and tactile cues is described in this study.

III. PROPOSED WORK

The concept is based on a unique wearable gadget that uses an Arduino board and may be worn as a band or a fabric for blinds. Five modules that make up the device's five ultrasonic sensors are each attached to a different section of the body. There were four of them—two for the hand, two for the knees, and two for each set of shoulders. A person who is blind has two options: they can use one band or put it anywhere on their body that feels comfortable. In this project, we make use of hand-held gloves or wearable bands.

The safety tool for the blind has vibration buzzers, sensors, and ultrasonic sensors. The suggested device will use ultrasonic waves to identify impending impediments in the way of blind people. The ultrasonic sensor HC SR-04 is used in the system, which operates on the idea of ultrasonic waves. In essence, it transmits ultrasonic waves from one node and receives them from another node. It determines the object's distance by computing the duration between those reflecting waves.

When the user starts this device by tying it to the wrist, this device transmits ultrasonic waves through the ultrasonic sensor inside it. Ultrasonic rays are transmitted along the path in front of the

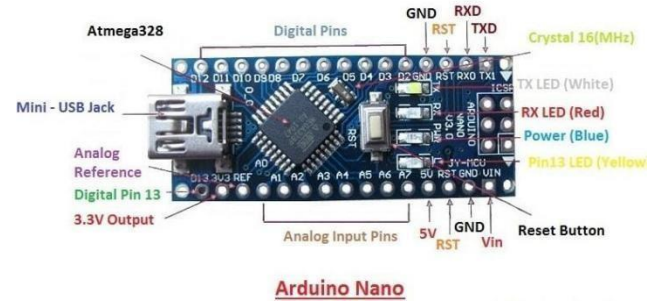
person and if they do not collide with any object or obstacle in that path, the process starts again. And if those ultrasonic rays hit any object or obstacle, then the ultrasonic sensor in the device gives commands to the buzzer and the alarm sound starts coming through the speaker from the buzzer.

Moreover, the device's vibration component provides information to the user. When receiving the notice, the user can utilise this gadget to switch off the alarm. A sensor that measures distance is called an ultrasonic sensor (HC-SR04). $\text{Time} = \text{Distance}/\text{Speed}$

A. Components used in this proposed system.

- **Arduino:** Arduino is an open-source electronics platform with straightforward hardware and software. An Arduino board can take inputs like a light on a sensor, a finger on a button, or a tweet and transform them into outputs like starting a motor, turning on an LED, or publishing anything online. Your board may be made to do a certain action by sending a set of instructions to its microcontroller. A microcontroller called the Arduino helps with object recognition and control in real-time environments and situations. It still remains despite the fact that it has been the focus of various advancements.
- **Less cost** – Comparing Arduino boards to other microcontroller platforms, they are less costly. It is possible to construct even the simplest Arduino module by hand, and even pre-assembled Arduino modules cost less than Rs 1000.
- **Simple programming interface** - The Arduino software is versatile enough to assist more experienced users while yet being user-friendly enough for complete beginners. For instructors, it is simple to build on the Processing programming environment.

□



1. **Ultrasonic Sensor:** Transceiver, transceiver receiver, and transmitter make up the ultrasonic sensor. In order to create sound waves, the transmitter transforms electrical signals. Sound waves are again converted into electrical signals by the receiver. Receiving and transmitting tasks are carried out by the transceiver. Crystal oscillators are also a part of it. In the ultrasonic sensor, it will carry out the stabilising process.



Figure 2. Ultrasonic sensor

2. **Buzzer:** A buzzer or beeper is a mechanical, electromechanical, or piezoelectric audio signalling device (piezo for short). Beacons and buzzers are frequently used as timers, alarm clocks, and to confirm human input such mouse and keyboard



motions.

Figure 3. Buzzer

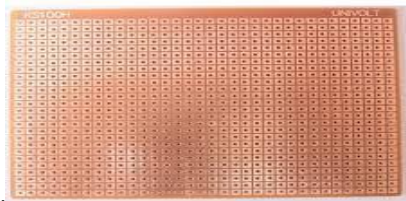
3. **Vibration Sensor:** Acceleration, proximity, or linear velocity may all be measured, visualised, and analysed using vibration sensors. A vibration sensor's operational concept is a sensor that uses various optical or mechanical principles to detect

observable system vibrations.



Figure 4. Vibration Sensor

4. **Zero PCB:** Electronic components are mechanically supported and electrically connected using a printed circuit board, or PCB. This is accomplished by employing signal lines, tracks, or conductive channels that are cut from copper sheets and fastened to a non-conductive substrate. On multipurpose Boards, circuits are frequently randomly integrated for running



gadgets.

Figure 5. Zero PCB

5. **Soldering iron:** A soldering iron is a hand tool used in soldering. Heat is required for the solder to melt in order for it to flow into the joint between two working parts. A soldering iron is made consisting of a heated metal tip and an insulated handle.



Figure 6. Soldering iron

B. Approach to the Suggested System:

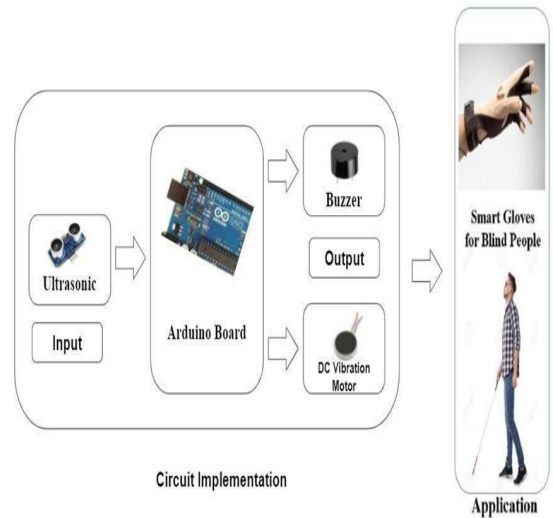


Figure 1: The block diagram the suggested system's illustration

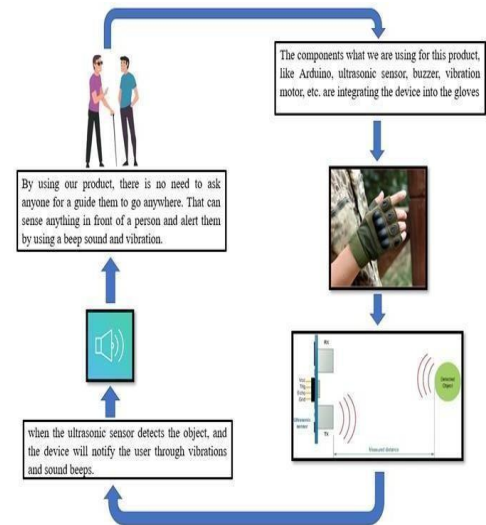


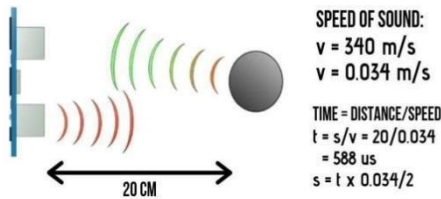
Figure 2: Approach to the Suggested System

The safety gear for the blind is a technology advancement that enables them to confidently traverse their surroundings and go from one place to another with the aid of a garment that produces ultrasonic waves that notify them with a buzz and vibrations. To create this product, an Arduino Nano board, and also it makes use of an ultrasonic sensor, a buzzer, and a vibration motor. The blind individual will be warned whenever the ultrasonic sensor identifies an object or impediment by a constant buzzing and vibrating sound until the way changes.

C. Working principle:

This gadget sends ultrasonic waves through the ultrasonic sensor when the user begins it by tying it on the wrist. Using the ultrasonic sensor HC SR-04, it operates on the idea of ultrasonic waves. In essence, it transmits ultrasonic waves from one node and receives them from a different node. It determines the distance from the object by computing the time gap between those reflecting waves.

A sensor that measures distance is called an ultrasonic sensor (HC-SR04). It produces ultrasonic at a frequency of 40000 Hz (40 kHz), which travels through the air and is blocked by everything in its path. To the module it will return.



The buzzer will beep in accordance with the distance and assist the individual in estimating the object's distance.

If there are no obstacles or objects in the way of the ultrasonic waves as they travel down the route in front of the person, the process repeats again. And if any objects or obstacles are struck by those ultrasonic beams, the device's ultrasonic sensor sends orders to the buzzer, which subsequently activates the alert sound through the speaker. Moreover, the safety device's vibration gadget provides information to the user. When receiving the notice, the user can utilise this gadget to switch off the alarm.

D. Proposed Algorithm

STEP 1: Choose the Arduino Mini device.

STEP 2: The Arduino's 5-volt pin is linked to the HC-VCC SR04's pin. **STEP 3:**

The Arduino D12 is linked to the HC-trigger SR04's pin.

STEP 4: The GND pin of the Arduino is linked to the Echo pin of the HC-SR04.

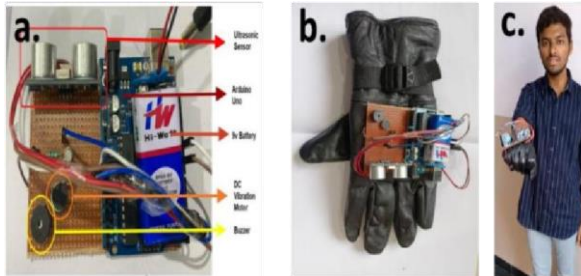
STEP 5: The 9-volt battery's positive terminal is attached to the Arduino's Vin pin, while its negative terminal is attached to the GND pin.

STEP 6: Between the Arduino D9 pin and the GND pin, there is a buzzer attached.

IV. RESULTS AND DISCUSSIONS

- ② The Arduino Nano, an ultrasonic sensor, a buzzer, a vibration sensor, a 9-volt battery, soldering wire, and connecting wires were used in the creation of the suggested safety device system.
- ② This project's basic idea is based on the moment an impediment is picked up by an ultrasonic sensor. As a result of the ultrasonic sensor's ability to reflect the waves it emits, which allows it to perceive them and determine distance based on range, the ultrasonic sensor's output waves are subsequently picked up by the buzzer. The trigger pin within the ultrasonic sensor starts the noise impulses or messages up to a certain distance. The signals are received by Arduino Nano, which acts as a mediator. It is used to read the inputs.
- ② Now that the buzzer is in operation, any obstacles encountered cause it to vibrate or emit a buzzing sound.
- ② People's living standards have increased, yet we have grown so materialistic that we have forgotten how difficult life is for persons with physical disabilities. They are subjected to harsh, uncaring treatment because they are physically disadvantaged. For their daily tasks, they start to become somewhat dependent on others. Those who are blind or otherwise disabled rely on others for all of their daily tasks. The ability of the outside environment to perceive knowledge is greatly impacted by the eyes, which are

responsible for watching and hearing the outside environment. As a result, blind persons cannot rely on their sight and consequently have several challenges when moving around in such an environment. This endeavour will assist them in overcoming the problems.



A novel solution to these problems is the obstacle detector project for blind people. The provision of help for the blind is suggested using a less complicated, portable, affordable, manageable, and effective system with many more astonishing qualities and advantages. The technology will make determining the separation between a person and an obstruction relatively simple.

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Figure: a picture of a circuit arrangement.a. circuit layout; b. gloves with a fixed circuit; c. a man wearing the prototype gadget.

V. CONCLUSION:

This project aims to develop a safety device for the blind, which will be very helpful to those who are blind and constantly rely on others. With the help of a buzzing sound or vibrations sent through a band or pair of gloves, the safety device for the blind project gives blind individuals the ability to move rapidly and confidently from one area to another.

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