Bright Vision-Blind People Ultimate Assistant

A Mini Project Report Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

In partial fulfilment of the award of Degree of Bachelor of Technology in

Computer Science and Engineering

Submitted

By

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CERTIFICATE

This is to certify that the work embodied in this dissertation entitled **'*Bright Vision – Blind People Ultimate Assistant*'**, submitted by **V. Sai Charan Reddy (13881A05D4)** for partial fulfilment of the requirement for the award of **Bachelor of Technology** in **Computer Science and Engineering** discipline to Vardhaman College of Engineering, Shamshabad, Hyderabad (T.S) during the academic year 2016-17, is a record of bona fide piece of work, undertaken by the supervision of the undersigned**.**

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DECLARATION

I **V. Sai Charan Reddy (13881A05D4)** student of **Bachelor of Technology in Computer Science and Engineering, session: 2016 - 17,** Vardhaman College of Engineering, Shamshabad, Hyderabad, Telangana, hereby declare that the work presented in this Project Report entitled '***Bright Vision – Blind People Ultimate Assistant***' is the outcome of my own bona fide work and is correct to the best of my knowledge and this work has been governed by Engineering Ethics. It neither contains material previously published or written by another person nor does it contain material which has been accepted for the award of any other degree or diploma of the college or other institute of higher learning, except where due acknowledgment has been made in the text.

V .Sai Charan Reddy (13881A05D4)

Date:

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V. Sai Charan Reddy (13881A05D4)

ABSTRACT

Persons who are blind frequently suffering when exercising the most basic things of daily life and that could put lives at risk while traveling, so came up with the idea of this research in the design and manufacturing ultrasonic sensor handheld that benefit the blind by vibrating alert feature .Ultra Sensor can detect obstacles within the designed range (200 cm) to avoid the obstacles. It also helps blind person to recognise the device with RF transmitter and receiver. It helps blind people to differentiate day and light, which also helps them to turn off the lights to save power. It is all new and safest way to detect obstacles and avoid risks for blind people.

CONTENTS

1.INTRODUCTION

1.1 MOTIVATION

Could you imagine the life of a blind person? It is very hard for them to travel independently and can be quite difficult for them alone. They always need to depend on others or by using age old traditional white cane. White canes for the blind and visually impaired are one of the most important identification and mobility aids for people who are blind or have low vision. Blind people have used canes as mobility tools for many decades.

Fig 1.1 White Cane

White canes can assist blind people in all the ways, but it takes few months to get used to it. The main aim of inventing white cane is to assist blind people while travelling. Cane inflexible making the cane susceptible to snapping or cracking. It is very hard for blind people to use it while travelling in crowded places, placing cane in the car or cab and it requires more material in construction of the cane which results in heavy cane. Blind people who have problems with wrist, arm, shoulder and back issues find difficult to use it.

To overcome all the problems with traditional white cane we came up with an idea called smart bright vision wearable. This wearable looks like a wrist band which can do all the functionalities of white cane. For visually impaired persons it is easy to carry in all the places, easy to use and easy to get used to it. It can accurately detect obstacles in front of the person with a range of two metres. A visually impaired person can walk without anyone’s help. The wearable detects the obstacle and give a response to the person by vibrating the wearable.

How can a Bright Vision wearable for blind can replace a traditional white cane?

It is a smart way to solve the problems of visually impaired persons. It can effectively solve all the problems that are faced by white cane. It can be easily carried anywhere. It is very useful for visually impaired persons who have problem with wrist, arm, shoulder and back. It is cost effective, production cost for making blind stick is expensive because it is made of different materials (metal tip, wood). Production cost for this wearable is much less than a white cane. Visually impaired persons experience difficulty in finding white cane at homes, smart wearable can solve it by using RF transmitter and receiver which can signal them with a buzzer sound.

1.2 PROBLEM DEFINITON:

A white cane is used by many people who are blind and visually impaired. Its primary uses are as a mobility tool. But it has many disadvantages. Using them in crowded places, busy restaurants and placing them in cars is a big challenge for blind people. This white cane will make blind people a target for those who want to take advantage. Using white can in public is quite noticeable.

Bright Vision wearable for blind can overcome all the problems of white cane faced by blind and visually impaired. It can effectively recognise obstacles in front of person and can signal with the help of vibrating device. It can recognise obstacles in front of him and above him. It can detect obstacles within the range of two metres for providing maximum protection. Blind people find really hard to locate their blind stick, but with the help of Bright Vision wearable you can find your wearable easily with the help of buzzer sound.

1.3 OBJECTIVE : The main aim of this project is to ensure that the following objectives are met:

- **It should be easy to use and easy to wear.**
- **It should effectively scan obstacles in front of person and give signal using vibrating device.**
- **RF receiver and transmitter is used to locate the wearable in a room/house.**
- **Code written to detect obstacles should able to handle all the worse inputs and it should take decision correctly.**
- **Placement of ultrasonic sensors should be properly arranged. It should point away from the person to detect obstacles in front of him.**
- **Cost Effectiveness:** The material's used in making of the Bright Vision wearable should be below 500 Indian Rupees.
- **Power management:** This wearable should consume less power, and should give more battery life.
- **Operational efficiency:** To improve the operational efficiency by improving the quality of the process.

2. LITERATURE SURVEY

2.1 INTRODUCTION

From the research of human physiology 83% of information human being gets from the environment is via sight. The statistics by the World Health Organization (WHO) in 2011 estimates that there are 285 billion people in world with visual impairment, 39 billion of people are blind and 246 billion are with low vision. The oldest and traditional mobility aids for persons with visual impairments is the walking cane (also called white cane or stick).There are various technologies that are currently available to visually impaired people.

2.2 EXISTING SYSTEM:

Literature study shows that there are mainly two technologies that are embedded to the white cane for blind personals.

They are mainly as below:

(1) RFID information grid
(2) Mobile platform devices/sensors

RFID INFORMATION GRID: RFID is radio frequency identification device. It holds unique information such as number or symbol or text etc. It is passive device which is energized by interrogators EMF field. To form a information grid the RFID tags are arranged in such a way that it could describe the longitudinal and latitudinal position. The searching device enquires about the positional information and sends it to server by SMS. The server holds database with relational description of local position for reference send by SMS. It search in database for same and broadcast it on FM which could be heard by the enquirer's device. The big issue To Design RFID Based Cognition Device for Assistance to Blind and Visually Challenged Personal for Indoor Use in system is that the SMS sending and delivering time. Again the air calls traffic congestions. The personal device may work properly but server failure detection case cannot be solved. It is very expensive mechanism and it costs more.

MOBILE PLATFORM DEVICES/SENSORS:

These aid connect white cane to the mobile devices. Mobile device will get the location of the white can which is carried by the blind person using GPS. It gets the current location of the blind person and gives him direction thorough Bluetooth headset or wired ear phones. But it has many disadvantages. Mobile should always be connected to internet. Blind person has to carry white cane, mobile and earphones along with him. It adds extra burden along with him.

All the existing aids that assist blind people for mobility is linked with white cane. White can has many disadvantages. Existing aid adds extra weight and extra burden to blind person. These aids are very expensive and may not reach to all the visually impaired persons.

2.3 Proposed System

In order to overcome the difficulties in the existing method and to provide the cost effective and user friendly system for blind navigation, the following design is proposed. This design removes the difficulty in carrying the heavy white cane. All the existing methods which are embedded to the heavy white cane is now embedded to light wearable called Bright Vision. It looks like a fitness band which is fitted to the left hand and is very convenient to carry to all the places. It can perform all the functionalities of the modern white cane. It has three main functionalities they as following

(1) It can detect obstacles in front of the persons using ultrasonic sensors and gives the reply back to the person by vibrating device.

(2) It can able to tell a blind person whether light is switched on/off in his room.

(3) It can also help blind person to locate his device in his room/house by using RFID.

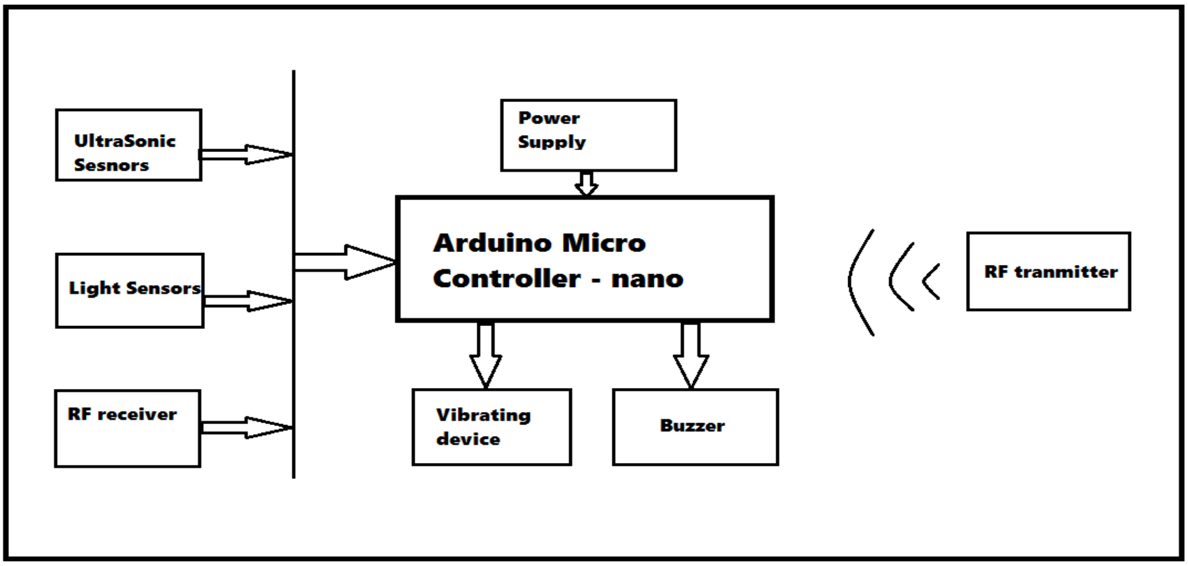


Fig 2.3 Block Diagram of the Bright Vision

3. ANALYSIS

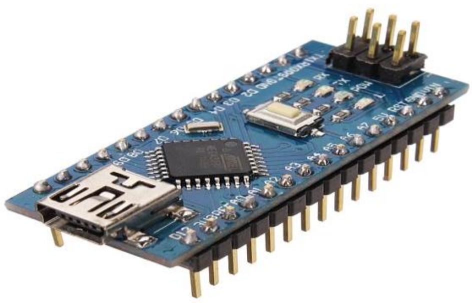
3.1 SYSTEM REQUIREMENT SPECIFICATION

3.1.1 Hardware Requirement:-

1. Arduino Nano micro-controller.
2. Ultrasonic sensors.
3. Piezo buzzer.
4. Light sensor (LDR).
5. Vibrator.
6. Micro switches.
7. Remote RF transmitter and receiver – 433 MHz
8. Power supply – 9V battery.
9. Connecting wires.
10. Hand gloves.

Hardware description:-

Arduino Nano:



Microcontroller	: ATmega328
SRAM	: 2 KB
EEPROM	: 1KB
Clock speed	: 16MHz
Operating Voltage	: 5V
Input Voltage	: 7-12 V
Digital I/O pins	: 14
Analog Input pins	: 8
DC current per I/O pin	: 40 mA
Flash memory	: 32 KB of which 2KB used by boot loader
Dimensions	: 0.73” X 1.70”
Length	: 45mm
Width	: 18mm
Weight	: 5g

Ultrasonic sensor:

Working voltage	: DC 5V
Working current	: 15mA
Working frequency	: 40Hz
Max range	: 2cm
Measuring angle	: 15 degrees
Dimensions	: 45X20X15mm

Piezo buzzer:

Operating voltage	: 3 to 30 V DC
Current consumption	: 9mA
Oscillating frequency	: 3.0 ± 0.5 KHz

Light sensor (LDR):

Resistance	: 400 ohms to 400 kOhm’s
Sensitivity	: 3msec
Operating voltage	: 3V to 12V

Vibrator:

Material	: Metal
Voltage	: 3V to 4.5V
Current	: 0.06A
Size	: 10X3mm

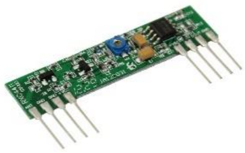
Micro switches:

Operating speed	: 1 m-sec
Type	: Push button

Remote RF transmitter and receiver:

Transmitter

Working voltage	: 3V - 12V of max. power use 12V
Working current	: < 40mA max , and min 9mA
Resonance mode	: (SAW)
Modulation mode	: ASK
Working frequency	: Eve 315MHz Or 433MHz
Transmission power	: 25mW (315MHz at 12V)
Frequency error	: +150kHz (max)
Velocity	: less than 10Kbps



Receiver:

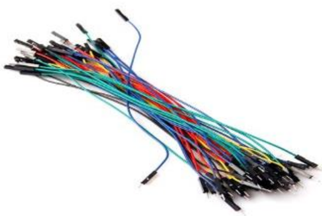
Working voltage	: 5.0VDC +0.5V
Working current	: ≤5.5mA max
Working method	: OOK/ASK
Working frequency	: 315MHz-433.92MHz
Bandwidth	: 2MHz
Sensitivity	: excel –100dBm (50Ω)
Transmitting velocity	: <9.6Kbps (at 315MHz and -95dBm)

Power supply:

Capacity	: 500 mAh
Typical drain	: 15 mA

Connecting wires:

Jumper wires	: As required



Hand gloves:

For holding the equipment with hand. All the controls will are embedded in this gloves.

3.1.2 Software Requirement:-

ARDUINO 1.6.12

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

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 and Genuino hardware to upload programs and communicate with them.

ARDUINO SKETCH

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

Libraries: Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. #include statements at the top of the sketch and compile the library with your sketch. Because libraries are uploaded to the board with your sketch, they increase the amount of space it takes up. If a sketch no longer needs a library, simply delete its #include statements from the top of your code.

Serial Monitor: Displays serial data being sent from the Arduino board (USB or serial board). We can also send the serial data from the code to other devices for communication.

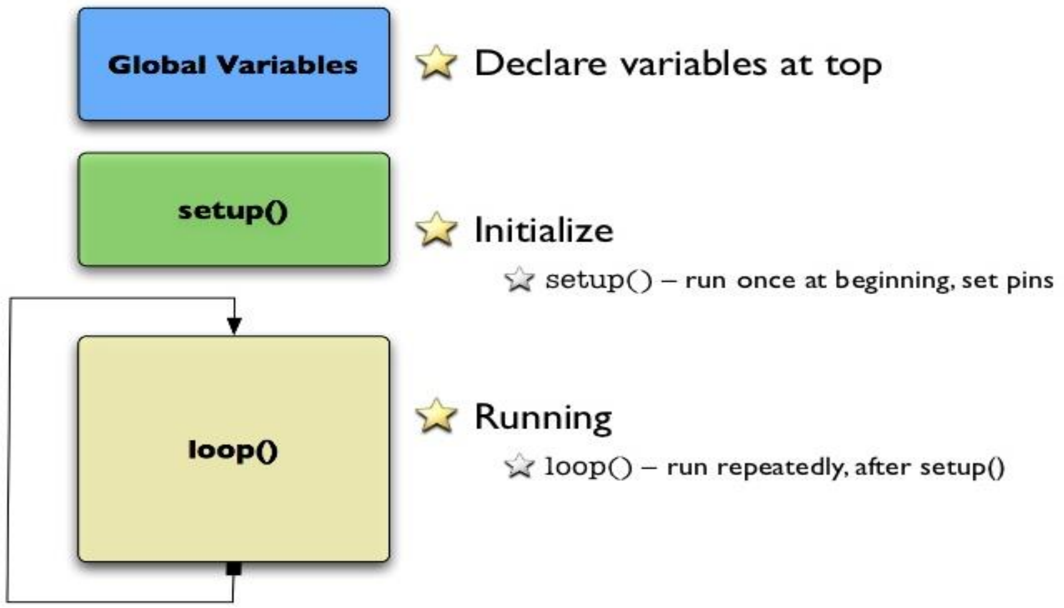


Fig 3.1.2.1 Arduino Sketch Structure

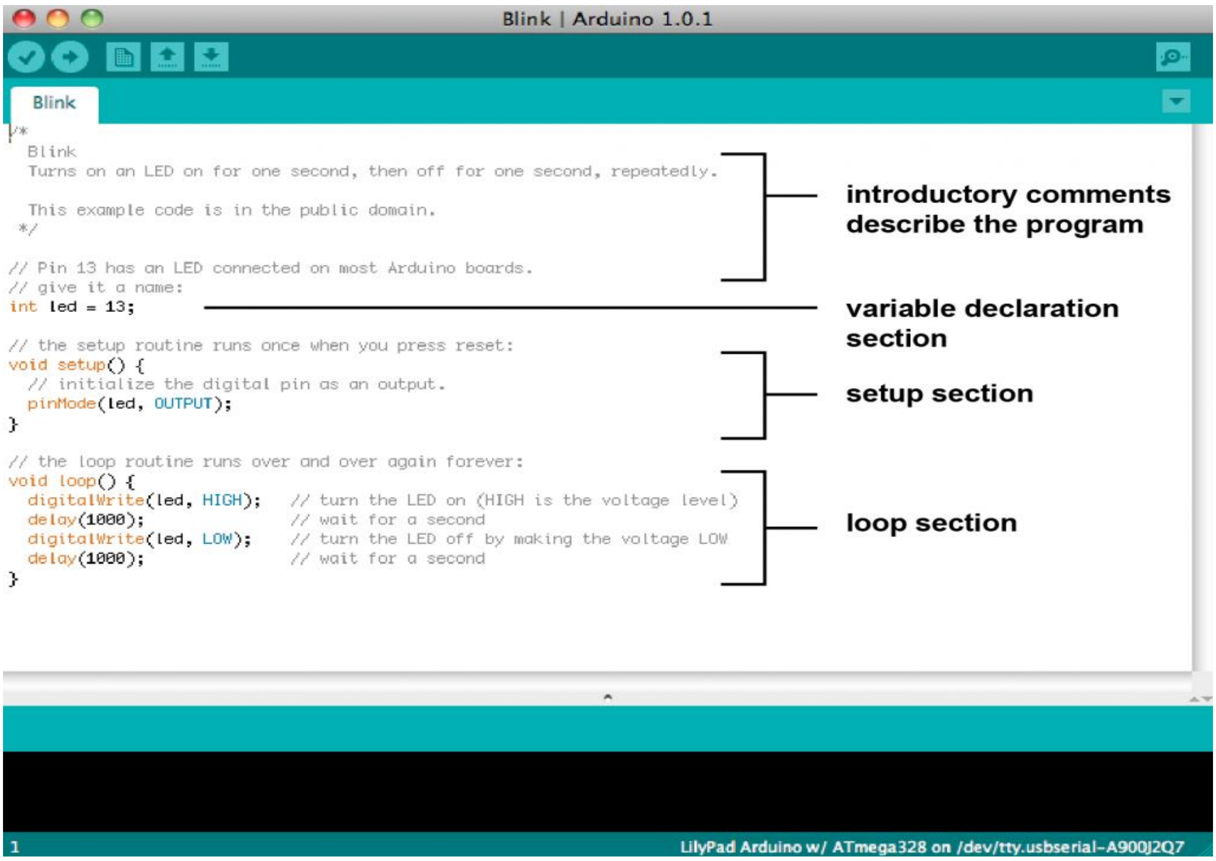


Fig 3.1.2.2 Arduino 1.6.12 Environment

3.2 PRODUCT REQUIREMENT SPECIFICATIONS

3.2 .1 Functional Requirements:

Functional requirements specify which output file should be produced from the given file they describe the relationship between the input and output of the system, for each functional requirement a detailed description of all data inputs and their source and the range of valid inputs must be specified.

User Interface:

Light Sensor:

(Input element)

Sensor gives output as logic 1 when it is exposed to light and gives logic 0 when no light is detected. This sensor is used to identify whether there is light or not in a room so that the user can switch off the lights when there are no one in the room and save electricity. Here we use an LDR (Light Dependent Resistor) sensor to detect the light and gives the respective output as input to the micro controller.

Ultrasonic Sensor:

(Input element)

Sensor gives output as logic 1 when an obstacle is detected at a particular distance and gives logic 0 when no obstacle is detected. This sensor is used to avoid the obstacles coming from the opposite direction. Ultrasonic sensor detects the obstacle and sends logic 1 as input to the micro controller.

Remote:

(Input element)

Remote equipment is connected to a transmitter whose pair receiver is connected to the micro controller. Here an RF transmitter and receiver is used to perform this operation. When the button on the remote is pushed it sends a logic 1 signal to the transmitter which again transmits a signal to the receiver connected to micro controller as an input. This device is used to find out where the band is present when it is misplaced.

Vibrator button:

(Output element)

Vibrator flat button has an oscillator in it which gives a vibration. When a logic 1 signal is sent as output from the micro controller to the vibrator it gives vibrations. It is placed in contact with the skin of the user so that the user can get the signal when the obstacle is approaching him.

Piezo buzzer:

(Output element)

Piezo buzzer gives out an audible sound to the user. It is used to notify the user where the band is as well as the presence of light in his environment. When a logic 1 signal is received from the output of micro controller to the buzzer it gives a buzzing sound. It gives sound when the remote button is pushed and also when there are lights in the room.

Arduino Nano:

(Control unit)

Arduino Nano is a micro controller which directs the input and output devices connected to it. It receives and sends logic 1 and logic 0 signals between the devices according to the code embedded into it. It also directs the analog signals within it. It is attached to the band the user holds.

3.2.2 Non Functional Requirements:

Describe user-visible aspects of the system that are not directly related with the functional behaviour of the system. Non-Functional requirements include quantitative constraints, such as response time and accuracy.

Performance Requirements:

Some Performance requirements identified is listed below:

- Arduino Nano must operate with a speed of 16MHz.
- Ultrasonic sensor must operate with a speed of 40Hz.
- The obstacle must be at a distance less than or equal to 100cm.
- RF transmitter and receiver must operate with a speed of 433MHz.
- The RF transmitter and receiver must be within the range of 2km to give response.
- Baud rate must be set to 115200 when code is being dumped into the micro controller.

Security:

Security of the product relies on the usage of the user. The user need not have support of the other person while walking. He can find his device even when misplaced by using the remote.

Maintainability:

The devices connected to the hand gloves are almost hidden and covered. Hence the probability of damaging the device is very low and can be maintained flexibly.

Reliability:

The product can mostly be used in closed or dry conditions. It cannot be used in rainy weather. Further developments are made in adding more features into the product like a reader, location teller, a personal guider with speaker and mic and also making it water resistant.

Usability requirement:

This product is made with whole and soul for the help of visually challenged people. They need to wear a band to their hand which consist of the whole device connected to it. This will lead them to their desired destination without the help of a second person.

Availability:

Roughly estimated price of the product is 500 rupees. This can be made available to all the blind people on demand.

4. DESIGN

4.1 INTRODUCTION:

SDLC Methodologies: This document play a vital role in the development of life cycle (SDLC) as it describes the complete requirement of the system. It means for use by developers and will be the basic during testing phase. Any changes made to the requirements in the future will have to go through formal change approval process.

The following diagram shows how a spiral model acts like:

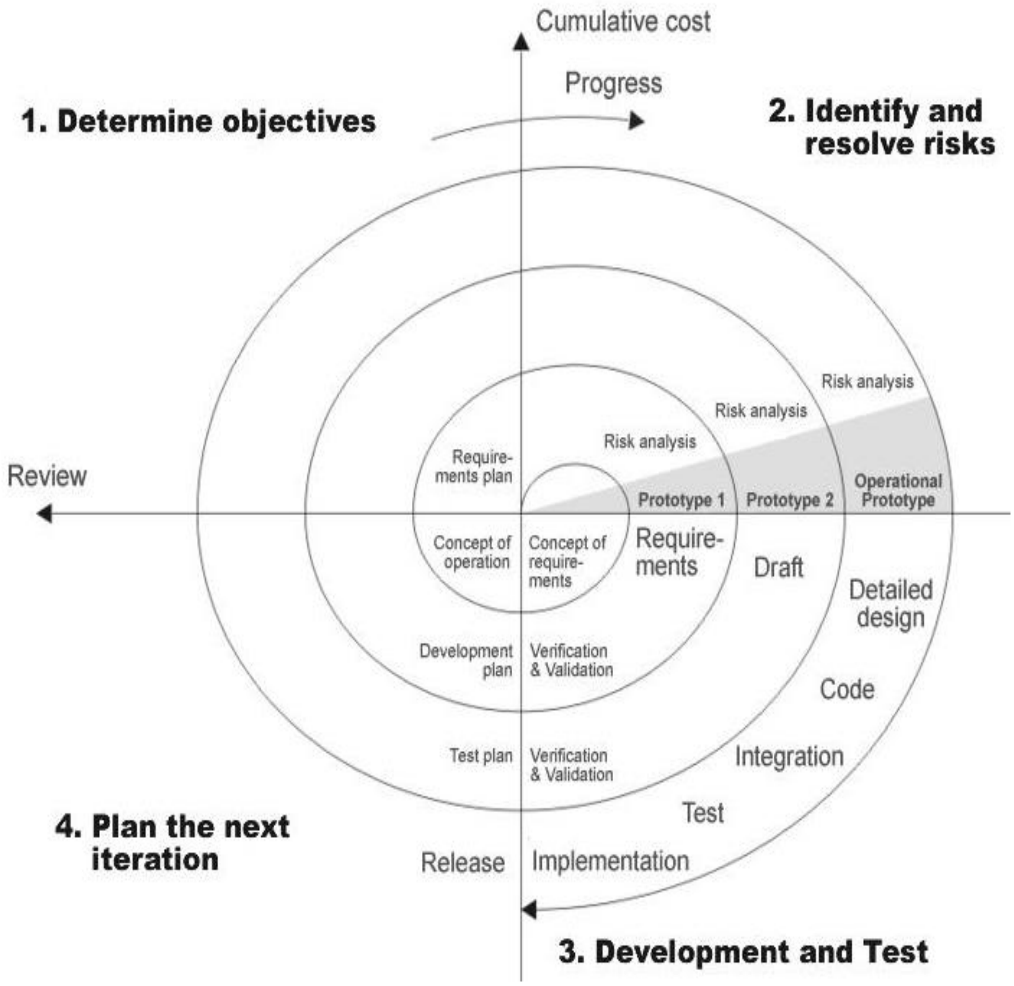


Fig 4.1 Spiral Model

4.2 UML DIAGRAMS:

4.2.1 Data Flow Diagrams:

The diagrams mentioned below describe the logical data from among various levels of the system.

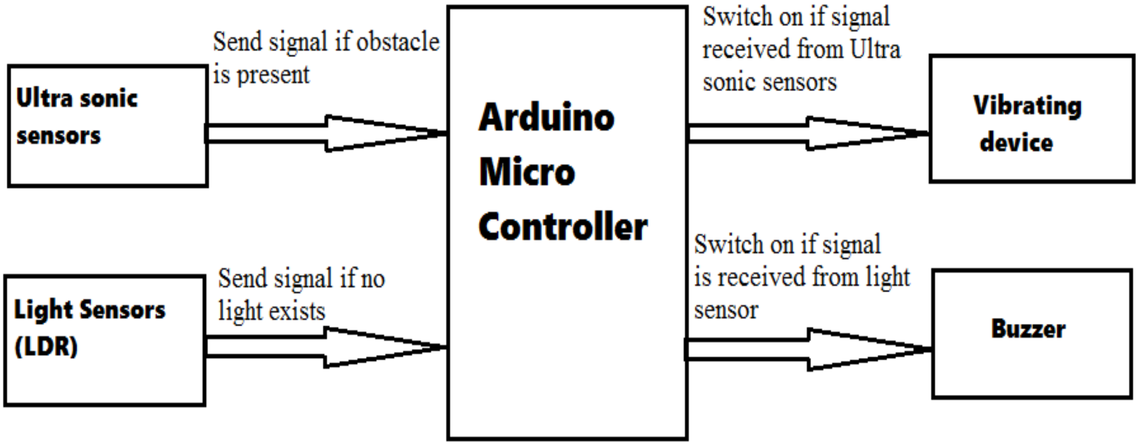


Fig 4.2.1.1 Detection of obstacle in Bright Vision

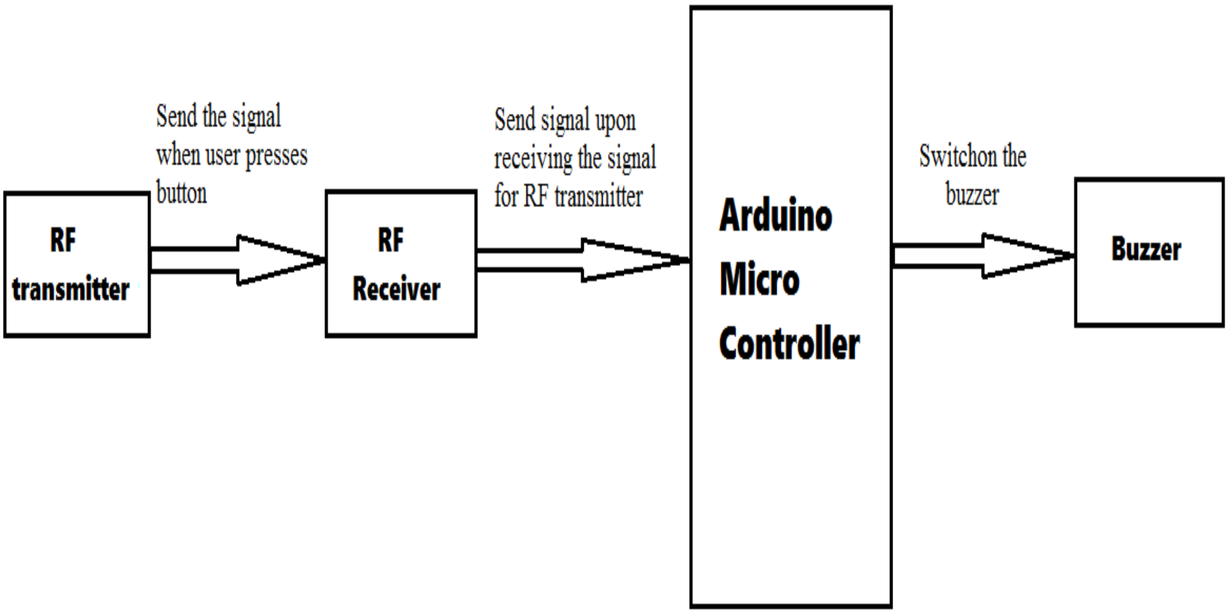


Fig 4.2.1.2 Finding of Bright Vision using RFID

4.2.2 Use case Diagram

The most important step to fully understanding the requirements and scope of this system was the creation of this use case diagram. A **use case diagram** at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

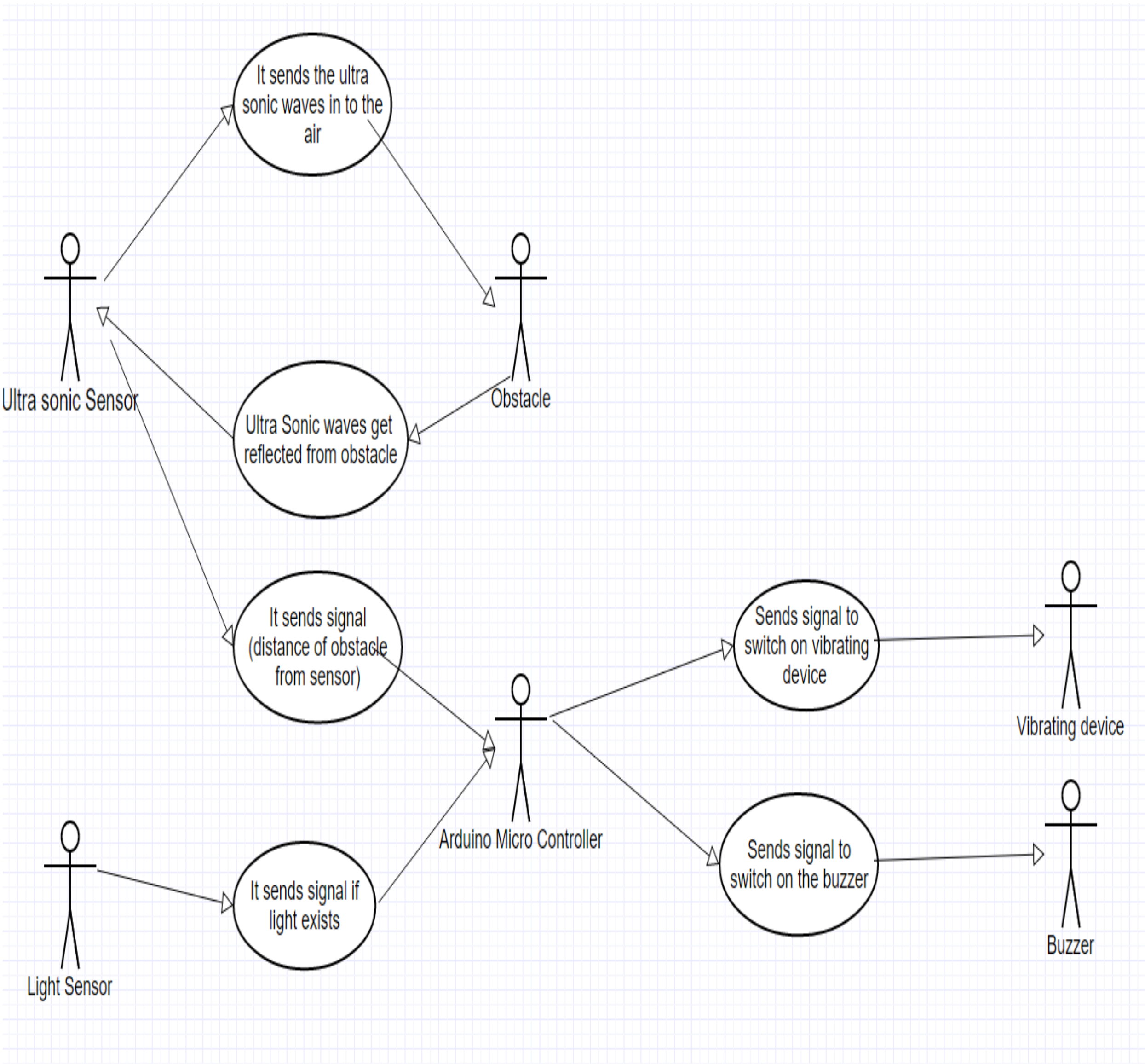


Fig 4.2.2 Use Case Diagram for Bright Vision System

4.2.3 Activity Diagram:

The activity diagram focuses on representing activities or chunks of processing which may or may not correspond to the methods of classes. An activity is a state with an internal action and one or more outgoing transitions which automatically follow the termination of the internal activity. Fig 4.2.3 shows the activity diagram of working of Bright Vision.

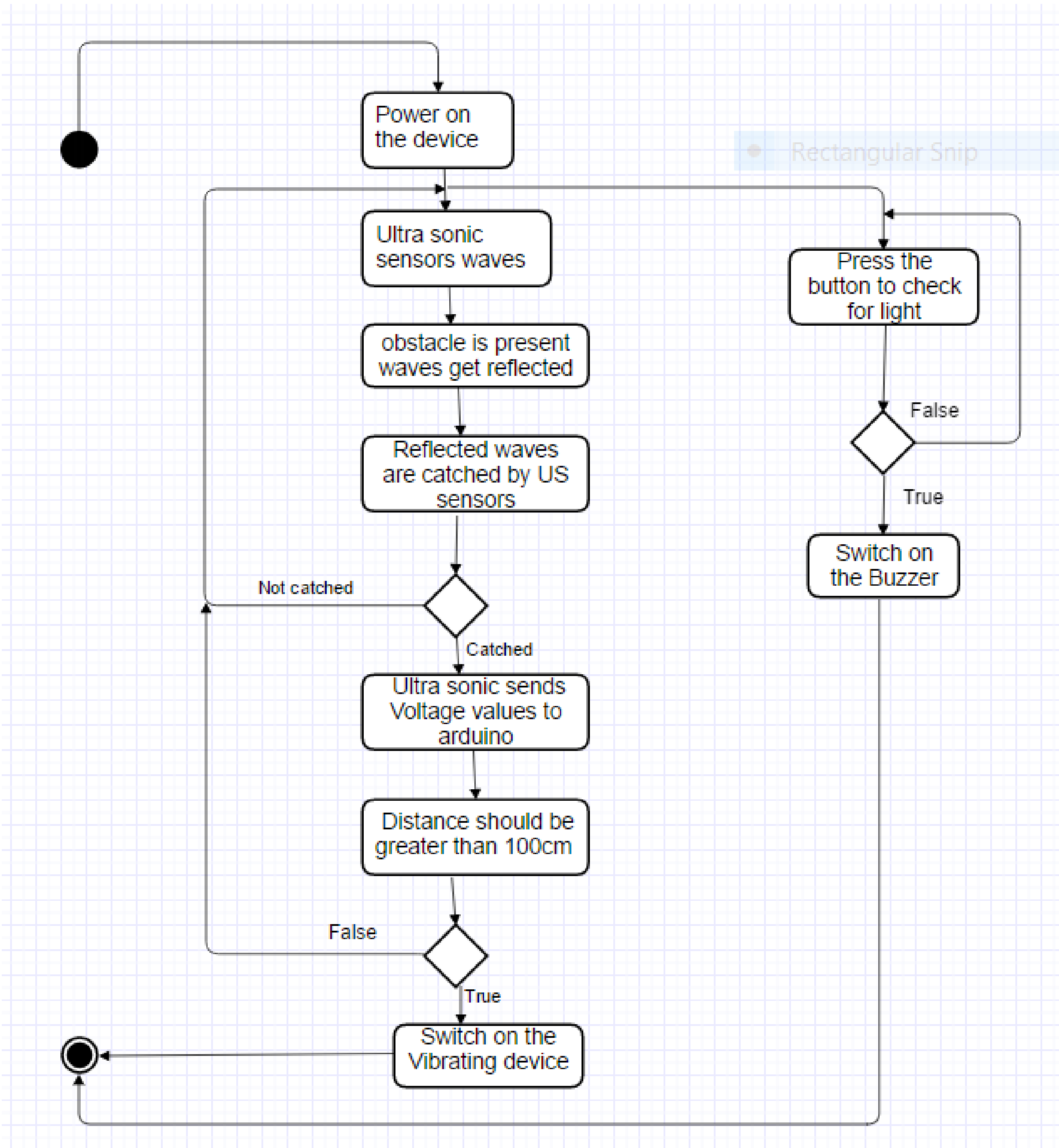


Fig 4.2.3 Activity diagram of working of Bright Vision

4.2.4 Sequence Diagrams:

The next step in the conceptual design phase was to draw some basic sequence diagrams. The sequence diagrams created were very rough and were mainly used to solidify the knowledge of the systems objects that had been presented in the class diagram.

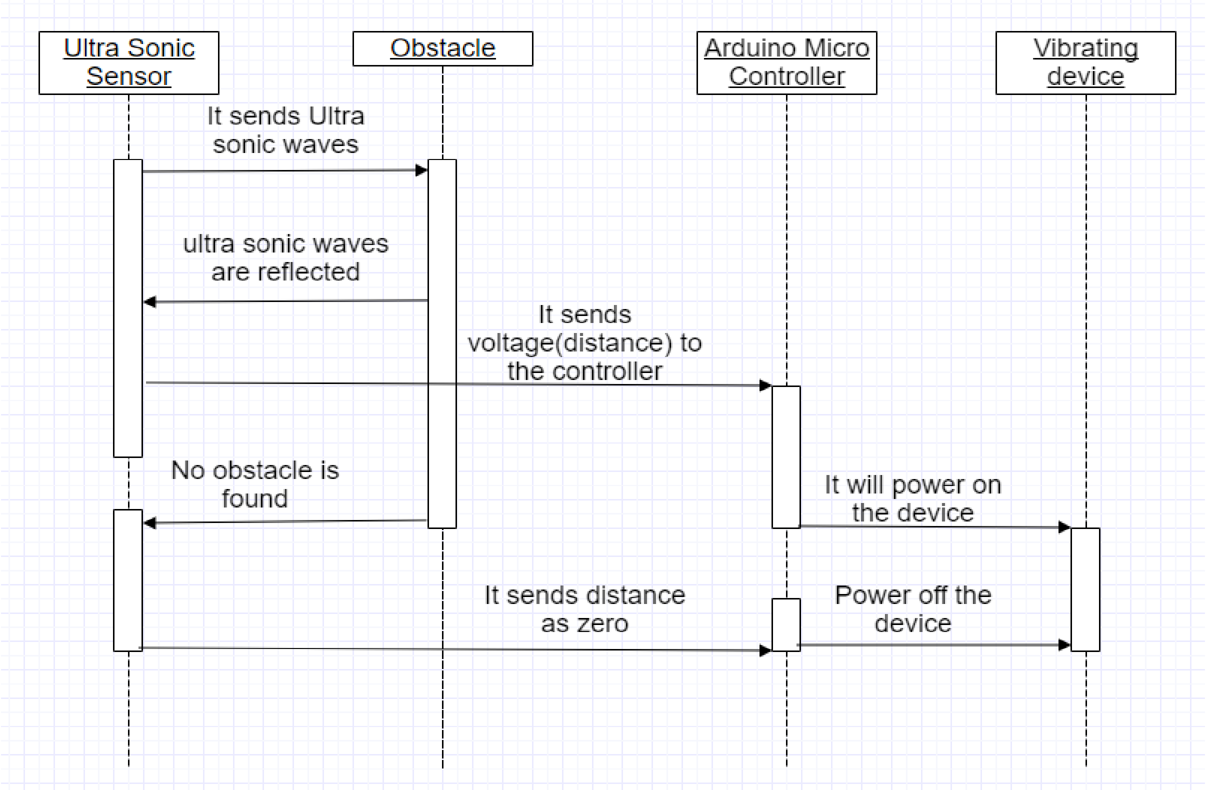


Fig 4.2.4.1 Sequence diagram of Bright Vision detecting obstacles

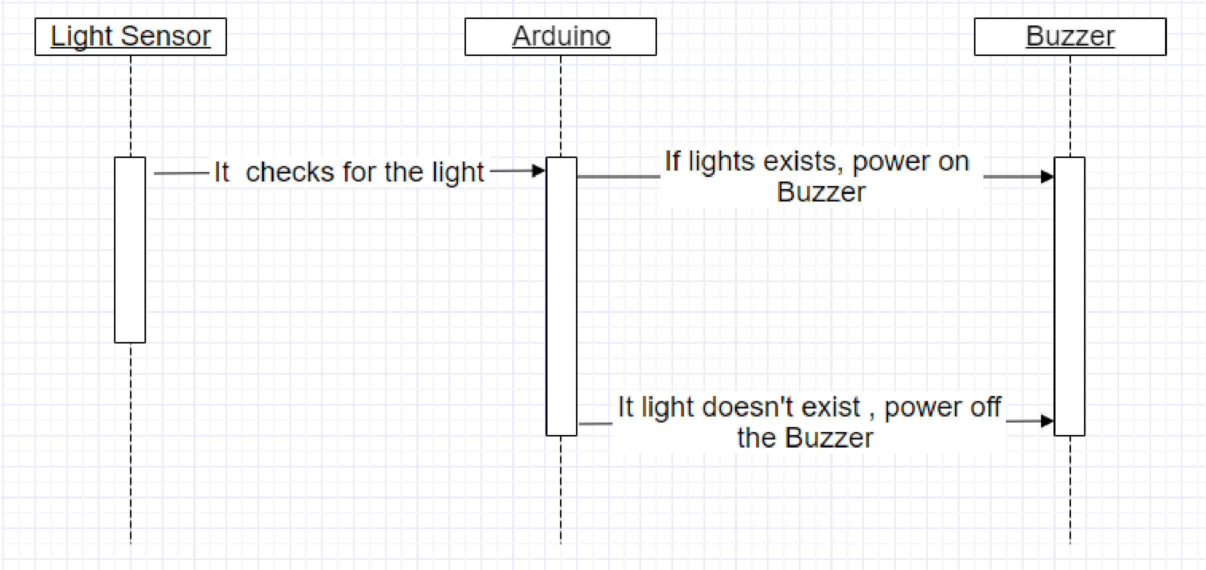


Fig 4.2.4.2 Sequence diagram of Bright Vision detecting light

5. IMPLEMENTATION AND RESULTS

5.1 BUILDING THE SYSTEM

Architecture:

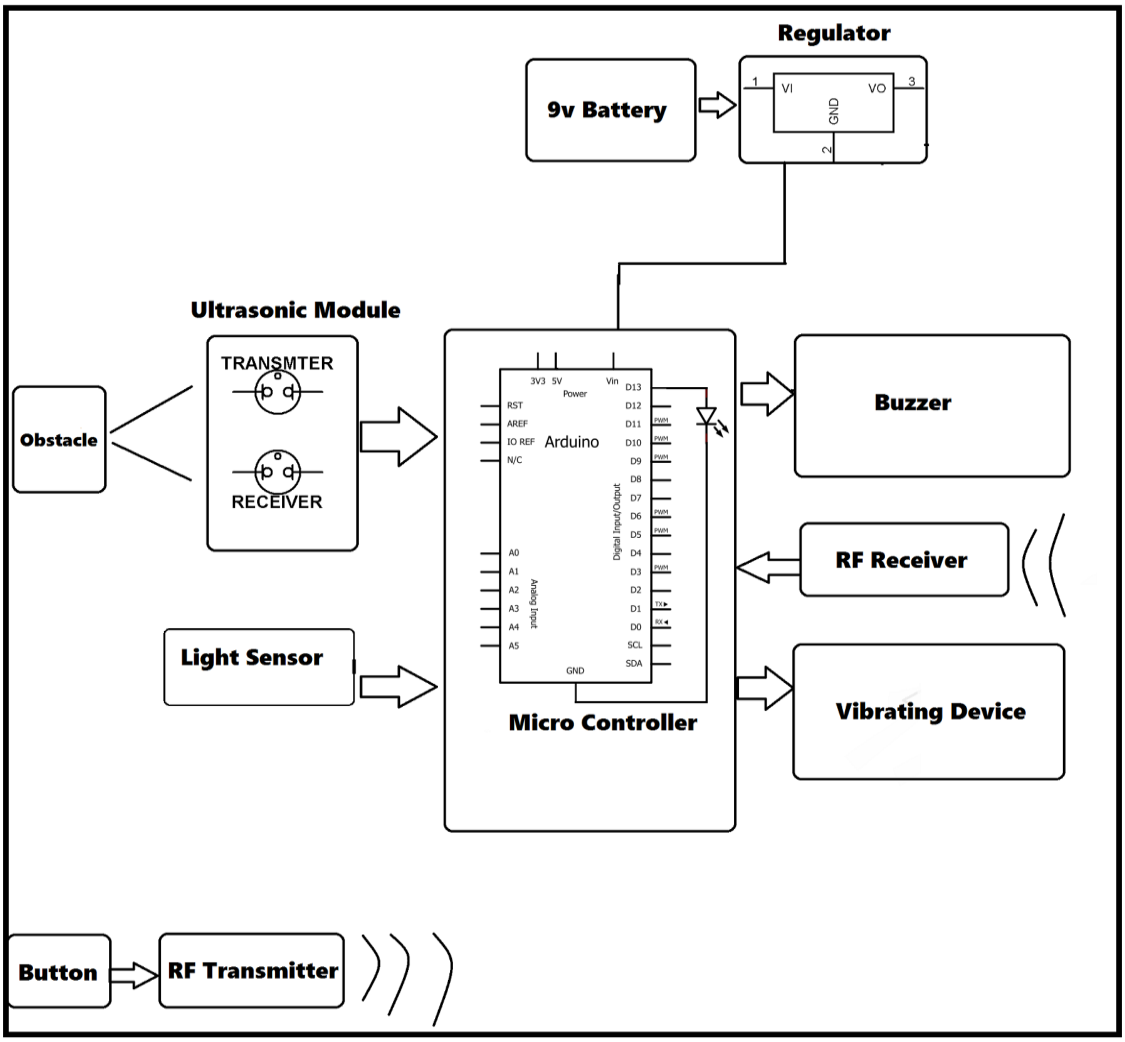


Fig 5.1 Architecture of Bright Vision

Architecture of Bright vision contains Arduino micro controller, Ultrasonic sensor module, light sensor, RF transmitter and receiver, buzzer and vibrating device. This architecture gives complete information of how data is travelled between sensors to microcontroller and microcontroller to signalling devices. RF transmitter transmits signals only when button is pressed, RF receiver tries to get the signals and transmit them to the microcontroller. Microcontroller which is powered by 9v battery have complete control logic to drive all the components connected to it.

5.2 IMPLEMENTATION OF ULTRASONIC SENSOR WITH ARDUINO

Ultrasonic sensors are used to find the distance of the obstacle. To implement ultrasonic sensor with Arduino, we need to include one package called NewPing.h package. It contains all the methods to communicate with the ultrasonic sensor. Ultrasonic sensor will have three pins trigger, echo, voltage and ground. Connect echo and trigger to digital pins of micro controller. Make a call to inbuilt function sonar function, it will have three parameters they are trigger pin number, echo pin number and maximum distance of obstacle.

Code to initialise ultrasonic sensor:

```
#include <NewPing.h>
#define TRIGGER_PIN  4
#define ECHO_PIN     3
#define MAX_DISTANCE 200
NewPing sonar (TRIGGER_PIN, ECHO_PIN, MAX_DISTANCE);
```

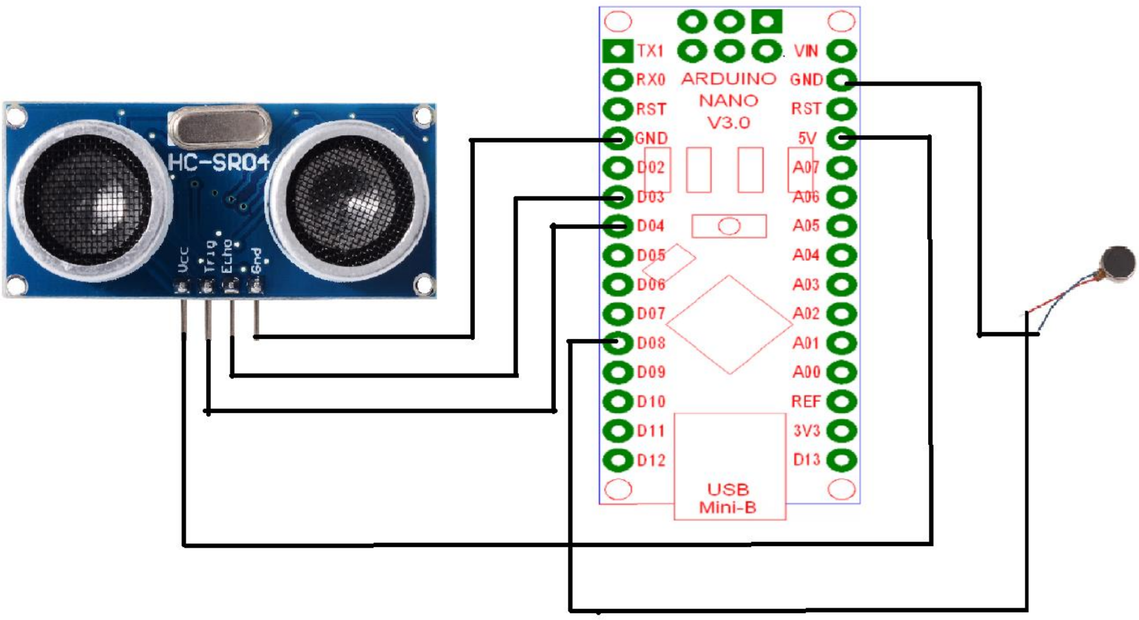


Fig 5.2.1 Implementation of ultrasonic sensor with Arduino

Sonar.ping_cm () function is used to get the distance of obstacle from ultrasonic sensor in centimetres. If the distance of obstacle is less than 80 centimetres then vibrating device starts vibrating.

5.3 IMPLEMENTATION OF LIGHT SENSOR WITH ARDUINO

Light sensor is used in Bright Vision is LDR. LDR stands for Light Dependent Resistor. An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits.

Fig 5.3.1 Typical LDR

The circuit shown above shows a simple way of constructing a circuit that turns on when it goes dark. In this circuit the LDR and the other Resistor form a simple 'Potential Divider' circuit, where the centre point of the Potential Divider is fed to the Base of the NPN Transistor.

When the light level decreases, the resistance of the LDR increases. As this resistance increases in relation to the other Resistor, which has a fixed resistance, it causes the voltage dropped across the LDR to also increase. When this voltage is large enough (0.7V for a typical NPN Transistor), it will cause the Transistor to turn on.

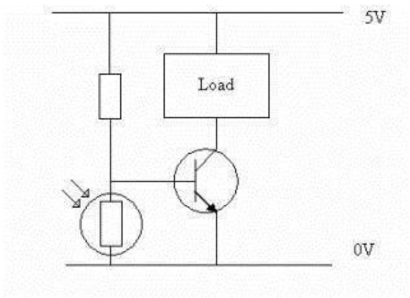


Fig 5.3.2 LDR controlled transistor circuit

Implementation: Button is pressed by the blind person to check whether light is turned on in his room/house and to know whether it is day/night. If light is present LDR detects it and gives value either 1 or 0 to the Arduino. 1 represents light exists and 0 represents light doesn’t exist. If light is present Arduino will give a signal to buzzer to make sound. It signals until light is switched off. Light sensor will not work until and unless button is pressed by the blind person.

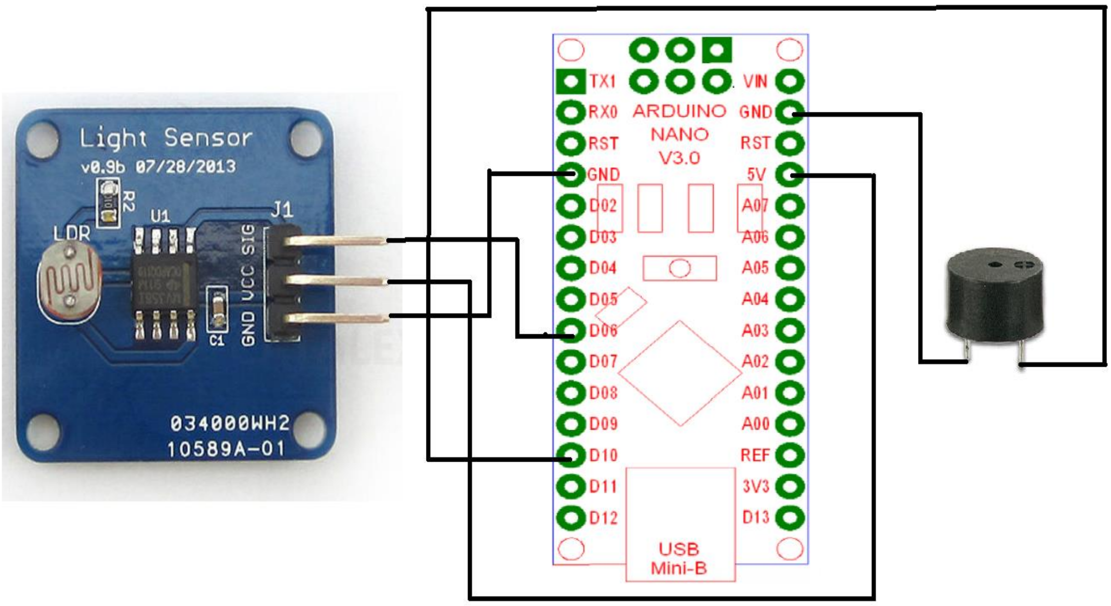


Fig 5.3.3 Implementation of Light sensor using Arduino

5.4 IMPLEMENTING RF WITH ARDUINO:

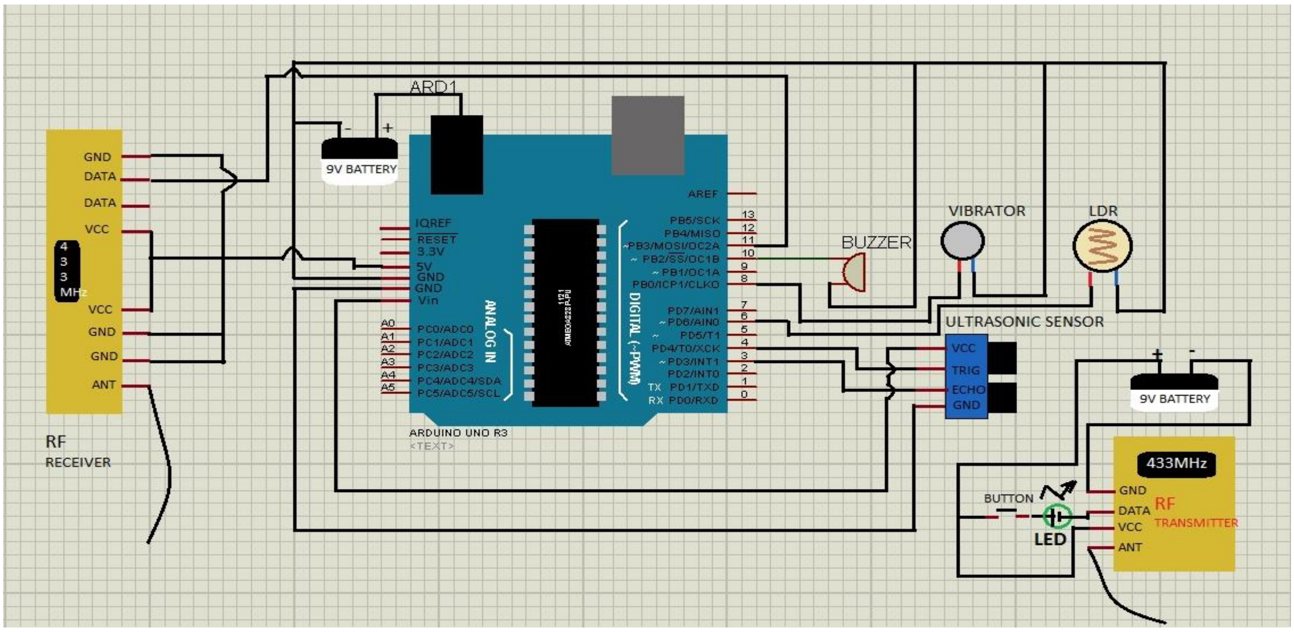


Fig 5.4.1 Complete circuit of Bright Vision

5.5 IMPLEMENTING THE CODE WITH THE ARDUINO

Arduino can be connected PC/laptop using mini USB port. Language used for writing the code for Arduino is embedded C. The editor used to write the code for Arduino is Arduino 1.6.12 which is provided by Arduino. It will have editor to write the code. Testing’s of the code can be checked with serial monitor. Code can be dumped into the Arduino with help of Arduino code editor. Entire Code has to be reinserted into the Arduino, if any error exist.

Logic to check for obstacle and light using Arduino:

Initialising the variables:

```
#include <NewPing.h>
#define TRIGGER_PIN  4
#define ECHO_PIN     3
#define MAX_DISTANCE 200
NewPing sonar (TRIGGER_PIN, ECHO_PIN, MAX_DISTANCE);
```

Setup: It is used to the pins.

```
void setup ()
{
  pinMode (8, OUTPUT); // vibrator is set to PIN-8
  pinMode (10, OUTPUT); // buzzer is set to PIN-10
  Serial.begin (115200);
}
```

Loop: Setup is called only once, Loop repeats until device is switched off or Arduino is turned off.

```
void loop()
{
        Serial.print ("Ping: ");
        Serial.print (sonar.ping_cm ());
        Serial.println ("cm");
        int a = digitalRead (6); // lightsensor gives the value either 0 or 1
        int n = sonar.ping_cm (); // it gives the distance of obstacle that is in front of wearable.
        if (n < 80) // if obstacle is less than 80cms
         {
            digitalWrite (8, HIGH); // it turns n vibrating device
         }
        else
        {
           digitalWrite (8, LOW); // it turns off vibrating device
        }
```

```
 if (a==0) // it checks whether light is turned ONN/OFF
{
  digitalWrite (10, HIGH); // buzzer is turns ON
 }
else if (a==1)
{
  digitalWrite (10, LOW); //buzzer is turned OFF
 }}
```

5.6 OUTPUT SCREENS AND PICTURES OF WEARABLE

The serial monitor results and pictures of Bright Vision Wearable are displayed in next few pages. The results of the wearable in serial monitor are classified into following categories.

1. Results of Bright Vision when obstacle is present: We can observe the live readings of ultrasonic sensors in serial monitor of Arduino 1.6.12 software. Maximum range of ultrasonic sensors is two meters. If the range shown in the serial monitor is below 80 centimetres then vibrating device starts vibrating. This shows that Bright Vision has successfully detected the obstacle and can able to signal back to visually impaired person by vibrating device.

2. Results of Bright Vision When obstacle is not present: We can observe the live readings of ultrasonic sensors in serial monitor of Arduino 1.6.12 software. Maximum range of ultrasonic sensors is two meters. If the range shown in the serial monitor is above 80 centimetres then vibrating device stops vibrating. This shows that Bright Vision has successfully detected the obstacles which are not in range.

3. Results of Bright Vision detecting light: We can observe the live readings of ultrasonic sensors in serial monitor of Arduino 1.6.12 software. Light sensor can detect light. If light is present then serial monitor shows output as one. This indicates that Bright Vision has successfully detected the light and can able to signal back user by giving buzzer sound.

4. Results of Bright Vision detecting no light: We can observe the live readings of ultrasonic sensors in serial monitor of Arduino 1.6.12 software. Light sensor can detect light. If no light is present then serial monitor shows output as zero. This indicates that Bright Vision has successfully detected the light and can able to signal user by stopping the buzzer sound.

5. Pictures of Bright Vision: Few pictures of construction of wearable and hands on experience of the wearable.

1. Results of Bright Vision when obstacle is present (0cm to 80cm):

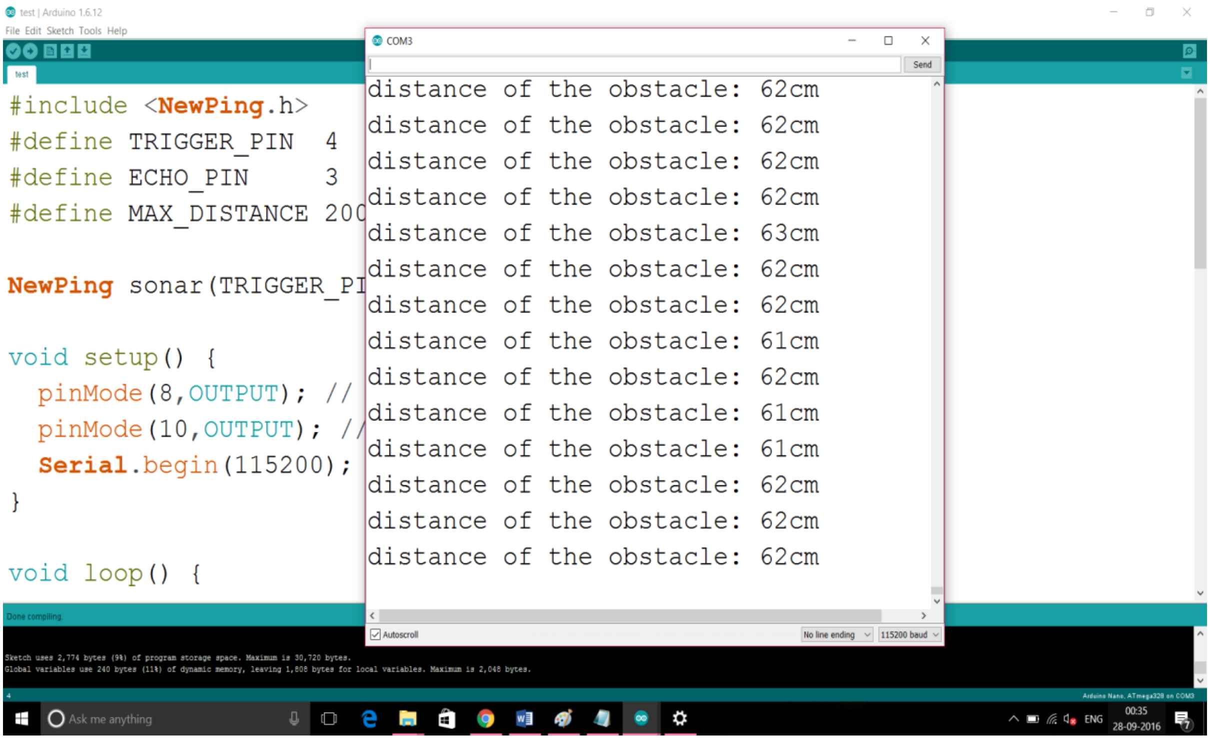


Fig 5.6.1 Results when obstacle is just less than range (Starts vibrating)

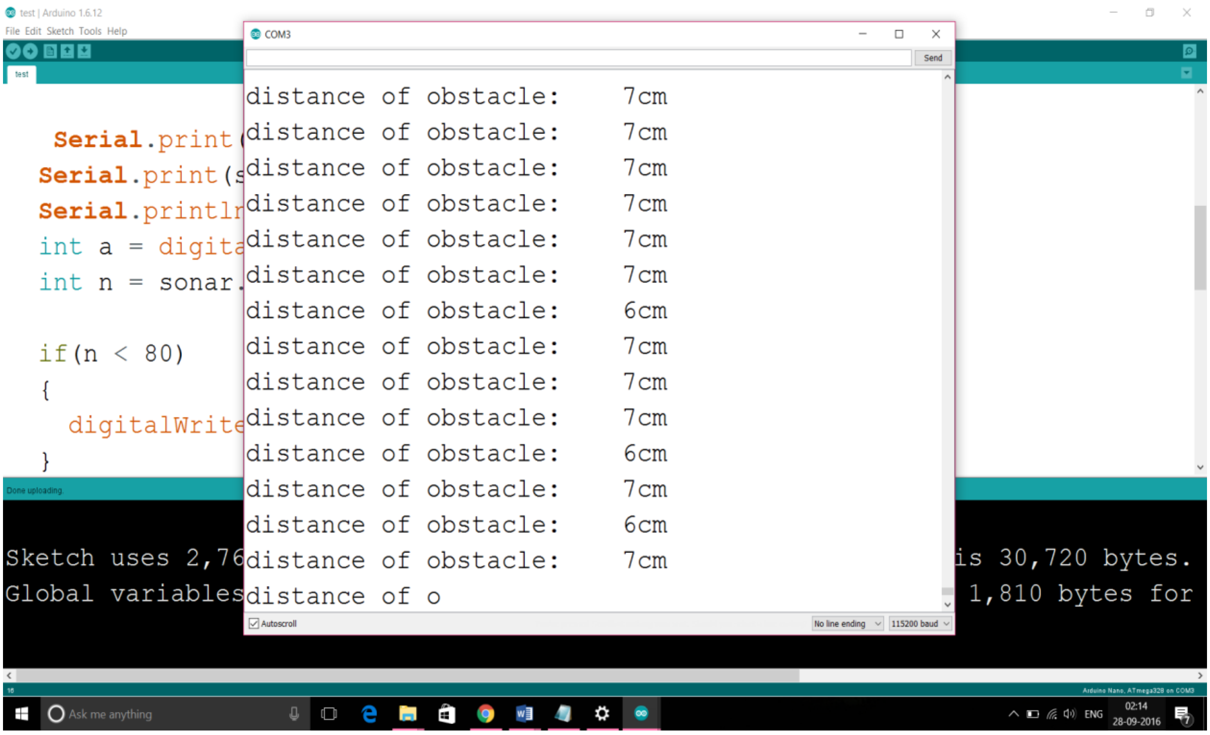


Fig 5.6.2 Results when obstacle is too close to the wearable

2. **Results of Bright Vision When obstacle is not present(80 - 200 cm):**

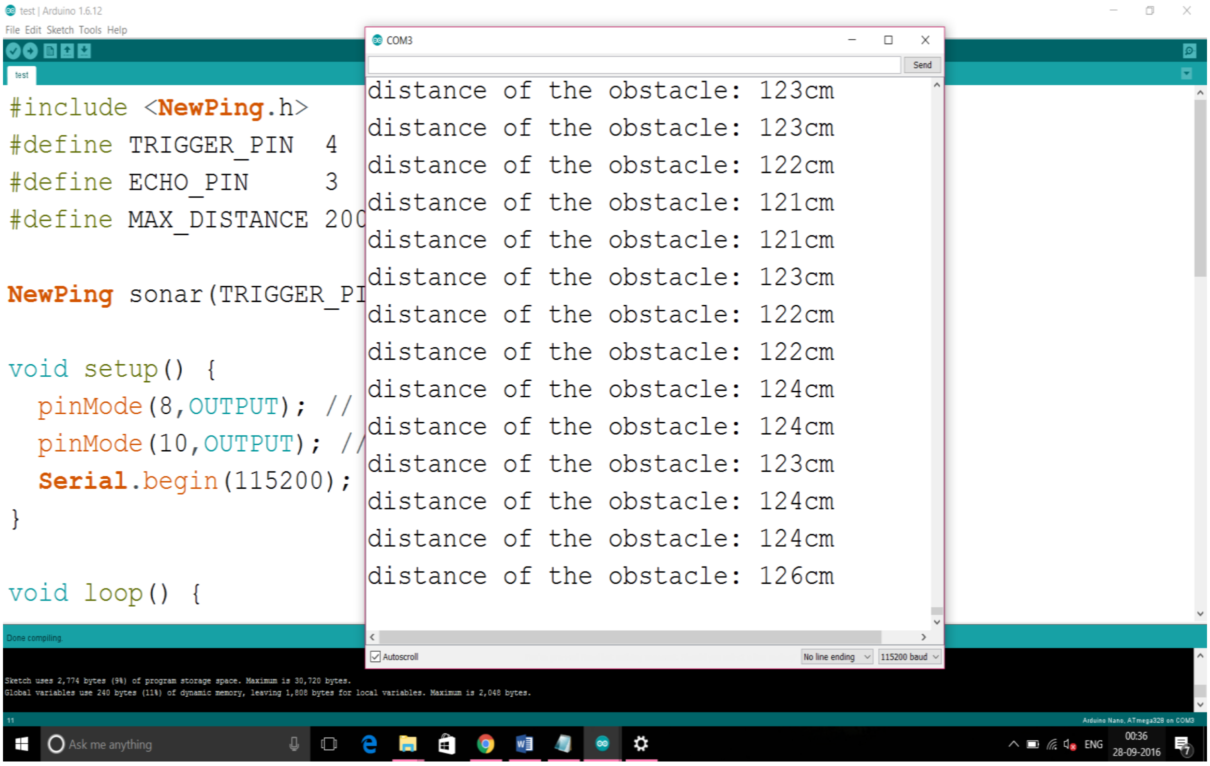


Fig 5.6.3 Results of Bright Vision when obstacle far above from wearable

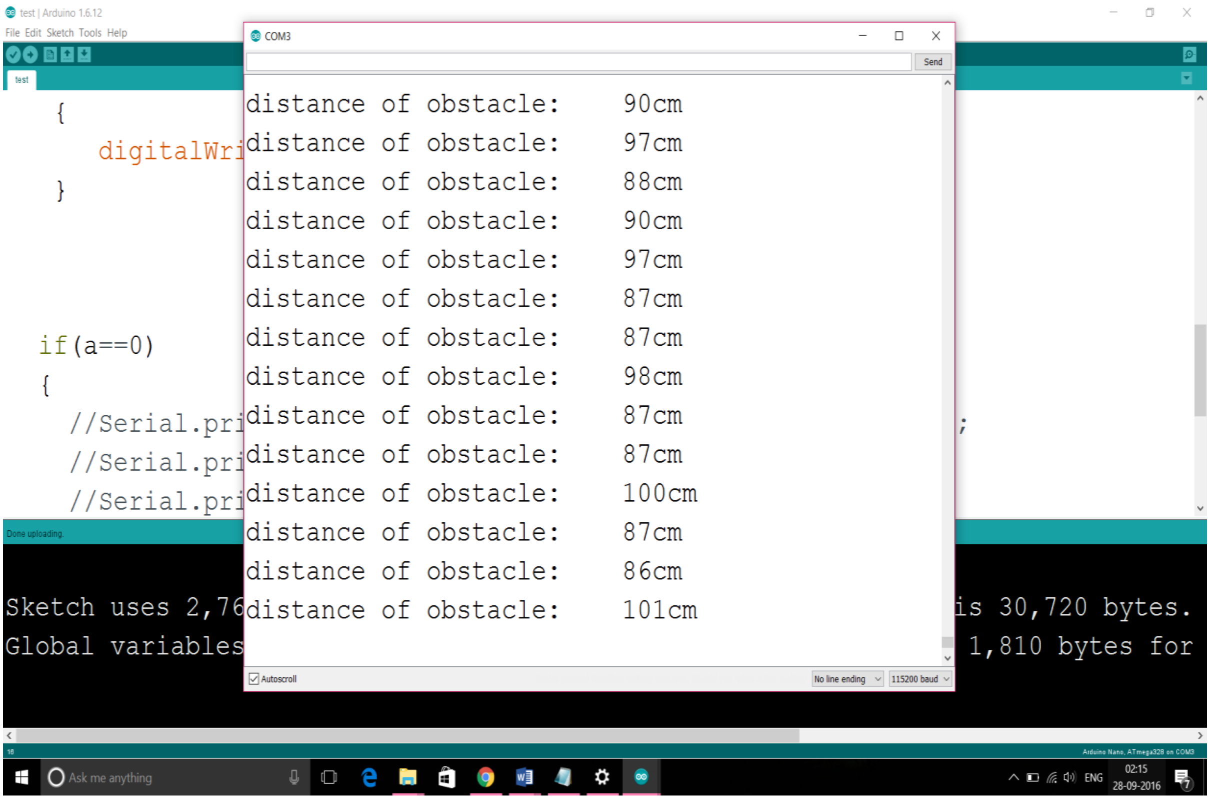


Fig 5.6.4 Results of Bright Vision when obstacle is just above range

3. Results of Bright Vision detecting light:

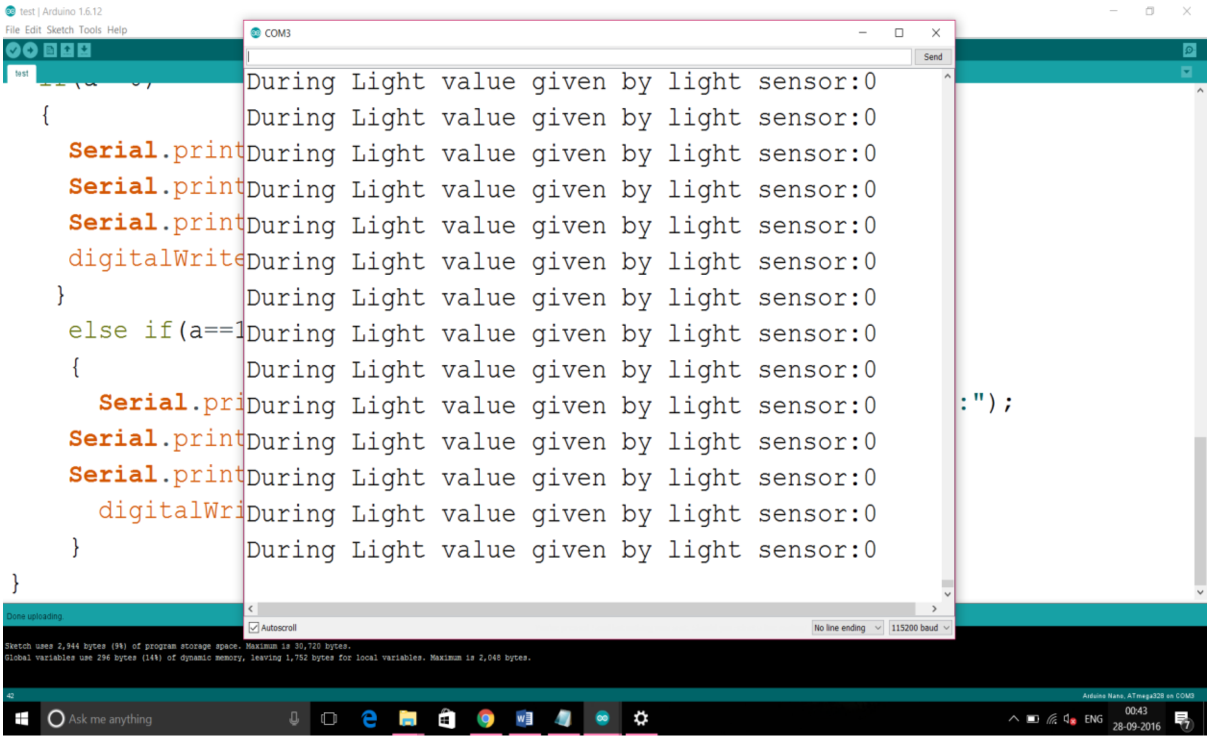


Fig 5.6.5 Results of Bright Vision when light is detected

4. Results of Bright Vision detecting no light:

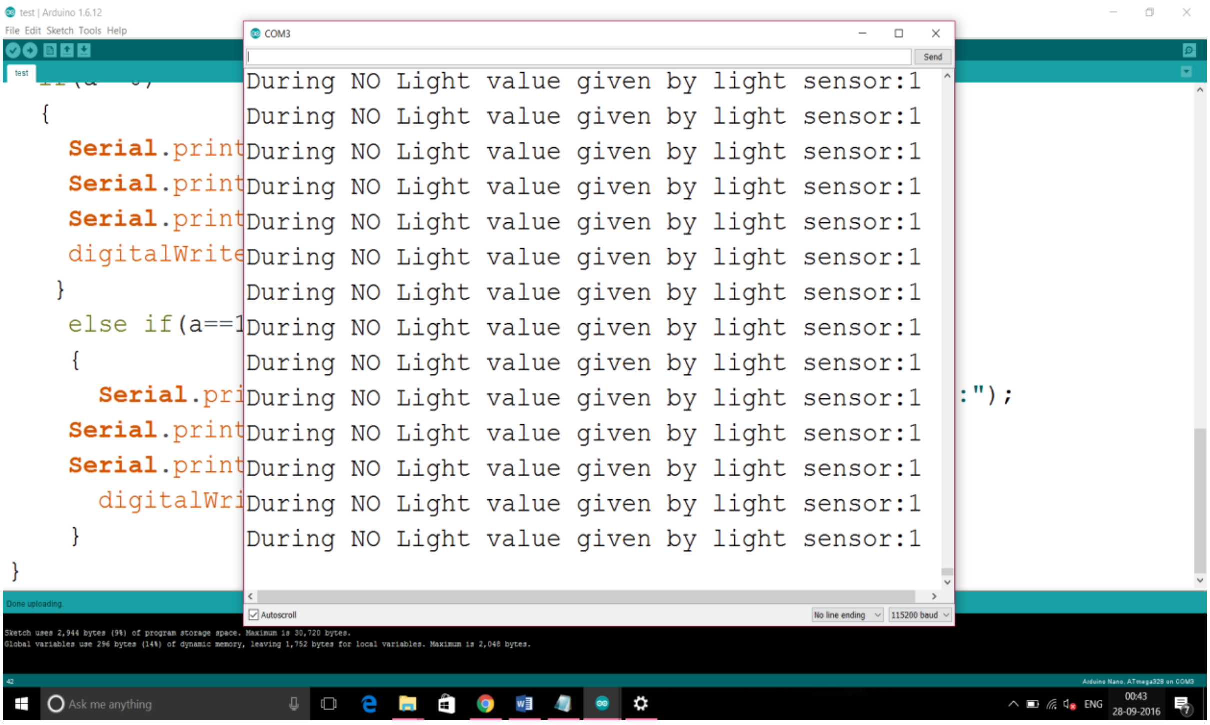


Fig 5.6.6 Results of Bright Vision when no light is detected

5. Picture of Bright Vision:

Fig 5.6.7 Bright Vison hands on experience

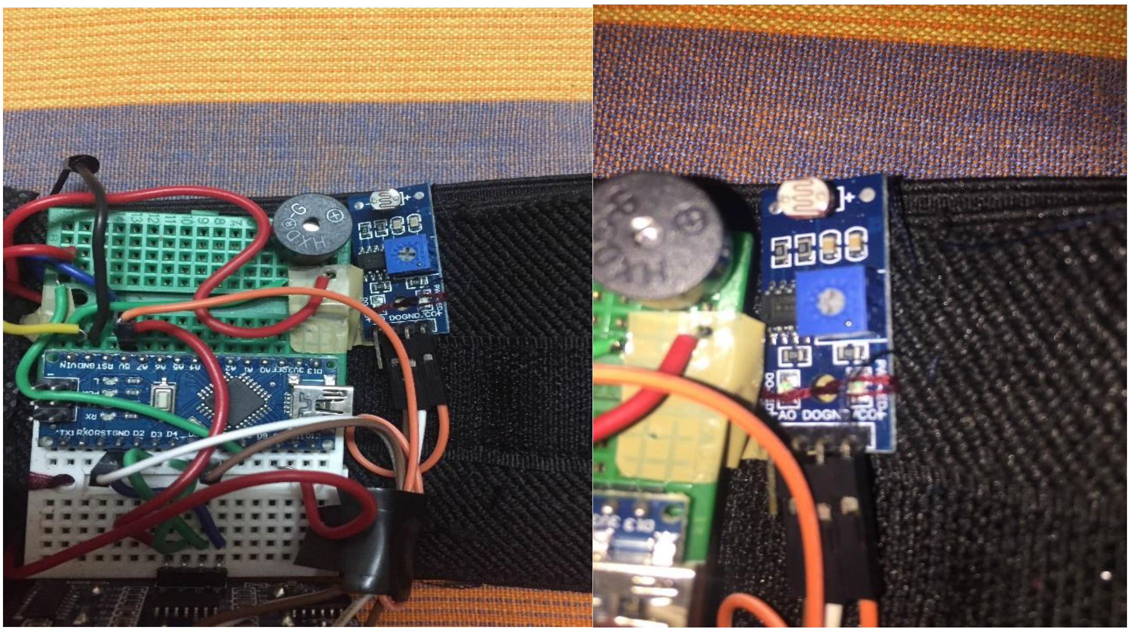


Fig 5.6.8 Construction of Bright Vision

6. TESTING AND VALIDATION

6.1 INTRODUCTION

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product. It is the process of exercising software with the hardware ensuring that all the parameters are satisfied.

Software system meets its requirements and user expectations and does not fail in an unacceptable manner.

6.2 TEST STRATERGY AND APPROACH

Field testing will be performed manually and functional tests will be written in detail.

Test objectives

- All the devices connected must work properly with accuracy.
- All the devices must respond to the inputs accordingly.

Features to be tested

- Verifying the distance at which the ultrasonic sensor is able to detect the obstacle.
- Verifying the response of the buzzer when obstacle is detected.
- Verifying the response of the buzzer when button is pressed to detect light.

6.3 DESIGN OF TEST CASES

S.NO	Steps involved	Inputs	Expected results	Actual result	Test case pass/fail
1.	Supplying the power to the equipment.	Switching on the switch attached to the battery.	The LED lights on the Arduino Nano must start blinking.	The LED lights on the Arduino Nano must start blinking.	Pass
2.	Obstacle is at a distance less than or equal to 80cm.	Ultrasonic sensor detects the obstacle and sends signal to controller.	The vibrator in contact with skin starts vibrating.	The vibrator in contact with skin starts vibrating.	Pass
3.	Obstacle is at a distance more than 100cm.	Ultrasonic sensor detects no obstacle and sends no signal to controller.	No vibration of vibrator.	No vibration of vibrator.	Pass
4.	Presence of light in the room and button is pushed to check.	LDR sensor detects the light and sends signal to controller.	The piezo buzzer turns ON giving a sound.	The piezo buzzer turns ON giving a sound.	Pass
5.	No presence of light in the room and button is pushed to check.	LDR sensor detects no light and sends no signal to controller.	There is no response of the piezo buzzer.	There is no response of the piezo buzzer.	Pass
6.	The equipment is away from the user and missing.(Within the range)	The remote button is pushed and the transmitter transmits the signal to the receiver.	The piezo buzzer turns ON giving a sound.	The piezo buzzer turns ON giving a sound.	Pass
7.	The equipment is away from the user and missing.(Not within the range)	The remote button is pushed and the transmitter transmits the signal to the receiver.	There is no response of the piezo buzzer.	There is no response of the piezo buzzer.	Pass

7. CONCLUSION

The objective set out in the introduction of this report were to try and develop a system that would remove all the difficulties faced by traditional white cane. The Bright Vision wearable has achieved the objectives and has been able to perform all the tasks required of it efficiently.

The Bright Vision wearable thus tracks the obstacles in front of it and signals backs to the visually impaired persons by using vibrating device. It can also effectively give information of existence of light. A visually impaired person can successfully search for his lost device in room/home by using RF transmitter and receiver.

8. FUTURE ETENSION

We plan to continue our project by implementing the following features in the future.

Blind shades: Using image processing techniques, blind shades should be able to recognise a person in front of visually impaired person and give a voice message to him. Voice message should be given through Bluetooth speaker.

Location tracking: By using Global Positioning System (GPS) wearable should be able to recognise the location of the visually impaired person and guide him to the desired location. Requesting the route of desired location should be taken from microphone and guiding the person should be done by Bluetooth speaker.

Saving the Structure of the Building: A blind person may visit same places many times like his home, office etc. Saving the structure of few frequently visited buildings makes him easy to walk in the building and it will be a great guiding assist for him.

Recognise Pits: It is very hard for a blind person with wearable to recognise the pits in front of him. Should find a way to recognise those using different sensors.

Mobile Connectivity: This device should be connected to mobile. Should design in such a way that wearable should be completely operated with mobile phone. Instead of using separate GPS and Bluetooth module we can directly make use of the modules present in the phone.

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[3]M. J. Christensen, R.H. Thayer, The Project Manager's Guide to Software Engineering's Best Practices, IEEE Computer Society, 2001.

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Web References

[www1] https://www.arduino.cc/
[www2] http://www.instructables.com/

APPENDIX

Glossary

White Cane: It is a mobility aid for the visually impaired people.

Micro Controller: A microcontroller is a self-contained system with peripherals, memory and a processor that can be used as an embedded system.

Arduino: It is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.

Sketch: A sketch is the name that Arduino uses for a program. It's the unit of code that is uploaded to and run on an Arduino board.

Serial Monitor: Serial is used for communication between the Arduino board and a computer or other devices. All Arduino boards have at least one serial port (also known as a UART or USART): Serial. It communicates on digital pins 0 (RX) and 1 (TX) as well as with the computer via USB.

GPS: Global Positioning System

USB: Universal Serial Bus

LDR: Light Dependent Resistor

RFID: Radio Frequency Identification

Trigger pin/Echo pin: Ultrasonic sensor works by sending and receiving (bouncing) ultrasound pulses, thus giving you the distance to the nearest object. It will pulse to trigger the detection and then listen for the echo using the pulse () function.

Buzzer: It is used to produce sound.