BLIND WALK

A MINI-PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project **"BLIND WALK USING ARDUINO"** is the bonafide work of **JANANI A(210701085)** and **JANANI V(210701087) ,** who carried out the project work under my supervision.

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

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TABLE OF CONTENTS

CHAPTER NO. PAGE

TITLE

LIST OF FIGURES

LIST OF MATERIALS

S.NO	MATERIAL NAME	QUANTITY
1	ARDUINO UNO	1
2	ARDUINO UNO WIFI	1
3	ULTRASONIC SENSOR	2
4	BUZZER	2
5	SWITCH	2
6	USB CABLE	2
7	JUMPER WIRES	REQUIRED AMOUNT

ABSTRACT

Eyesight is a precious gift, yet millions worldwide lack it, with 40 million in India alone, including 1.6 million children. To assist them, IoT-based Smart Shoe Systems and Smart Specs have emerged. These innovations, employing ultrasonic sensors and Arduino UNO boards, harness the power of IoT to empower the visually impaired. Smart Shoe Systems offer sustainable mobility solutions, embedded with sensors, Arduino technology, and buzzers, alerting wearers to obstacles with auditory cues, facilitating independent navigation. Similarly, Smart Specs enhance perception and navigation, featuring sensors and intelligent algorithms that deliver real-time audio or tactile feedback, aiding individuals with low vision in various environments. By leveraging cutting-edge technologies like smart shoes and glasses connected to the internet, we strive to create a more inclusive world. These smart shoes and specs ensure that they detect the objects that are present within a range of distance and in addition they provide these information to the mobile phones including voice notes.These groundbreaking inventions not only enhance mobility for those with visual impairments but also foster independence and a sense of belonging. They enable individuals to navigate their surroundings more confidently, promoting self-sufficiency and empowerment. Through the integration of Bluetooth connectivity and smartphone apps, these assistive technologies take accessibility to new heights, offering tailored support and enhancing the quality of life for visually impaired individuals worldwide.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Smart Shoe Systems, equipped with sensors and auditory alerts, offer long-term mobility solutions, enabling users to detect obstacles and navigate surroundings with newfound confidence. Similarly, Smart Specs utilize intelligent algorithms and sensory feedback to enhance perception and facilitate seamless navigation for those with low vision. Now, with the integration of Bluetooth connectivity, these assistive technologies take another leap forward, connecting seamlessly with companion smartphone apps. This integration enables the devices to communicate vital information about the surrounding environment directly to the user through speech synthesis. As obstacles are detected, the Smart Shoes and Smart Specs transmit real-time data to the smartphone app, which then translates this information into speech, providing users with instant auditory cues about the objects in their path. This innovative feature not only enhances mobility but also fosters a greater sense of independence and empowerment, allowing individuals with visual impairments to navigate their surroundings with dignity and autonomy.

1.2 SCOPE OF THE WORK

As the technology is been improving day by day, it is necessary to make the world a happy place. Taking that into account our focus of the proposed system is towards the Visually impaired people who suffer difficulties while roaming around. Hence the Blind Walk, an Iot integrated smart shoe and specs provides solutions to enhance the lives of these visually impaired people. These groundbreaking devices, leveraging the Internet of Things (IoT), present a transformative approach to enhancing the lives of the visually impaired. Through a combination of ultrasonic sensors and Arduino UNO boards, they provide not just aids, but tools for independence and inclusion.

1.3 PROBLEM STATEMENT

Despite the advancements in technology, millions of visually impaired individuals worldwide continue to face significant challenges in navigating their surroundings independently. The goal is to develop a novel assistive device that empowers individuals with visual impairments to navigate their surroundings independently, thereby enhancing their quality of life and fostering greater inclusion in society.

1.4 AIM AND OBJECTIVES OF THE PROJECT

The BLIND WALK includes two devices one is smart shoe and other one is the smart spectacle. It aims at detecting obstacles and provides auditory alerts through embedded buzzers . These empower the users to navigate their surroundings independently and safely. By providing real-time audio or tactile feedback, they assist users in navigating diverse environments with confidence and ease. By harnessing the power of the internet and cutting-edge technologies, such as smart shoes and glasses, we can create a more inclusive world. The proposed systems empower users that is visually impaired people to navigate their surroundings independently enhancing their sense of freedom and autonomy.

CHAPTER 2

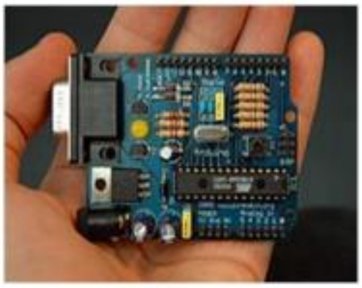
SYSTEM SPECIFICATIONS

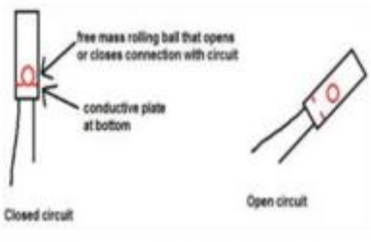
2.1 HARDWARE SPECIFICATIONS

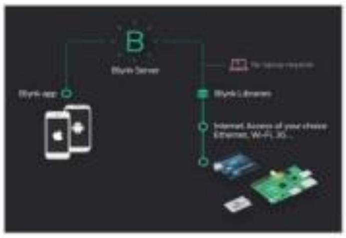
Ultrasonic Sensor	:	HC-SO4
Arduino UNO	:	Arduino® UNO R4 Minima
Buzzer	:	1.5V to 24V
Shoe	:	Lightweight and Durable
Bluetooth	:	HCO5
Jumper Wires	:	As required

2.2 SOFTWARE SPECIFICATIONS

Arduino IDE	:	Version 2.3.2
Smartphone Application	:	-







CHAPTER 3

MODULE DESCRIPTION

SMART SHOE:

Smart shoe leverages detection of objects that are at the ground level.

- Sensor Technology: The shoe is equipped with sensors, like tiny eyes, that constantly scan the surroundings to detect obstacles such as walls, objects, or people.

- Arduino UNO Board: Inside the shoe, there's a small computer called an Arduino UNO board. It's like the brain of the shoe, processing information from the sensors and making decisions based on what it "sees."

- Buzzer Alerts: When the sensors detect an obstacle nearby, a buzzer inside the shoe makes a sound to alert the user. It's like a warning signal that helps the user know there's something in their way.

- Bluetooth Connectivity: The shoe can talk to a smartphone app using Bluetooth technology. It's like a wireless connection that allows the shoe to share information with the app on the user's phone.

- Companion Smartphone App: The user's phone has a special app that works together with the smart shoe. When the shoe detects an obstacle, it sends a message to the app.

- Voice Notes: The app receives the message from the shoe and can play a voice message to the user, describing what the obstacle is and where it's located. For example, it might say, "There's a chair in front of you, about two meters away."

SMART SPECS:

Smart specs leverage the detection of the objects that are in the air.

- Sensor Technology: Smart Specs are equipped with sensors, similar to small cameras or detectors, that scan the user's surroundings to detect objects and obstacles.

- Arduino UNO Board: Inside the Smart Specs, there's a compact computer called an Arduino UNO board. It processes information from the sensors, interpreting what they "see" and making decisions based on that information.

- Bone Conduction Transducers: Instead of using traditional earphones, Smart Specs may use bone conduction transducers to deliver audio feedback. These transducers send vibrations through the user's bones, allowing them to hear sound without blocking their ears.

- Bluetooth Connectivity: Smart Specs can communicate with a smartphone app via Bluetooth. This wireless connection enables the glasses to send information about detected objects to the app on the user's phone.

- Companion Smartphone App: Users have a special app on their smartphone that works alongside the Smart Specs. When the glasses detect an object, they send a message to the app.

- Voice or Audio Feedback: The app receives the message from the Smart Specs and can provide audio feedback to the user. For example, it might say, "There's a person approaching from your left side."

CHAPTER 4

SYSTEM DESIGN

4.1 ARCHITECTURE DIAGRAM

An architecture diagram is a graphical representation of a set of concepts, that are part of an architecture, including their principles, elements and components

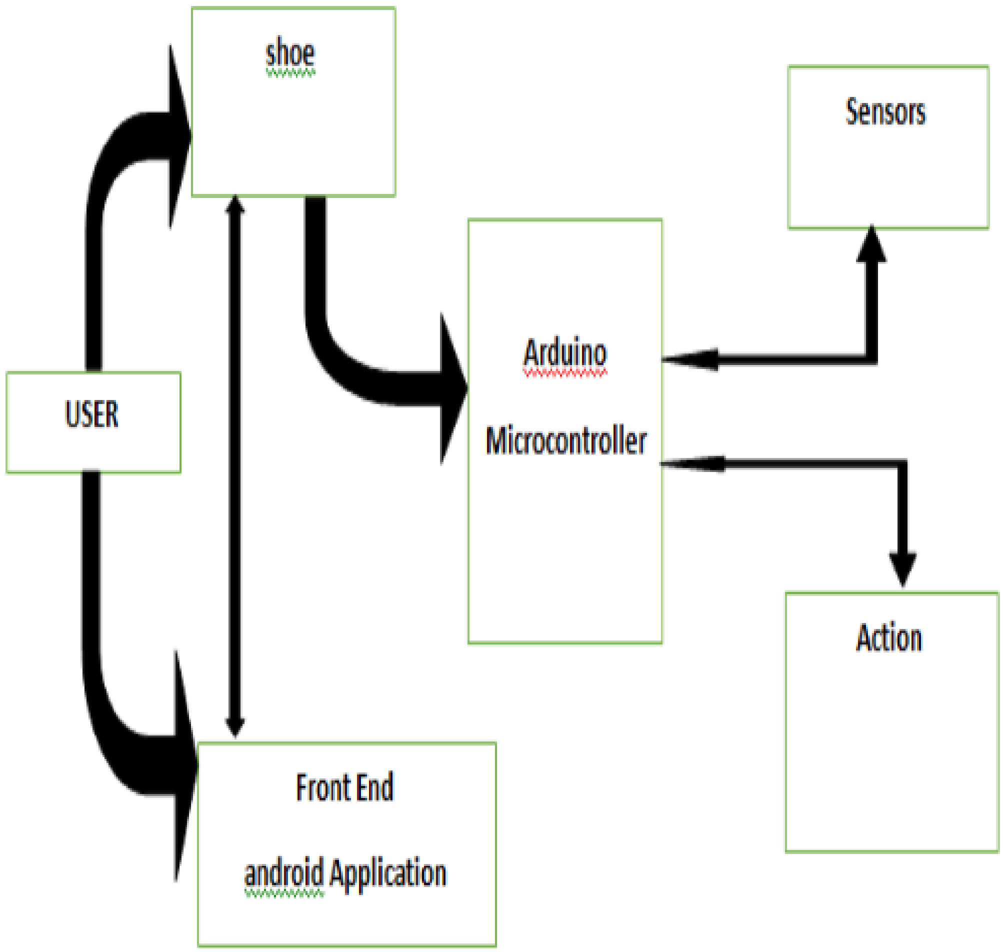


Figure 4.1 Architecture Diagram

From the above Figure 4.1, the architecture of the system is well understood.

4.2 FLOW CHART

A flowchart is a type of diagram that represents an algorithm, workflow or process. The flowchart shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows. This diagrammatic representation illustrates a solution model to a given problem.

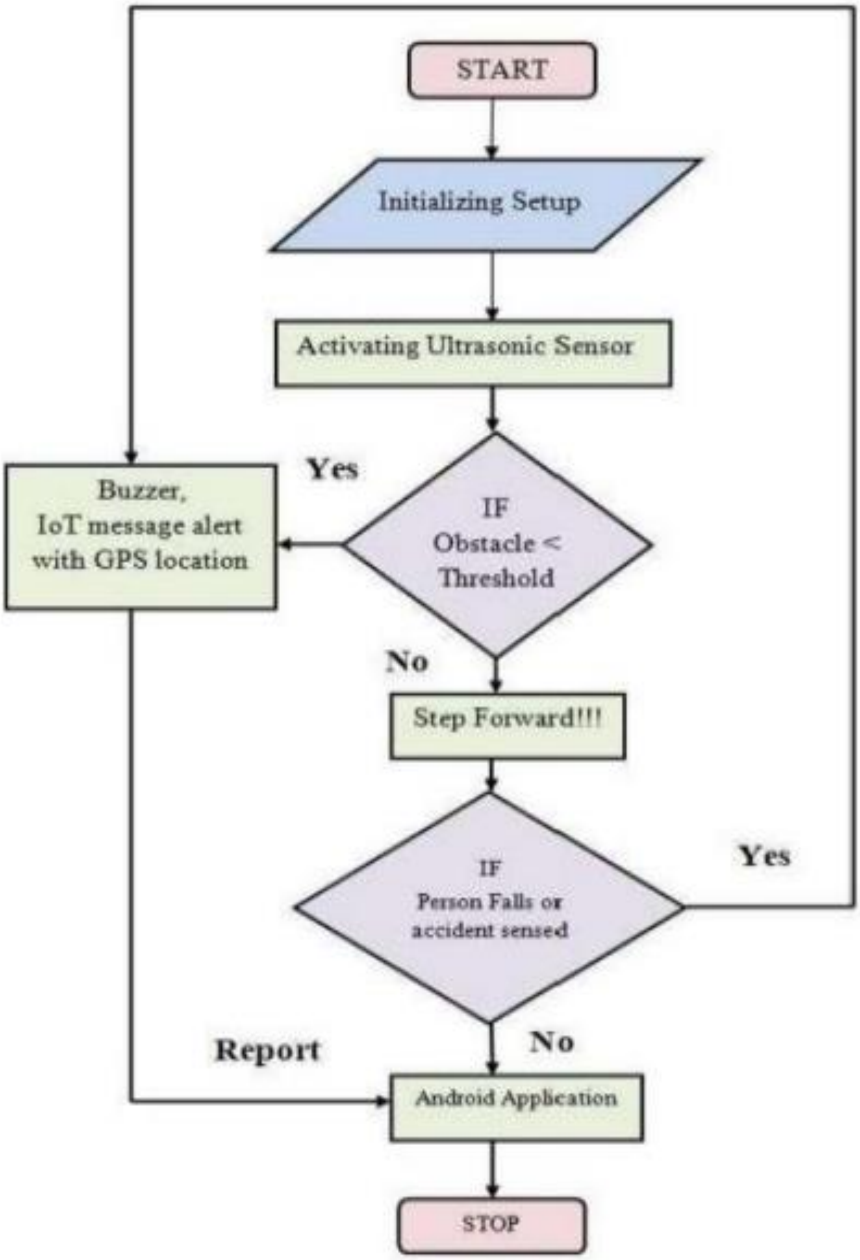


Figure 4.2 Flow Chart

From the above Figure 4.2, the workflow of the system is identified.

4.3 USECASE DIAGRAM

A use case is a list of actions or event steps typically defining the interactions between a role (known in the Unified Modelling Language as an actor) and a system to achieve a goal. The actor can be a human or other external system.

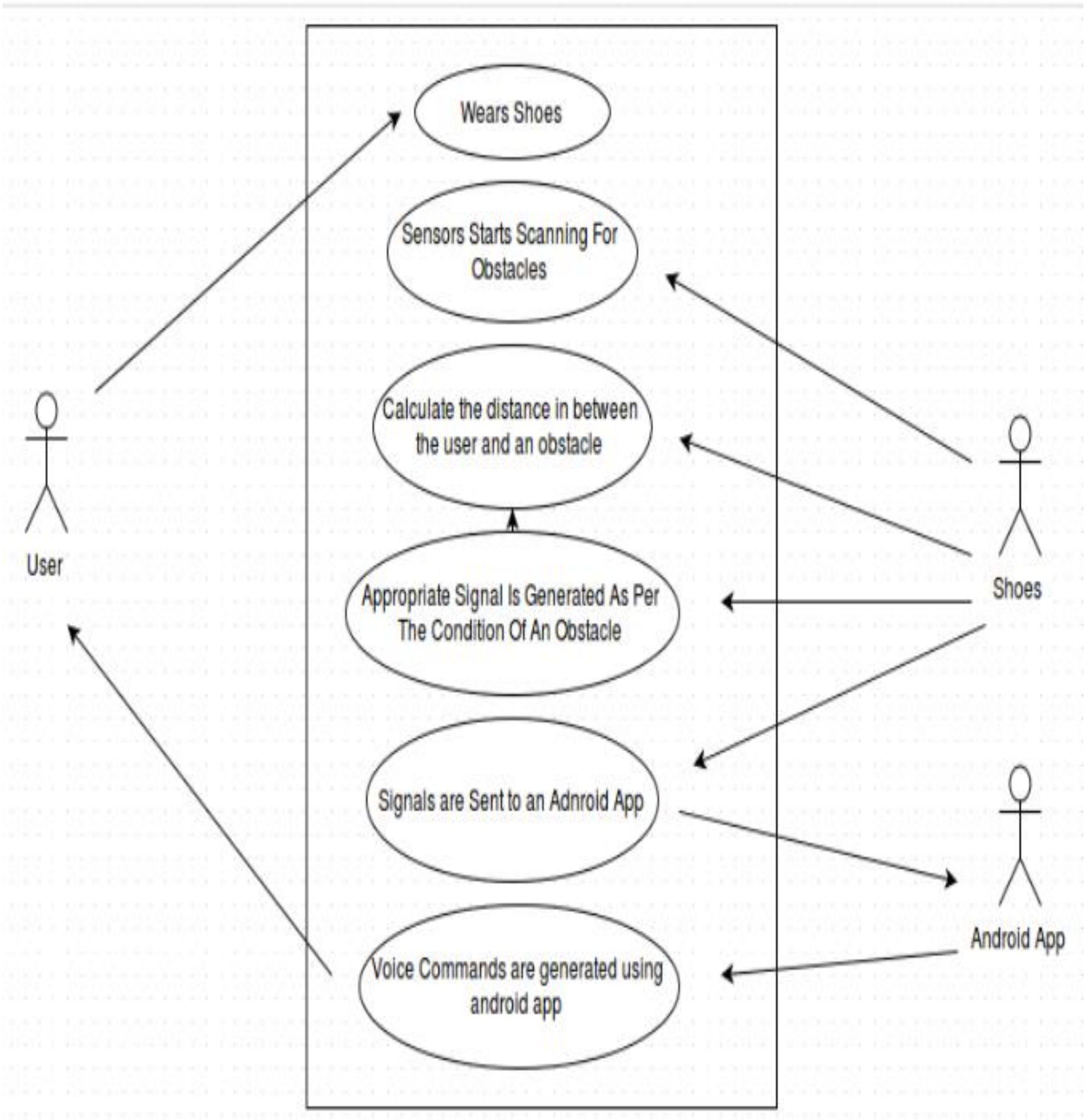


Figure 4.3 Use case diagram

From the above figure 4.3, the interactions between a role in the system is shown

4.4 ACTIVITY DIAGRAM

An activity in Unified Modelling Language (UML) is a major task that must take place in order to fulfil an operation contract. Activities can be represented inactivity diagrams. An activity can represent: The invocation of an operation. A step in a business process.

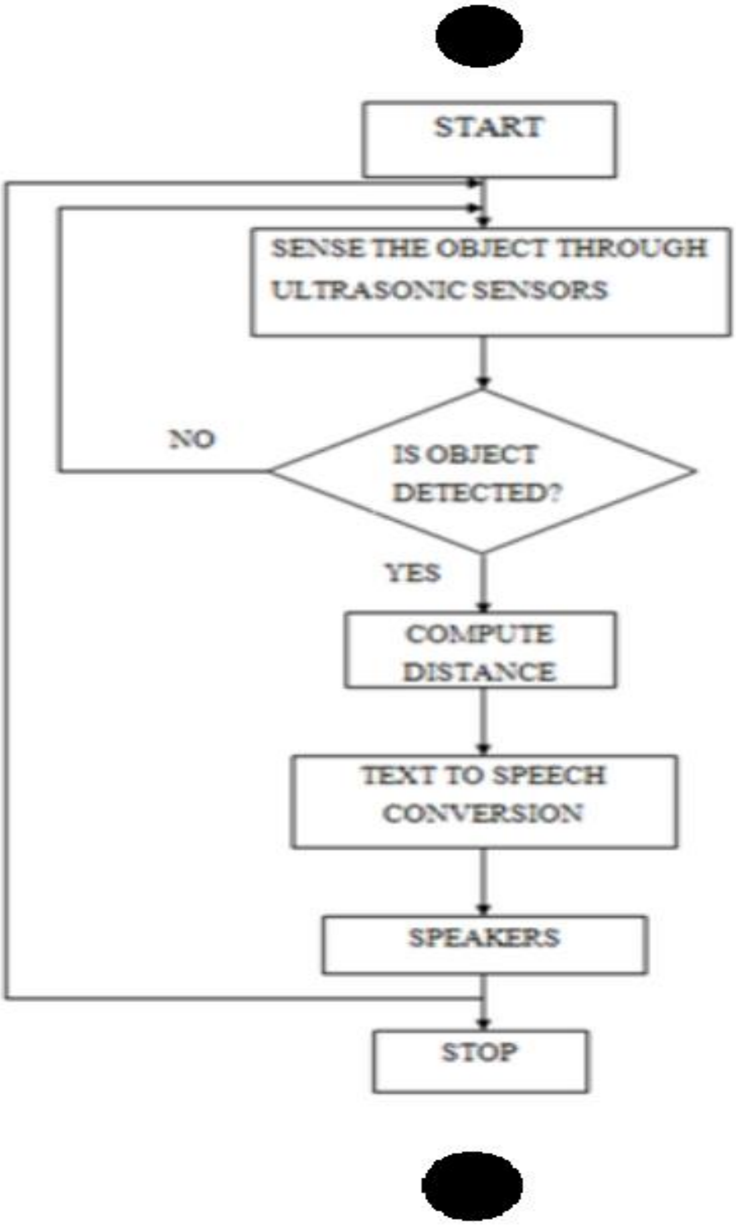


Figure 4.4 Activity Diagram

From the above figure 4.4, the activities if the system is shown.

4.5 SEQUENCE DIAGRAM

A sequence diagram is a type of interaction diagram because it describes how—and in what order—a group of objects works together

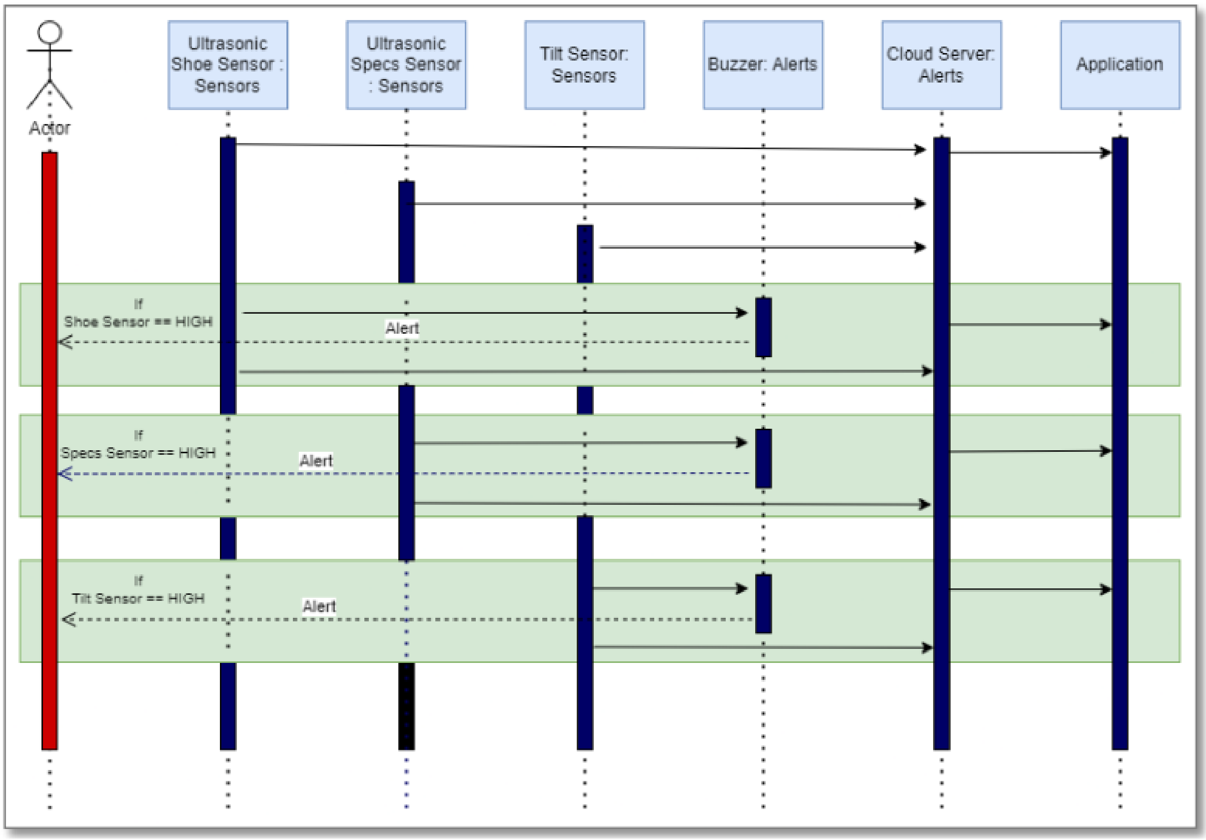


Figure 4.5 Sequence Diagram

The above figure 4.5 represents the type of interaction of the system.

4.6 CLASS DIAGRAM

A class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modelling Language (UML). In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity.

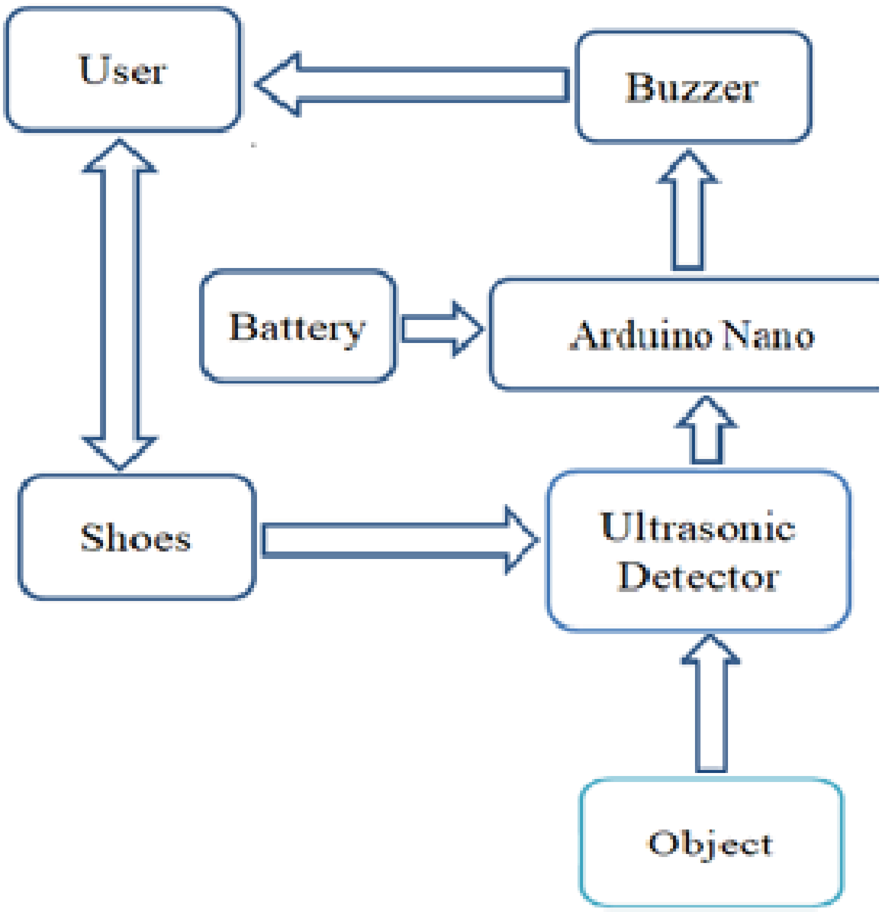


Figure 4.6 Class Diagram

The above Figure 4.6 is the class diagram for the system.

CHAPTER 5

SAMPLE CODING

```
#include <SoftwareSerial.h>
SoftwareSerial bluetooth(2, 3);

#define trigPin 9
#define echoPin 8
#define BUZ 13
long duration, distance;

void setup() {
  pinMode(BUZ, OUTPUT);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  Serial.begin(9600);
  while (!Serial);
  bluetooth.begin(9600);
}

void loop() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  duration = pulseIn(echoPin, HIGH);
  distance = duration / 58.2;
  Serial.println(distance);
```

```
  if (distance >= 10 && distance < 20) {
    bluetooth.println("Obstacle detected at a distance of 10m - 20m!"); // Send
message for 10m-20m range
  } else if (distance >= 20 && distance < 30) {
    bluetooth.println("Obstacle detected at a distance of 20m - 30m!"); // Send
message for 20m-30m range
  } else if (distance >= 30 && distance < 40) {
    bluetooth.println("Obstacle detected at a distance of 30m - 40m!"); // Send
message for 30m-40m range
  } else if (distance >= 40 && distance < 50) {
    bluetooth.println("Obstacle detected at a distance of 40m - 50m!"); // Send
message for 40m-50m range
  } else {
    bluetooth.println("No obstacle detected."); // Send message if no obstacle
detected or outside specified ranges
  }

  delay(10);

  if (distance < 15)
  {
    for (int i = 0; i < 5; i++) {
      digitalWrite(BUZ, HIGH);
      delay(50);
      digitalWrite(BUZ, LOW);
      delay(50);
    }
  }
}
```

CHAPTER 6

SCREEN SHOTS

SMART SHOE:

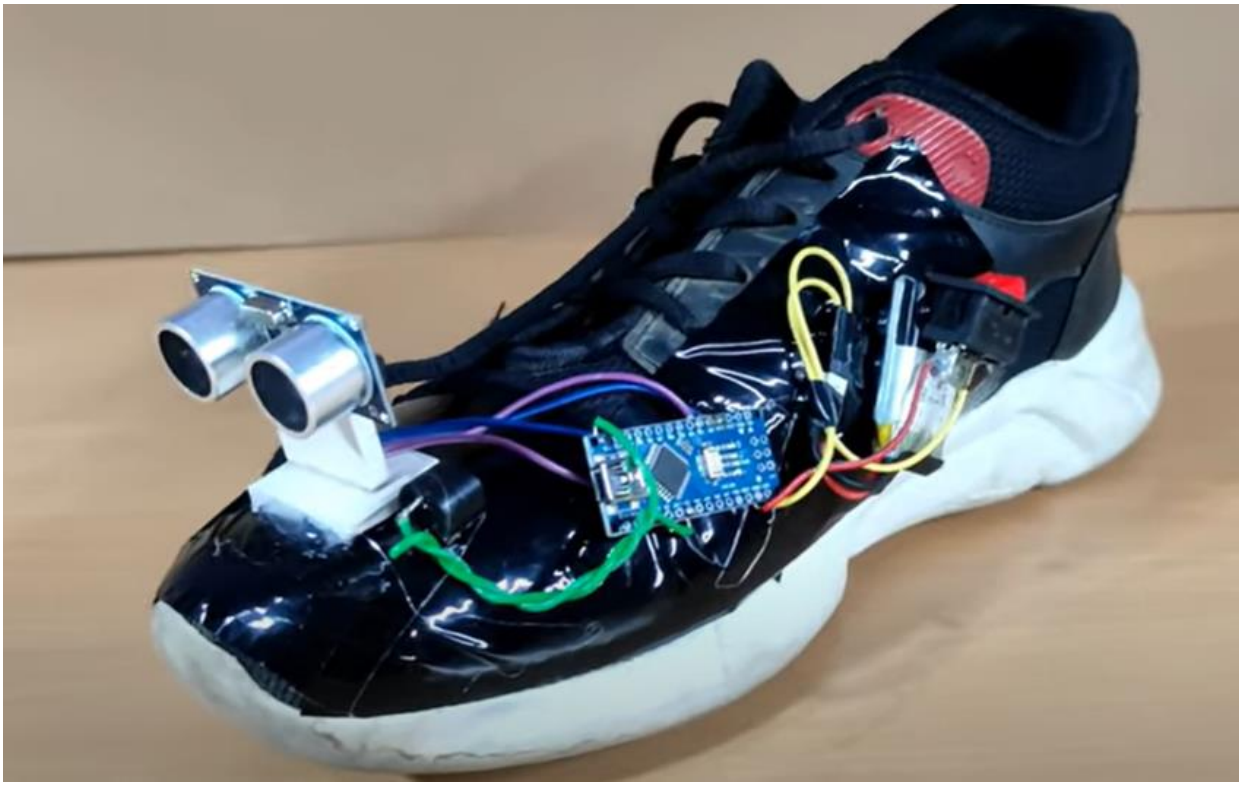


Figure 6.1 SMART SHOE

SMART SPECS:

Figure 6.2 SMART SPECS

CHAPTER 8

CONCLUSION AND FUTURE ENHANCEMENT

In this paper, we have proposed a system for detecting obstacles in the way of a blind or a visually impaired person, that helps them navigate independently, and alerts them through a buzzer. Also, it helps the guardian(s) to keep track of the user. We have included all the objectives we would like to use and their expected results. Possible future work is to add new available techniques to the review process, which may include edge sensitivity, Voice alerts, Object identification using AI. Regular weather forecasts can be generated in time to alert users to rain and storms in advance. The product can be used more widely by using artificial intelligence and image processing, which can help detect obstacles more accurately. Defense implementation that uses sensors to detect landmines and provide feedback to soldiers to avoid casualties

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