SPECTACALES FOR VISUALLY CHALLANGED PEOPLE

MINI PROJECT REPORT

Submitted by

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Bonafide record of work done by

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ABSTRACT

Engineering solutions have involved in everyone's life, most importantly are those aiming to help people with disabilities, however, the modern assistance devices with their current prices are not meeting the requirements of the market. This project is mainly focusing on people with visual impairments . The components used in this project are Arduino nano, ultra-sonic sensor, vibrating motor. It effectively measures the distance between the person and the detected. The device we have proposed aims to help people with visual impairment.

The main motive of the project is to detect objects in front of visually challenged people by acknowledge them using buzzer. This device includes a pair of glasses and an obstacle detection module fitted in it in the center, a processing unit, an output device i.e. a beeping component, and a power supply. The Obstacle detection module and the output device is connected to the processing unit. The power supply is used to supply power to the central processing unit. The obstacle detection module basically consists of a ultrasonic sensor, processing unit consist of a control module and the output unit consists of a buzzer. The control unit controls the ultrasonic sensors and get the information of the obstacle present in front of the man and processes the information and sends the output through the buzzer accordingly. These glasses could easily guide the visually people and help them avoid obstacles

1. INTRODUCTION

The number of visually impaired people is growing over the last few years. According to the report of the world health organization (WHO), about 253 million people live with vision impairment. Among them, 36 million people are blind and 217 million have moderate to severe vision impairment. The major portion of visually impaired people is aged 50 or older and live in the developing countries. Everyday these visually impaired people face problems in understanding and interacting with the surroundings, particularly those which are unfamiliar. It is really hard for a blind person to go out alone and there are not so many available products that can assist them. However, Researches have been going on for decades for developing an effective device for visually impaired people. Some devices, such as Lightweight Smart Glass System with Audio Aid , NavBelt , Guidecane ,VA-PAMAID , Electronic Travel Aid , and etc. have been made.In this paper, we present a design for the smart glasses that can easily guide the visually impaired people and able to give proper direction.

2.THE PROPOSED MODEL

The circuit diagram of our proposed model is shown in Fig 2.1. The system has ultrasonic sensors, vibration motor with Arduino nano which all placed in a spectacle . The ultrasonic sensor are placed front side of the wearable device for perfect detection. In this way, an obstacle can be detected from front side.

When an obstacle comes near to the blind within the range of 1 meters, the sensors measure the obstacle distance and send the value to the microcontroller. Here the data from ultrasonic sensors are processed by Arduino nano microcontroller.

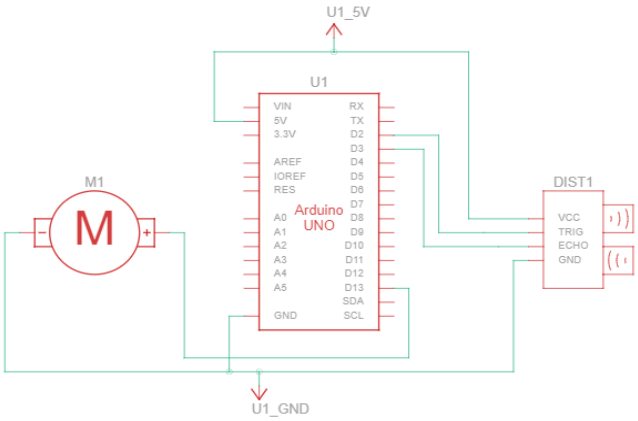

Fig. 2.1 Circuit diagram of the proposed model

3.COMPONENTS

3.1 Microcontroller: Arduino NANO:

Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board.

This board has many functions and features like an Arduino Duemilanove board. However, this Nano board is different in packaging. It doesn't 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.

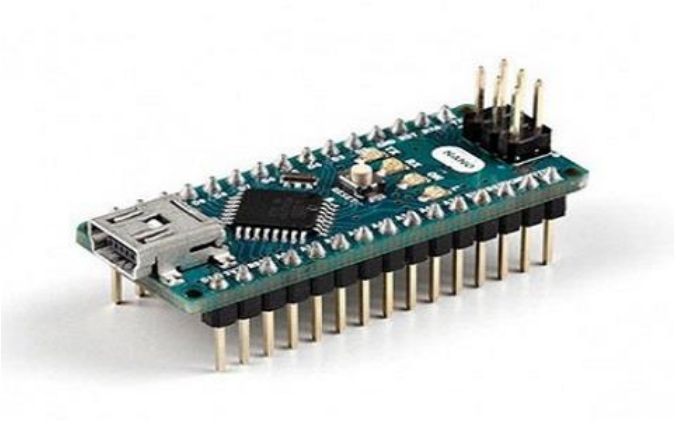

Fig 3.1.1-Arduino NANO

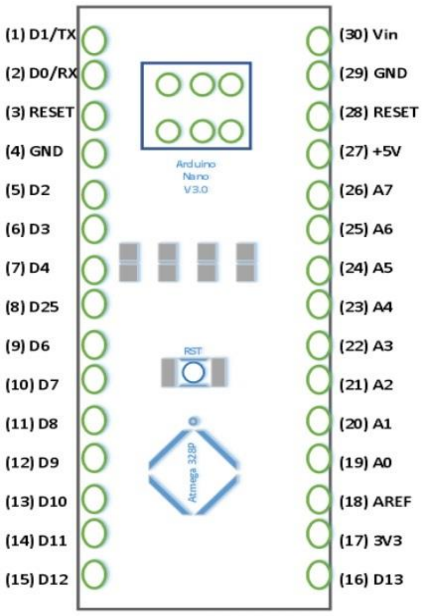

Fig 3.1.2-Pin out of Arduino NANO

Tab 3.1.1. Difference between Arduino UNO and Arduino Nano

Specifications	Arduino Uno	Arduino Nano
Processor	ATmega328P	ATmega328P
Input Voltage	5V / 7-12V	5V / 7-12V
Speed of CPU	16 MHz	16 MHz
Analog I/O	6 / 0	8 / 0
Digital IO/PWM	14 / 6	14 / 6
EEPROM / SRAM [kB]	1 / 2	1 / 2
Flash	32	32
USB	Regular	Mini
USART	1	1

Tab 3.1.2. Arduino Nano Technical Specifications

Microcontroller	ATmega328P – 8-bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage for Vin pin	7-12V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA
Flash Memory	32 KB (2 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz
Communication	IIC, SPI, USART

3.2.Ultra Sonic Sensor:

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

Fig 3.2.1 Ultra Sonic Sensor

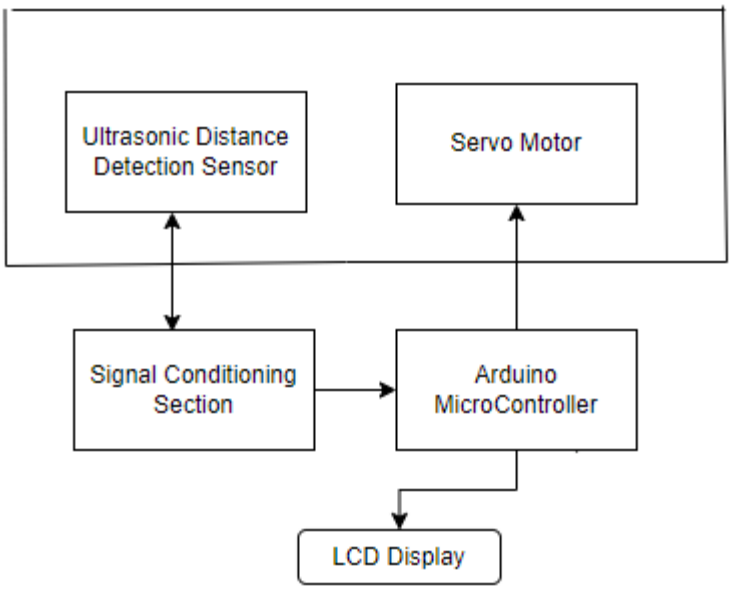

Fig 3.2.2 Ultra Sonic Sensor Block Diagram

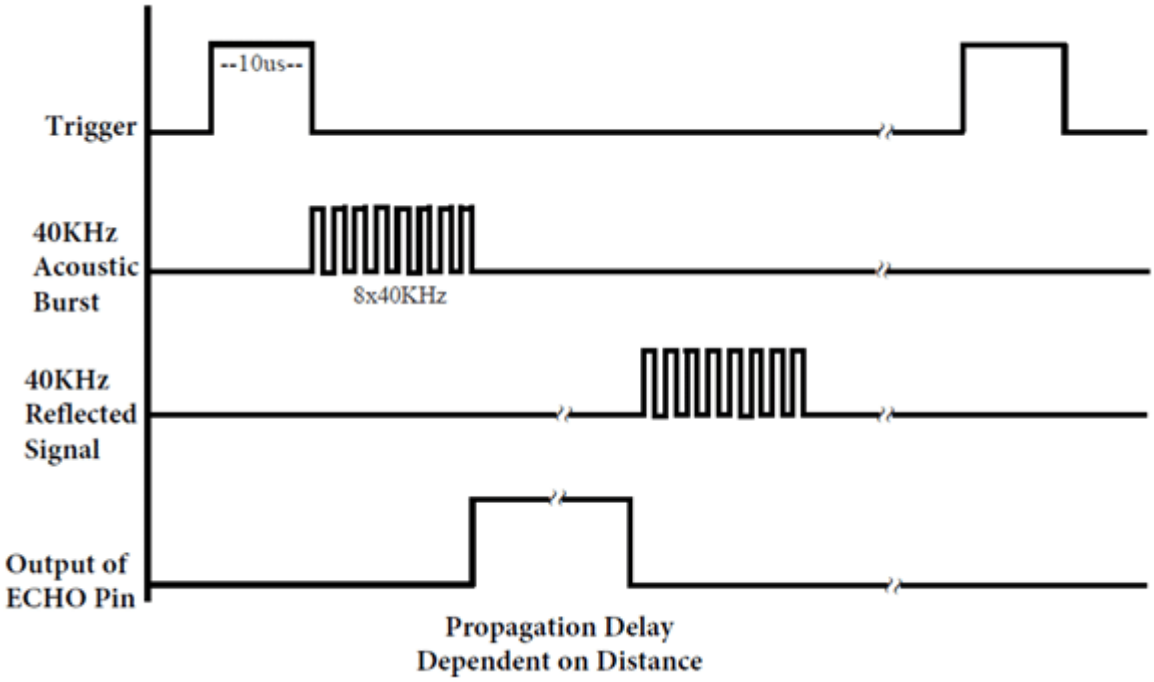

Fig 3.2.3. Ultrasonic Sensor Timing Diagram

3.3 Vibration Motor

Vibration motor is a coreless DC motor and the size of this motor is compact. The main purpose of this motor is to alert the user from receiving the call by without sound/vibrating. These motors are applicable for different applications like pagers, handsets, cell phones, etc. The main feature of this motor is, it has magnetic properties, lightweight, and motor size is small. Based on these features, the motor performance is highly consistent. The configuration of these motors can be done in two varieties one is coin model and another one is a cylinder model. The vibrator motor specifications mainly include type, max operating torque, max.centrifugal force, weight range, rated current and output.

Fig 3.3 Vibration Motor

Tab 3.3.1. Vibration Motor Specifications

Specification	Value	Measured in
Operating Voltage	3	V
Frame Diameter	10	mm
Body Length	3.4	mm
Voltage Range	2.5 – 3.8	V
Start Voltage	2.3	V
Weight	1.2	g
Rated Current	75	mA
Rated Speed	12000	rpm
Start Current	85	mA
Vibration Amplitude	0.8	G
Terminal Resistance	75	Ohm
Specification	Value	Measured in
Operating Voltage	2.2 – 3.6 DC	V
Rated Voltage	3.0 DC	V
Rotation	Clockwise	–
Motor Position	Operates in all positions	–
Operating Conditions	30 – 70^0C	Ordinary Humidity
Shaft end play	0.05 – 0.2 (Maximum)	mm
Mass	1.23	Grams
Holding strength of vibration weight	49N	–
Storage Conditions	40 – 80^0C	Ordinary Humidity
Rated Load	Counterweight	–

4.WORKING AND CONSTRUCTIONS

- The project work based on distance between user and object , the distance is calculated by using ultra sonic sensor, the sensor emits sound waves and these hits the object and reflections are captured by the sensor and thus it calculate the distance.By using arduino nano user can set the ranges for vibration, this vibration indicates that user is closer to the object.
- In order to accurately locate obstacles, the ultrasonic spectacles have an ultrasonic emitter in the centre of the spectacle frame and two ultrasonic receivers that work separately, have separate evaluating logics and are arranged at the left and right in the spectacle frame. The ultrasonic spectacle is designed in such a way that the sensors and vibration generators of the electronic ultrasonic system may be built into optical spectacles in order to assist vision.
- The advantages of ultrasound glasses are the quasi-digital distance specification and at separate recording of ultrasound signals in two Receivers with independent evaluations circuits, similar to a binaural system in the Hearing process. All obstacles can be turned by turning the head nisse in the field of view by size, Scan direction and distance.

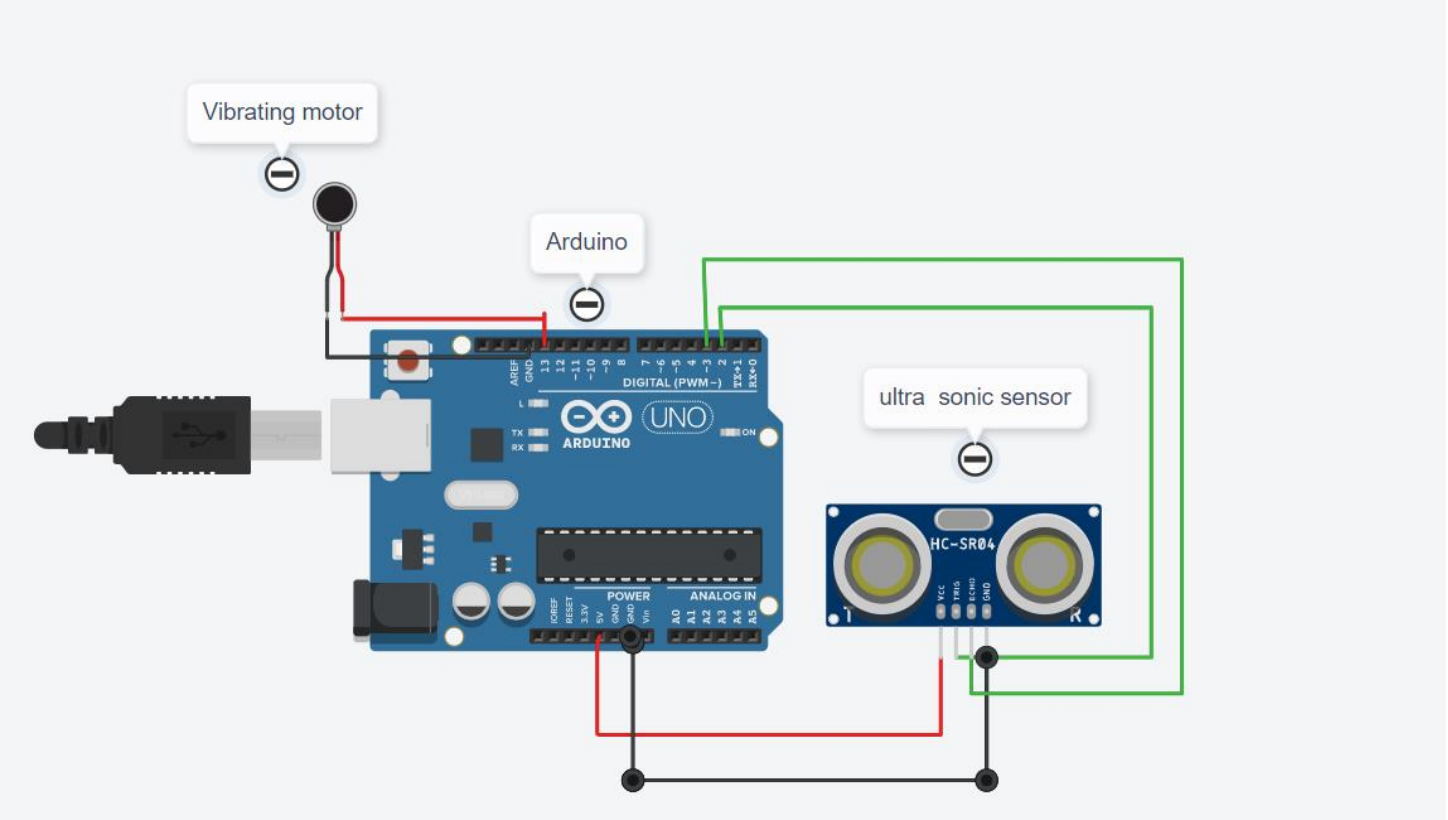

Fig 4.1. Simulated Circuit in Tinkercad

5.APPLICATION SOFTWARE

The Arduino IDE is generally developed using C language. David Mellis developed the Arduino software, which was based on Wiring. Before long, Gianluca Martino and Tom Igoe joined the project, and the five are known as the founders of Arduino.

Fig 5.1- Interface of the Arduino IDE

The IDE invented by these searches for the USB port devices i.e., Arduino UNO. The user just needs to select a particular port. When a particular port is selected, the IDE is ready to process it and to upload the program in it.

6. RESULT AND ANALYSIS

The aim of this project is to design and develop a spectacles for visually challenged people.

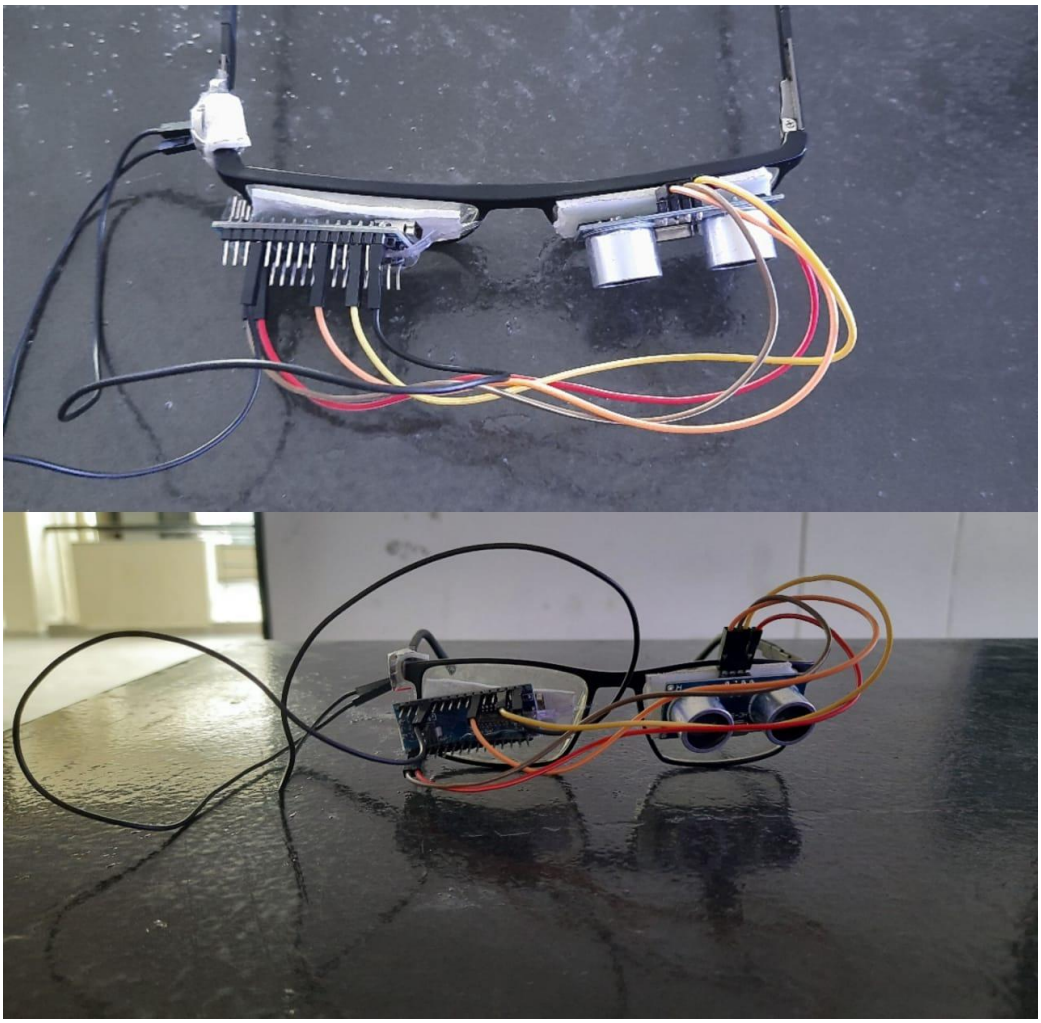

Fig 6.1 - spectacles for visually challenged people.

7. CONCLUSION

This project presenting a unique smart device for visually impaired users, which can help them to travel anytime avoiding any kinds of obstacle indoor and outdoor environment. Our proposed device is more comfortable and less expensive. The ultrasonic sensors are used in this device which is small, light in weight, and consume less power thus users friendly.

8. FUTURE SCOPE

Future research work will include

(I) making the system wireless and

(II) implementing image recognition to get the information of obstacle.

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10.APPENDICES

```
void setup() {
  // put your setup code here, to run once:

   pinMode(7,OUTPUT);
   pinMode(10,INPUT);
   pinMode(13,OUTPUT);
   Serial.begin(9600);
}

int distance;
void loop() {
  // put your main code here, to run repeatedly:
   digitalWrite(7,LOW);
   delay(2);
   digitalWrite(7,HIGH);
   delay(10);
  digitalWrite(7,LOW);
  distance =pulseIn(10,HIGH);
```

```
  if(distance *0.034/2<30){
        Serial.println(distance *0.034/2);
        digitalWrite(13,HIGH);
}
else
        digitalWrite(13,LOW);
        delay(500);
}
```

Serial.begin(9600) - Enables serial communication between components and ide with baud rate 9600

pinMode(pin,I/O) - Configures pin as input or output pin as user desire.

digitalWrite(pin,H/L) - configures pin as High or low voltage.

pulseIn(pin,H/L) - This function can be very useful to be able to read data from certain sensors.

delay(value) - delays for program for given value.