CHAPTER - 1

INTRODUCTION

Moving through an unknown environment becomes a real challenge when we can't rely on our own eyes. Since dynamic obstacles usually produce noise while moving, blind people develop their sense of hearing to localize them. A white cane is the most common mobility aid for the visually challenged. However, it does not give information about the obstacles above knee level and those which are at a distance greater than 1m. Even though guide dogs were the initial companion of the blind, later on technologies played a vital role. Smart ids with adjustable length, elbow canes, were developed in the market to guide the visually challenged. However, these attempts were not completely successful in assisting the user. To alleviate these issues the Smart electronic aid is designed in such a way that it includes an Ultrasonic sensor for Obstacle detection, supported with heat and water detection. In this system, Vibratory motors are used to inform about the moving obstacles. The intensity of vibration depends on the speed of the moving obstacles.

A lot of study is being done to design a fine instrument that provides the user a better walking experience. One of them is Smart Vision. The device can detect stationary as well as moving obstacles. The device can detect specific landmarks and will inform the user the distance from the obstacle. HALO is another device that can be mounted on the existing white cane and can detect low hanging obstacles such as branches of trees. It consists of ultrasonic range sensor with an eccentric-mass vibrating motor which vibrates distinctly for ground obstacle and low hanging obstacle. An intelligent guide stick detects obstacles using ultrasonic sensors but it is unable to tell whether the obstacle is in motion or not.

Smart id is a unique and effective tool designed for visually disabled people for improved and easy navigation. We know that visually impaired people are dependent on other human beings or some animals like trained dogs or a wood stick for their movement indoor or outdoor. We proposed a innovative smart id that allows visually challenged people to navigate with ease using advanced technology. We introduced the features of safety by using GSM Module which will help the guardian of the blind Subject to trace the location as they will receive the SMS of the location on their phone if their subject is lost somewhere or is in some Panic situation. We also made the stick efficient to work in rainy environment also through fabrication of entire module. Our project is Voice based Blind Smart id which makes use of programmed voice for guidance and uses WIFI technology

for navigation purpose. Vision is the most important part of human physiology as 83% of information human being gets from the environment is via sight. The 2011 statistics by the World Health Organization (WHO) estimates that there are 285 billion people in world with visual impairment, 39 billion of which are blind and 246 with low vision. The traditional and oldest mobility aids for persons with visual impairments are the walking cane(also called white cane or stick) and guide dogs. The most important drawbacks of these aids are necessary skills and training phase, range of motion and very little information convyed with the rapid advances of modern technology, both in hardware and software front has brought potential to provide intelligent navigation capabilities. Recently there has been a lot of Electronics Travel Aids(ETA) designed and devised to help the blind navigate independently and safely. Also high-end technological solutions have been introduced recently to help blind persons navigate independently.

To identify the position and orientation and location of the blind person any of those solutions rely on Global Positioning System (GPS) technology While such systems are suitable for outdoor navigation, due to the need for line of sight access to satellites, they still need additional components to improve on the resolution and proximity detection to prevent collision of the blind persons with other objects and hence subject his/her life to danger However in comparison to other technologies many blind guidance systems use ultrasound because of its immunity to the environmental noise. Another reason why ultrasonic is popular is that the technology is relatively inexpensive, and also ultrasound emitters and detectors are small enough to be carried without the need for complex circuitry. Apart from the conventional navigation systems , a blind aid systems can be provided a new dimension of Real-time assistance and Artificial vision along with dedicated obstacle detection circuitry. This different units are discussed to implement the design of a 'Smart stick' for blind.

1.1 Overview with Problem Statement

The development of electronic sensing devices for the visually impaired requires knowledge of the needs and abilities of this class of people. In this project we present a rough analysis that can be used to properly define the criteria to be adopted for the design of such devices. In particular, attention will be focused on clear-path indicators, highlighting their role in orientation and mobility tasks. A new device belonging to this class is presented. The detector is based on a multisensor strategy and adopts smart signal processing to provide the user with suitable information about the position of objects hindering his or her path. Experimental trials demonstrate the efficiency of the device

developed. The main problems with these GPS-only based systems is failure to provide guidance in cases where the route details are not clearly updated, making them unusable indoors and at urban locations with tall buildings, as well as the high price for some despite limited context-awareness functionality. User has to update the system frequently for each and every new location to get the route details.

1.2 Objective

The main objective of the system is to provide fool proof smart id applications to visually impaired people that can make them independent.

1.3 Scope of Project

In the proposed system is a combination of android and cloud technology. An android mobile having GPRS and GPS facilities will connect to cloud server for the updates for route description. Whenever a blind person wants to go from one place to another place, he has to select the source and destination point and then our system will guide him in a proper way.

He will be guided to his destination by the updates received via the cloud server; Android application first gives the source (usually current location) & destination location and the date and time. The proposed system is a context aware system which will find the best route based on date and time using context aware concept and guide the user. This system uses the Google Map which gives the co-ordinates of the particular location and vice-versa. This system has a voice play module which will instruct the user to move in proper direction.

- Higher performance is expected upon extension of the system to include location information retrieved using Google.
- Since cloud servers are used no need to update the route details in android phone, all the route details are available in cloud and the necessary information is extracted as and when required.
- This system uses the Voice Play system which will guide the user clearly without any confusion.

1.4 Existing System

In the existing there are many devices to detect the obstacles through spectacles, walk stick and so on. These devices can detect the objects upto certain distance (i.e., around 4cm) which may not work in many scenarios. These devices are unable to detect the road conditions such as humps, potholes and so on.

A. MOBILE ROBOT

Mobile Robot as a Guide for Visually impaired Persons The mobile robots are used for centuries for the path planning, obstacle avoidance and motion planning purposes. The mobile robots are good choice for obstacle avoidance but they are unsuited for normal application because of large size, heavy weight, highly expensive. It is also extremely difficult for a visually impaired person to use the mobile robot for stair climbing and board walks.

B. The NAV-BELT

The Nav-Belt is a portable computer device with a series ofultrasonic sensors mounted on a belt to provide a 120 degree view. This device has a view angle very similar to the radar screen image. This image is given as an input to the portable computer which generates audio sounds to help the user navigate easily from the obstacles. This Nav-Belt is popular device for the persons to travel freely in any direction they want. There is one Guidance mode in the Nav-Belt which gets the start and end geo-location information from the user and generates a simple path from the start point till end. It is much easier to follow the output signal given by the Nav-Belt and the normal walking speeds are achieved. The normal walking speed of humans is ranging from 0.6 m/sec to 0.9m/sec.

C. GUIDE CANE

The Guide Cane is comprised of a simple cane with a pair of wheels with the servo motor mounted at the end. At distal end, a pair of wheels are attached which helps the visually impaired person to navigate easily through the obstacles. A steering servo motor is under the control of the computer and helps the user to steer right and left relative to the can. A series of ultrasonic sensors are mounted at the end at some height above the ground. In the operating mode, the user holds a guide-cane with one hand and the guide cane guides the user. The guide wheels are ground contacted right in front of the user. The user controls the guide-can using a small portable joystick. The guide-can understands the direction relative to the current absolute direction from the compass fluxgate.

1.5 Proposed System

Advancement of the existing system is very much necessary. In this system sensor with camera is implemented on the tag and in 3 more places like legs and in a cap for a complete object detection in all the possible angles. User will be assisted about the obstacle present ahead through voice assistance and by the vibration of the Id card. The objects can be detected within the range of 10-20cm. The location of the person using this system will be notified to the family members through the map link and also the images of front view when the panic button is activated by the user.

1.6 Organization of the Project Report

The report is organized in the following manner.

The chapter 1 gives the introduction part of our project study and implementation of human behavior analysis and gives the information about the objectives, problem statement as well as the proposed system usage.

The chapter 2 specifies the literature paper which we have studied to undergone this project. Here wecan find the different referred papers along with is objectives, methods used and the disadvantages and problems it contains in detail.

The chapter 3 specifies the minimum hardware and software requirement for our project. It also gives functional and non functional requirements.

The chapter 4 gives the System analysis and Design part of this project. Here we can fin the detaileddescription and the different methods which we have used to built our project in detail. It also gives the detailed process flow information with different technology used.

The chapter 5 indicates the implementation part of the project. It gives the information about differentmethod which we used and the workflow diagram in the form of flowchart.

The chapter 6 indicates the testing part of the project. Here we can find n-detail explanation about thedifferent testing mechanism used for he testing process.

The chapter 7 indicates the resulting part along with the snapshot of the running project. It gives the visual pictures of the current running project with different test scenarios.

CHAPTER - 2

LITERATURE SURVEY

2.1 Survey papers

Author name & Year	Title	Methodology	DrawBacks
Aniket Birambole , Pooja Bhagat , Bhavesh Mhatre Prof. Aarti Abhyankar Year-2022	Blind Person Assistant: Object Detection	Single Shot Multi Box Detector	However the accuracy can be increased
Md.Atikur Rahman, Muhammad Sheikh Sadi Year-2021	IoT Enabled Automated Object Recognition for the Visually Impaired	SSD(SHIFT Algorithm)	Minimum number of object detection
Miss Rajeshvaree Ravindra Karmarkar, Prof.V.N. Honmane Year - 2021	Object detection system for the blind with voiceguidance	YOLO(You Look Only Once)	However the accuracy can be increased

Prof. Pradlya Kasteare, Prof.Aishwarya Kumkar, Yash Jagtap,Akshay Talgade, Aditya pole. Year - 2021	A survey on object detection algorithm for visually impaired people	CNN(Convolution Neural Network)	Accuracy of the object is low
Rais Bastomi, Firza Putra Ariatama, Lucke Yuansyah Arif Tryas Putri, Mohammad Rizki Maulana Mat Syai'in. Year – 2019	Object Detection and Tracking from a Single Camera in Unmanned Aerial Vehicles (UAVs)	CNN(Convolution Neural Network)	Distance measurement is only in the range of 50 cm to about 300cm
Hafiz M. U. Munir , Fahad Mahmood , Ayesha Zeb , Fahad Mehmood, Umar S. Khan, Javaid Iqbal Year-2017	The Voice Enabled Stick	IOT SENSORS	Accuracy of 94 percent object detection
M.F. Saaid, A. M. Mohammad, M. S. A. Megat Ali Year-2016	Smart Cane with Range Notification for Blind People	IOT SENSORS	The upper position sensor With angle of 90°

Fig 2.1: Literature Survey

CHAPTER – 3

SOFTWARE AND HARDWARE REQUIREMENT SPECIFICATION

3.1 Functional Requirements

- **Obstacle Detection:** The blind stick should be able to detect obstacles in its path using sensors such as ultrasonic or infrared sensors and provide feedback to the user.
- **Navigation Assistance:** The device should be able to provide navigation assistance to the user using GPS or other location-based technologies and provide directions to the user.
- **Alert Generation:** The device should be able to generate alerts in case of emergencies, such as detecting a dangerous object or location, and alert the user through sound or vibration.
- **Battery Management:** The device should be designed with a long battery life and should provide battery status information to the user to avoid unexpected shutdowns.
- **User Interface:** The device should have a user-friendly interface with tactile feedback, such as buttons or touchscreens, to enable the user to interact with the device easily.

3.2 Non Functional Requirements

Non-Functional Requirements describe the aspect of the system that is not directly related to its functional behavior. Non-functional requirements define system properties and constraintsit arises through user needs, because of budget constraints or organizational policies, or due to external factors such as safety regulations, privacy registration and so on.

The different Non-functional requirements for our project are:

Easy to Operate

The system should be easy to operate and should be such that it can be developed within a short period and fit in the limited budget of the user.

Performance Requirements

Since the software is online, therefore much of the performance of the system depends on thetraffic that is present online and the speed of the Internet. We are trying to give an improved performance by setting cookies to the functions so that when the user submits something for the second time, the processing is done much quicker.

Usability Requirements

The Navigation for the various operations is arranged in an orderly fashion based on the requirements. The interface also must provide a soothing look to the eye of the user.

Portability Requirements

The system should be portable and should be able to switch any environment changes such asa change of database within a very short period. Easy to Operate The system should be easy to operate and should be such that it can be developed within a short period and fit in the limited budget of the user

- Secure access to confidential data.
- 24 X 7 availability.
- The flexible service-based architecture will be highly desirable for future extension.

3.3 System Requirements

Here we have explained the Hardware and software requirements of your project.

3.3.1 Software requirement

- Coding Language : C++
- Android API 1.5 or higher
- IFTTT Cloud App
- IDE: Ardunio.

3.3.2 Hardware requirement

- Obstacle Sensor.
- Microcontroller.
- Voice Board.
- Power Supply.
- GPRS, GPS, GSM, CAMERA.
- Android 5 or higher.

3.4 Requirement Traceability Matrix

Serial No	Requirement ID	Requirement Brief	Requirement Description
1	RID-1	Send sensor data to nodemcu	Sense the object on Left
2	RID-2	Send sensor data to nodemcu	Sense the object on Right with vibration
3	RID-3	Send sensor data to nodemcu	Sense the object on Bottom
4	RID-4	Send sensor data to nodemcu	Sense the object on Top
5	RID-5	Receiving of Data by NodeMCU	Voice assistance through speaker
6	RID-6	If emergency occur then panic button is operable	Image capturing and cloud notification
7	RID-7	NodeMCU connects with cloud	Normal message is sent to gaurdian

Fig 3.1: Requirement Traceability Matrix

CHAPTER – 4

SYSTEM ANALYSIS AND DESIGN

System Analysis is first stage according to System Development Life Cycle model. This System Analysis is a process that starts with the analyst. Analysis is a detailed study of the various operations performed by a system and their relationships within and outside the system. One aspect of analysis is defining the boundaries of the system and determining whether or not a candidate should consider other related systems. During analysis, data is collected from the available files, decision points, and transactions handled by the present system. Logical system models and tools are used in analysis. Training, experience, and common sense are required for collection of the information needed to do the analysis.

4.1 Requirement Analysis

Requirement Analysis is a software engineering task that bridges the gap between system level software allocation and software design. It provides the system engineer to specify software function and performance, indicate software's interface with the other system elements and establish constraints that software must meet.

The basic aim of this stage is to obtain a clear picture of the needs and requirements of the end-user and also the organization. Analysis involves interaction between the clients and the analysis. Usually, analysts research a problem from any questions asked and reading existing documents. The analysts have to uncover the real needs of the user even if they don't know them clearly. During analysis it is essential that a complete and consistent set of specifications emerge for the system. Here it is essential to resolve the contradictions that could emerge from information got from various parties.

This is essential to ensure that the final specifications are consistent.

It may be divided into 5 areas of effort.

1.Problem recognition

2.Evaluation and synthesis

3.Modeling

4.Specification

5. Review

Each Requirement analysis method has a unique point of view. However all analysis methods are related by a set of operational principles. They are:

- The information domain of the problem must be represented and understood.
- The functions that the software is to perform must be defined.
- The behavior of the software as a consequence of external events must be defined.
- The models that depict information, function and behavior must be partitioned in a hierarchical or layered fashion.
- The analysis process must move from essential information to implementation detail.

4.2 Requirement Specification

Specification Principles:

Software Requirements Specification plays an important role in creating quality software solutions. Specification is basically a representation process. Requirements are represented in a manner that ultimately leads to successful software implementation.

Requirements may be specified in a variety of ways. However there are some guidelines worth following: -

- Representation format and content should be relevant to the problem
- Information contained within the specification should be nested
- Diagrams and other notational forms should be restricted in number and consistent in use.
- Representations should be revisable.

Software Requirements Specifications:

The software requirements specification is produced at the culmination of the analysis task. The function and performance allocated to the software as a part of system engineering are refined by establishing a complete information description, a detailed functional and behavioral description, and indication of performance requirements and design constraints, appropriate validation criteria and other data pertinent to requirements.

An outline of the Software Requirements Specification:

A simplified outline can be given for the framework of the specifications. This is according to the IEEE Standards.

4.3 Requirement Validation

Requirement validation is an important process in software engineering that involves reviewing and verifying the requirements of a system to ensure that they are accurate, complete, consistent, and feasible. The purpose of requirement validation is to ensure that the system meets the user's needs, functions correctly, and is delivered on time and within budget.

The process of requirement validation typically involves the following steps:

1. **Requirement review:** This involves reviewing the requirements to ensure that they are complete, accurate, and consistent with the user's needs.

2. Requirement analysis: This involves analyzing the requirements to ensure that they are feasible and can be implemented within the given constraints of the project.

3. Requirement testing: This involves testing the requirements to ensure that they are functional and meet the user's needs.

4. Requirement verification: This involves verifying the requirements to ensure that they are traceable to the user's needs and can be tracked throughout the software development process.

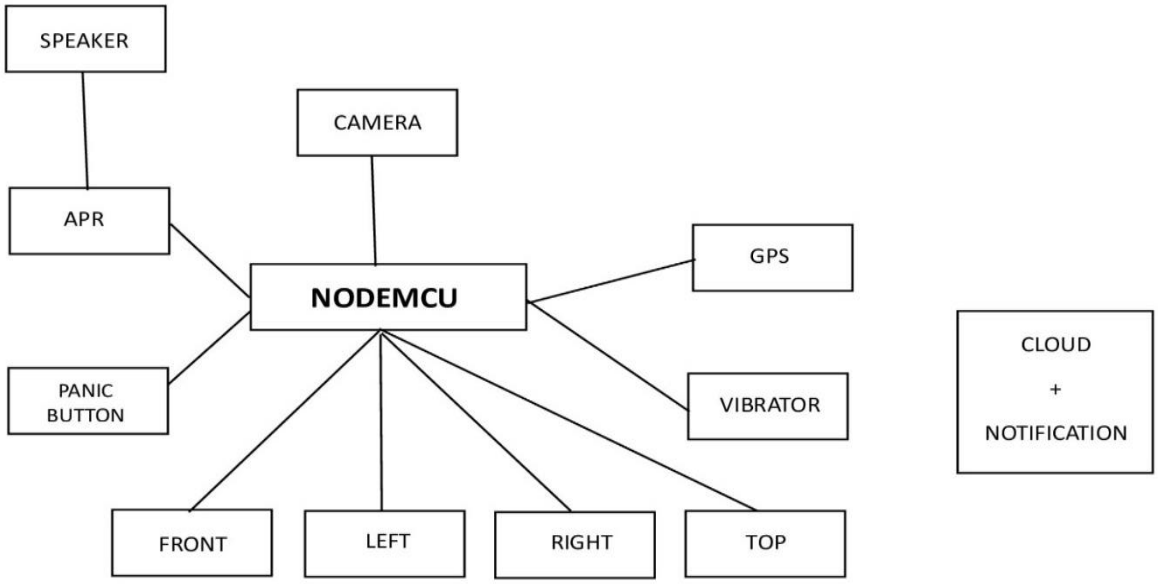
4.4 System Analysis

The system design process builds up general framework building design. The programmingoutline includes speaking to the product framework works in a shape that may be changed into one or more projects. The prerequisite indicated by the end client must be put systematically. An outline is an inventive procedure; a great configuration is a way to the viable framework. The framework "Outline" is characterized as "The procedure of applyingdifferent systems and standards with the end goal of characterizing a procedure or a framework inadequate point of interest to allow its physical acknowledgment". Different configuration components are taken after to add to the framework. The configuration detail portrays the components of the framework, the segments or components of the framework, and their appearance to end clients.

4.5 System Architecture

The architectural configuration procedure is concerned with building up a fundamental basic system for a framework. It includes recognizing the real parts of the framework and the interchange between these segments. The beginning configuration

procedure of recognizing these subsystems and building up a structure for subsystem control and correspondence is called construction modeling outline and the yield of this outlined procedure is a portrayal of the product structural planning. The proposed architecture for this system is given below. It shows the way this system is designed and



the brief working of the system.

Fig 4.1 System Architecture

4.6 High-Level Design

The architecture diagram provides an overview of an entire system, identifying the main components that would be developed for their interfaces. The HLD uses possibly non-technical to mildly technical terms that should be understandable to the administrators of the system. In contrast, low-level design further exposes the logical detailed design of each of these elements for programmers.

4.6.1 Sequence Diagram

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagramthat shows how processes operate with one another and in what order. It is a construct of aMessage Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

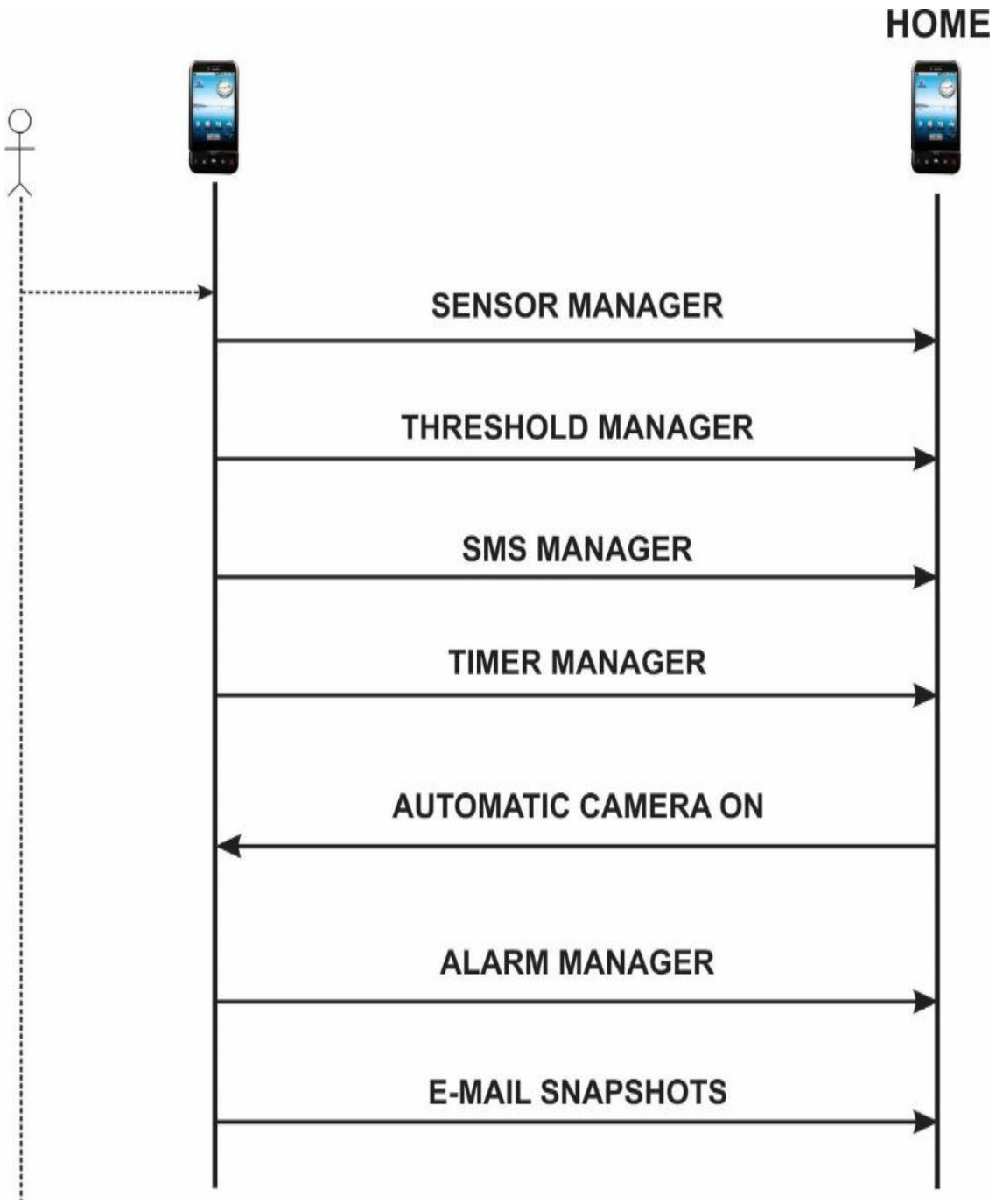


Fig 4.2 Sequence Diagram

4.7 Low-Level Design

This process can be used for designing data structures, required software architecture, source code, and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data

designwork. During the detailed phase, the logical and functional design is done and the design ofapplication structure is developed during the High-Level Design.

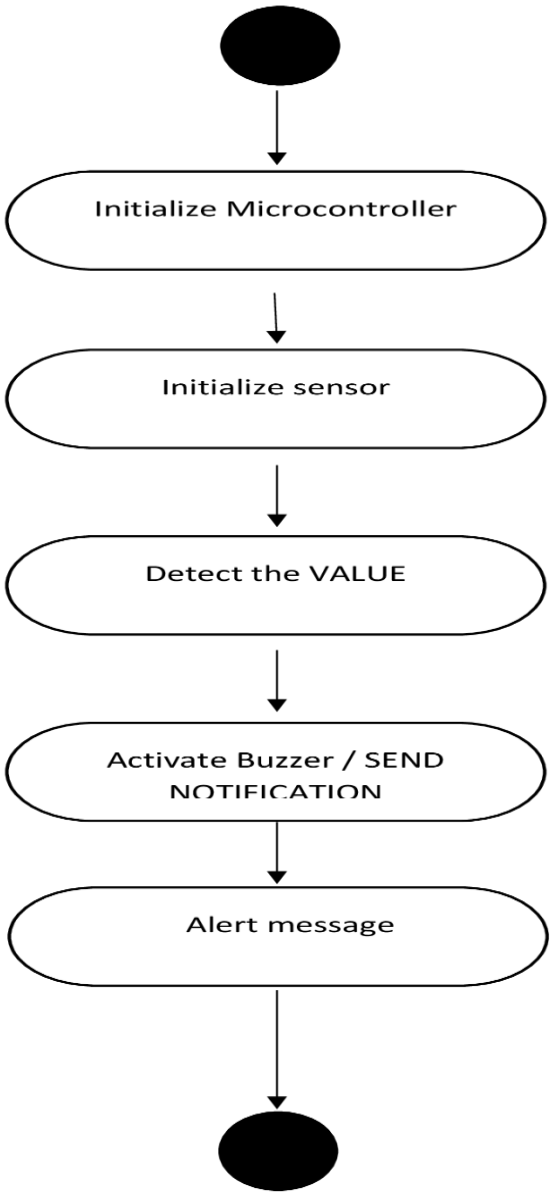


Fig 4.3: Low Level Design

4.7.1 Flowchart

A flowchart is a diagram that represents a set of instructions. Flowcharts normally use standard symbols to represent the different types of instructions. These symbols are used to construct the flowchart and show the step-by-step solution to the problem.

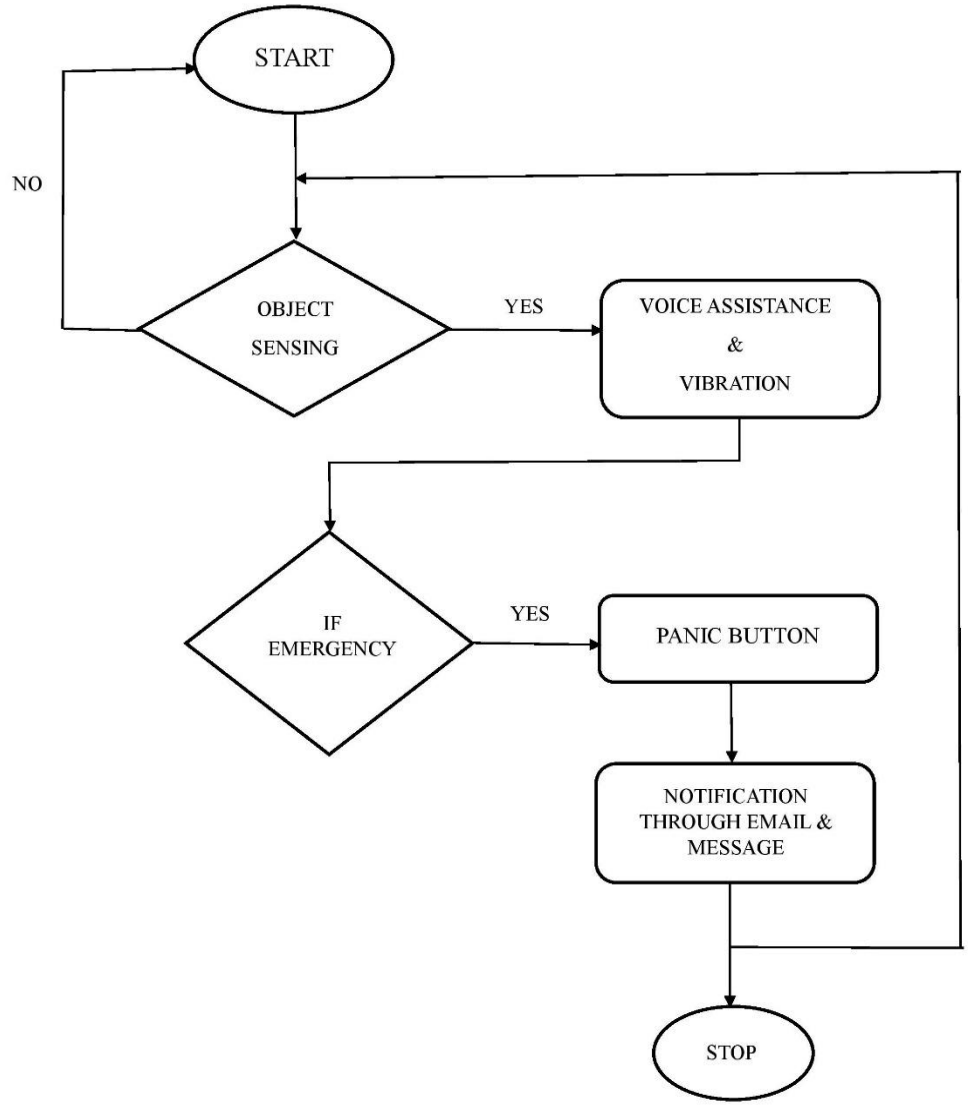


Fig 4.4: Flow Chart

4.8 User Interface Design

4.8.1 IFTT Cloud Application

IFTTT (If This Then That) is a cloud-based app that allows users to create "applets" or automated workflows between different apps, devices, and services. The app works by using triggers and actions to automate certain tasks based on specific conditions.

For example, you can create an applet that automatically saves all your Instagram photos to Dropbox or sends you a notification when it's going to rain tomorrow. IFTTT supports over 650 different services, including popular apps like Gmail, Twitter, Facebook, and

Amazon Alexa. The app also allows users to create their own custom applets using webhooks, which allows for even more flexibility and customization.

The IFTTT app is available for free on both iOS and Android devices. Users can also access the service through a web browser. Some advanced features and integrations may require a paid subscription to IFTTT Pro.

Here are some characteristics of the IFTTT app:

1. Cloud-based: IFTTT is a cloud-based app, which means that all applets and data are stored in the cloud and can be accessed from anywhere with an internet connection.

2. User-friendly: The IFTTT app is designed to be user-friendly and easy to use, even for people with limited technical knowledge.

3. Wide range of applets: IFTTT supports over 650 different services, which means that users can create applets for a wide range of tasks and use cases.

4. Customizable: Users can customize their applets using various triggers, actions, and conditions to create personalized and unique workflows.

5. Integration with third-party services: IFTTT integrates with a wide range of third-party services, allowing users to automate tasks across multiple apps and services.

6. Free and paid versions: IFTTT offers both a free and a paid version of the app. The free version provides access to basic applets and features, while the paid version, IFTTT Pro, Offers more advanced features and integrations.

CHAPTER – 5

IMPLEMENTATION

5.1 Work Flow

The flowchart below shows the flow of our application in cellular phone. Firstly the application will be in the sleep mode that is the accelerometer will be running in the background. The accelerometer reading is taken periodically and is compared with the threshold values which are set by the user. If the accelerometer value crosses the threshold then the fall is detected and the application is started. If the value does not cross the threshold then the fall is not detected and the application goes back to the idle state. If the fall is detected then the application starts and alerts the user. The user has to respond to the application within the stipulated time. If the user respond to the alert within the time then the application goes back to the idle state else the message is sent to the social contacts and it waits for the reply from the contact. The message contains the key word, the GPS coordinates where the fall is detected. If the contact replies to the message the application checks the replied message for the key. If the message contains key then the call is made to that contact and it also enables the speaker so that bidirectional communication take place between the victim of the fall and the social contact.

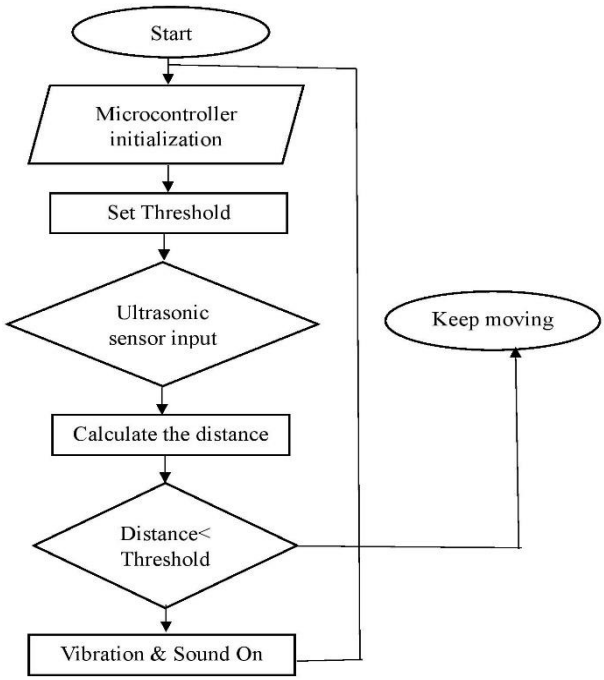


Fig. 5.1 Work Flow of the application

Implementing a Smart ID for Blind People's involves several components such as sensors, APR kit, NodeMcu, ESP 32 Cam, power source, and software. Here are some steps that you can follow to implement a Smart ID Blind People's:

1. **Design the smart id:** Start by designing the smart id physical structure, which should be lightweight and easy to maneuver. The smart id should have a sturdy chassis to support its components.
2. **Choose the components:** Select the sensors, ARP kit, NodeMCU, ESP 32 Cam, power source, and software that you will use to build the smart id. For smart id, you may need sensors that can sense the obstacles and track the blind user location.
3. **Assemble the smart id:** Once you have all the components, assemble the smart id according to your design. Connect the sensors, ARP kit, NodeMCU, and ESP 32 Cam to the power source and test the id's functionality.
4. **Program the NodeMCU:** Write code for the NodeMCU that control the sensors and connects with the GSM. The sensor should be able to sense the obstacles along with a voice alert.
5. **Test the smart id :** Test the smart id in different environments and lighting conditions to ensure that it works as intended. Make any necessary adjustments to the software or hardware to improve the smart id's performance.
6. **Deploy the smart id:** Once the id is fully functional and Ensure that it is properly maintained and before handing it to the blind user's.
7. **Monitor the smart id:** Monitor the id's performance and make any necessary modifications to the software or hardware. Ensure that the smart id is operating within its intended parameters and that it is fulfilling its purpose.

5.1.1 Node MCU

NodeMCU is an open-source development board that combines the power of an ESP8266 Wi-Fi module with a user-friendly programming interface. It provides a convenient platform for prototyping IoT (Internet of Things) projects, enabling users to connect and control various sensors, actuators, and devices through Wi-Fi. With its built-in Lua interpreter, NodeMCU simplifies the development process by allowing users to write and execute code directly on the board, eliminating the need for external microcontrollers.

Its small size, low cost, and extensive community support make NodeMCU an ideal choice for beginners and advanced users alike, facilitating the creation of innovative and connected projects.

Fig 5.2: Node MCU

5.1.2 APR Kit

APR Kit, or Automotive Performance Racing Kit, is a comprehensive package designed to enhance the performance and capabilities of a vehicle. It typically includes various components such as engine modifications, suspension upgrades, exhaust systems, and tuning software. APR Kits are specifically tailored for different car models and aim to optimize horsepower, torque, and overall driving dynamics. These kits are popular among car enthusiasts and racing enthusiasts who seek to maximize their vehicle's potential for track use or spirited driving. By combining carefully engineered components and advanced tuning, APR Kits provide a complete solution for enthusiasts looking to extract the most performance out of their vehicles.

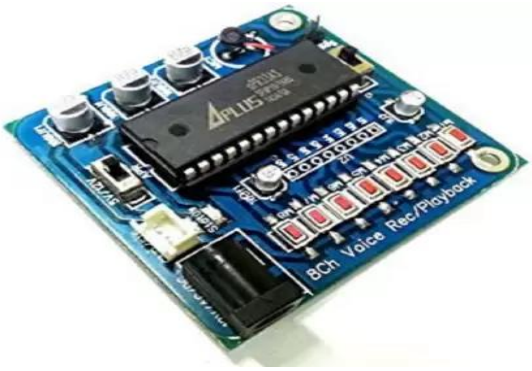


Fig 5.3: APR KIT

5.1.3 ESP 32 CAM

ESP32-CAM is a versatile development board based on the ESP32 microcontroller and equipped with a camera module. It offers a compact and affordable solution for projects requiring image and video capture capabilities. The ESP32-CAM integrates a 2MP camera sensor, along with the necessary hardware and software components for image processing and communication. With its built-in Wi-Fi and Bluetooth connectivity, it allows seamless integration with IoT applications, home automation systems, security systems, and more. The board is programmable using the Arduino IDE or the ESP-IDF framework, enabling developers to easily capture, process, and transmit visual data, making it a popular choice for projects involving surveillance, computer vision, and remote monitoring.

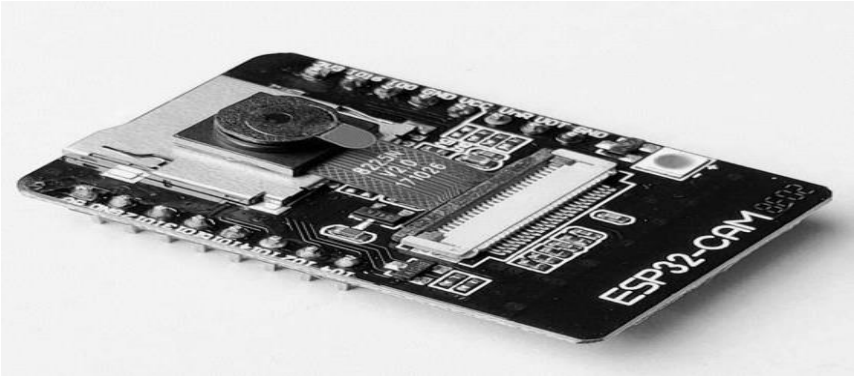


Fig 5.4: ESP32 CAM

5.1.4 IR SENSORS

IR (Infrared) sensors are electronic devices designed to detect and measure infrared radiation emitted by objects. These sensors operate by utilizing infrared light, which falls outside the visible spectrum, to detect the presence or proximity of objects. They consist of an infrared emitter that emits IR light and a receiver that detects the reflected or emitted IR radiation. When an object comes within the sensing range, the emitted or reflected IR light is detected by the receiver, triggering a response or providing information about the object's presence, distance, or movement. IR sensors find applications in various fields such as object detection, proximity sensing, gesture recognition, and ambient light measurement, making them valuable tools in automation, robotics, security systems, and consumer electronics.

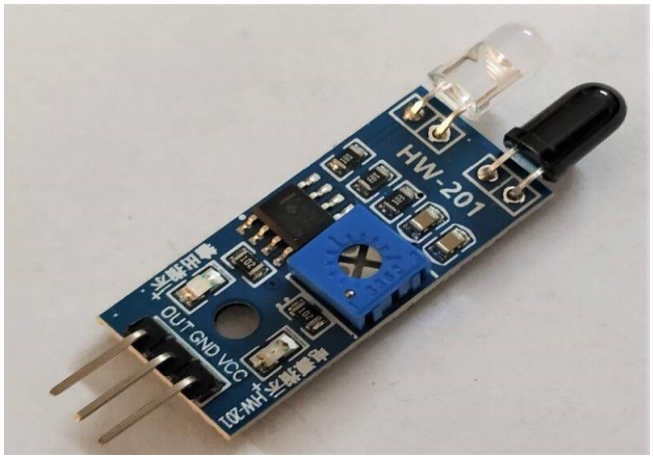


Fig 5.5: IR SENSOR

5.1.5 GSM

A GSM (Global System for Mobile Communications) module is a compact device that integrates a GSM modem and other necessary components for mobile communication. It enables devices to establish a connection with cellular networks and perform functions such as voice calls, text messaging (SMS), and data transfer. The module typically includes a SIM card slot for authentication and a serial interface for communication with the host device. GSM modules are widely used in applications that require remote communication, such as IoT devices, security systems, vehicle tracking, and telemetry systems. They provide reliable and efficient wireless communication capabilities, allowing devices to connect to the cellular network and exchange information, making them an essential component in modern mobile communication systems.

Fig 5.6: GSM

5.1.6 Vibrator

A vibrator is a small mechanical or electrical device that generates vibrations or oscillations. It is commonly used to provide tactile feedback or create vibrations in various applications. In the context of consumer electronics, a vibrator is often found in mobile phones and other handheld devices. It functions by utilizing an eccentric motor or a similar mechanism to produce vibrations, which can be used for notifications, alerts, haptic feedback, or vibrating alarms. Vibrators are designed to be compact, lightweight, and energy-efficient, making them suitable for integration into portable devices. They enhance user experience by adding a tactile dimension to interactions and notifications, making devices more engaging and interactive. Additionally, vibrators are used in other fields, such as industrial machinery, medical devices, and sex toys, where controlled vibrations are desired for specific purposes.

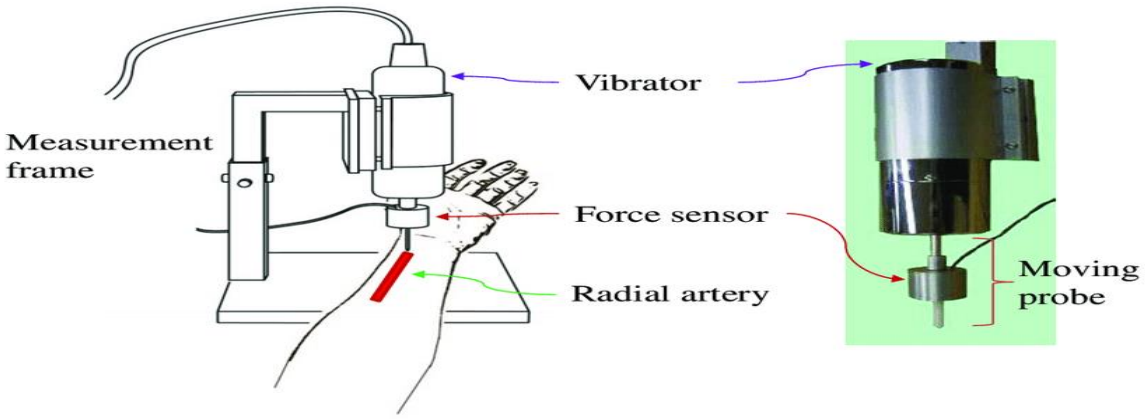


Fig 5.7: Vibrator

5.1.7 Panic Button

A panic button for blind people is a device designed to provide quick and easy access to emergency assistance in case of danger or distress. It is specifically tailored for blind or visually impaired individuals who may face difficulties in reaching out for help. The button typically features a large, easy-to-press button and a loud alarm or notification system that alerts nearby individuals or emergency services. The device may be connected to a smartphone app or a remote monitoring system, enabling real-time tracking and communication with emergency services. Panic buttons for blind people offer an additional layer of safety and peace of mind for individuals with visual impairments, empowering them to lead independent and secure lives.

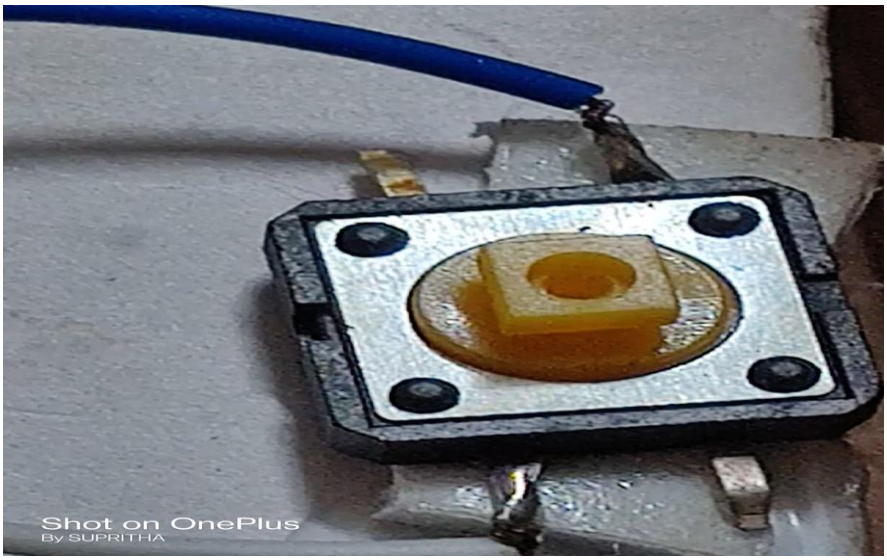


Fig 5.8: Panic Button

5.2 Project Modules

- Sensor Manager Module
- Threshold Manager Module
- Contact Manager Module
- SMS Manager Module
- Reply verification module

5.2.1 Sensor Manager Module

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. In this project we use accelerometer which is embedded in cellular phones.An accelerometer is a device for measuring acceleration and gravity induced reaction forces. These forces may be static, like the constant force of gravity pulling at your feet, or they could be dynamic - caused by moving or vibrating the accelerometer. An accelerometer measures the acceleration and gravity it experiences. Both are typically expressed in SI units meters/second^2 ($m \cdot s^{-2}$) or popularly in terms of g-force.

5.2.2 Threshold Manager Module

Threshold Manager (henceforth, TM) makes it easy to set up events and alarms (thresholds). A threshold is a test of some variable against some value, with a report when the threshold value is exceeded. So it scales to the largest networks, with little traffic overhead. Just testing if variables exceed or fall below threshold values does not do us much good unless we have a way to get the information out of the device. We probably

want to be notified of drastic events by traps. We might well be content with just logging less critical threshold crossings. Here in this project the user will have the ability to set the threshold value which is compared with the readings of the accelerometer. If the value exceeds the specified value then the fall is detected or else not.

5.2.3 Contact Manager Module

This module explains how to add contact to the social contact list. The user is given the option of adding more than one social contact to the list. When the fall is detected the message is sent to all the contacts one by one. There is also the options given to the user so that the user may delete the contacts and also the add contacts.

5.2.4 SMS Manager Module

Text messaging, or texting, refers to the exchange of brief written messages between fixed-line phone or mobile phone and fixed or portable devices over a network. SMS/MMS Manager contains a powerful rule editor which can be used to automate message processing. This allows deploying common scenarios such as SMS voting polls, but also much more complex schemes.

- React to events like message being received or connection going down.
- Reply to SMS, MMS, and e-mail with any type of message.
- Embed multimedia content like pictures and sound in MMS messages, add attachments to e-mail.
- Create contacts and add them to distribution lists.
- Assign messages to specific users or groups.
- Control third-party systems with rules by making dynamic HTTP requests or by writing information to an SQL table.

5.2.5 Reply Verification Module

When the fall is detected then the message is sent to the social contact specified by the user. The replied message is then checked for the password or the keyword. If the message contains the keyword and is sent by the same contact then the call is made or else the message is discarded.

5.3 Maintenance

The term "software maintenance" is used to describe the software engineering activities that occur following delivery of a software product to the customer. The

maintenance phase of the software life cycle is the time period in which a software product performs useful work. Maintenance activities involve making enhancement to software products, adapting products to new environments and correcting problems. Software product enhancement may involve providing new functional capabilities, improving user display and modes of interaction, and upgrading external documents. Adaptation of software to a new environment may involve moving the software to a different machine. Problem correction involves modification and revalidation of software to correct errors. The enhancement of this project can be accomplished easily. That is, any new functional capabilities can be added to the project by simply including the new module in the homepage and giving a hyperlink to that module. Adaptation of this project to a new environment is also performed easily.

Corrective Maintenance

Even with the best quality assurance activities, it is likely that they customer will uncover defects in the software. Corrective maintenance changes the software to correct defects.

Adaptive Maintenance

An activity that modifies the software to properly interface with a changing environment. The system has been modified so that various change include to the new system. In case of Fund Transfer, adoptive maintenance has been performed, that is in earlier system (character based UNIX system) changes are fixed and if any new changes are to be included, was a difficult task. Now provisions are given so that the user can define various changes. Such as it designed to accommodate the new change in further.

Enhancement Maintenance

As software is used, the customer/user will recognize additional functions that will provide benefit. Perceptive maintenance extends the software beyond its original functional requirements. In the case of visual cryptography ,system can be added new functions such that the user can able to retrieve the information in a user friendly and it will be very helpful for future development.

CHAPTER – 6

TESTING

6.1 Design of Test Cases

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 checkthe functionality of components, sub-assemblies, assemblies, and/or a finished product. It is the process of exercising software with the intent of ensuring that the software system meetsits requirements and user expectations and does not fail unacceptably. There are various types of tests. Each test type addresses a specific testing requirement.

6.2 Types of Testing

6.2.1 Unit Testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at the component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

6.2.2 Integration Testing

Integration tests are designed to test integrated software components to determine if they run as one program. Testing is event-driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfied, as shown by successful unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

6.2.3 Functional Testing

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user

manuals. Functional testing is centered on the following items: Valid Input: identified classes of valid input must be accepted. Invalid Input: identified classes of invalid input must be rejected. Functions: identified functions must be exercised. Output: identified classes of application outputs must be exercised. Systems/Procedures: interfacing systems or procedures must be invoked. The organization and preparation of functional tests are focused on requirements, key functions, or special test cases. In addition, systematic coverage identifies business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

6.2.4 System Testing

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration-oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

6.2.5 White Box Testing

White Box Testing is a testing in which the software tester knows the inner workings, structure, and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black-box level.

6.2.6 Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure, or language of the module being tested. Black box tests, like most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box. you cannot "see" into it.The test provides inputs and responds to outputs without considering how the software works.

6.3 Test Strategy and Approach

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

6.3.1 Test objectives

- The images should be acquired from the web camera
- Detect the exact emotion which is shown by the user.

- All field entries must work properly.
- The entry screen, messages, and responses must not be delayed.

6.3.2 Features to be Tested

- Verify that the emotion is detected properly
- Verify that the songs are generated for the user according to the emotion
- All links should take the user to the correct action.

6.4 Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end-user. It also ensures that the system meets the functional requirements.

6.5 Test Case

Here we can find the different testing aspects which we have included to check each part of the entire work flow.

Serial No	Requirement Id	Test Case Reference	Test Result	Remarks
1	RID-1	TC-1 - IR Sensor(Left)	Pass	Send sensor data to nodemcu
2	RID-2	TC-2- IR sensor(Right)	Pass	Send sensor data to nodemcu
3	RID-3	TC-3- IR sensor(Bottom)	Pass	Send sensor data to nodemcu
4	RID-4	TC-4- IR sensor(Top)	Pass	Send sensor data to nodemcu
5	RID-5	TC-5- Node MCU establishes connection with APR	Pass	Connectivity is good
6	RID-6	TC-6- Speaker connected with APR	Pass	Alerts user
7	RID-7	TC-7- Node MCU establishes connection with GSM module	Pass	Connectivity is good

8	RID-8	TC-8- Node MCU establishes connection with Panic button	Pass	Connectivity is good
9	RID-9	TC-9: Connection of camera with Node MCU	Pass	Image Captured
10	RID-10	TC-10: Connection to cloud	Pass	Alert message with notification

Fig 6.1: Test Case

CHAPTER - 7

SNAPSHOTS AND RESULT DISCUSSION

7.1 Code Snippet for Implementation

The below code snippets shows the code used for the implementation of our project on Smart id for blind people's.

```
#include <ESP8266HTTPClient.h>
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
BlynkTimer timer;
#include <TinyGPS++.h>
TinyGPSPlus gps; // The TinyGPS++ object
float lati;
float longi;
unsigned int move_index = 1;       // fixed location
//D5 =front ir
//D6 =left ir
//D7=right ir
//D4 =voice1 front ir
//D0 =voice2 left ir
//D2 =voice3 right ir
//D1 =vinration motor
char ssid[] ="blind";
char password[] ="12345678";
void setup()
{
Serial.begin(9600);
WiFi.mode(WIFI_STA);
WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
delay(500);
```

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

pinMode(D5,INPUT);
pinMode(D4,OUTPUT);
digitalWrite(D4,HIGH);
pinMode(D6,INPUT);
pinMode(D0,OUTPUT);
digitalWrite(D0,HIGH);
pinMode(D7,INPUT);
pinMode(D2,OUTPUT);
digitalWrite(D2,HIGH);
pinMode(D1,OUTPUT);
//digitalWrite(D1,LOW);
timer.setInterval(1000,dat);
}
void loop()
{
while (Serial.available() > 0)
{
// sketch displays information every time a new sentence is correctly encoded.
if (gps.encode(Serial.read()))
displayInfo();
}
timer.run();
}
void displayInfo()
{
if (gps.location.isValid() )
{
lati = (gps.location.lat());     //Storing the Lat. and Lon.
longi = (gps.location.lng());
}
```

```
}
void checkGPS(){
if (gps.charsProcessed() < 10)
{
Serial.println(F("No GPS detected: check wiring."));
}
}
void dat() {
int val =digitalRead(D5);
int val1 =digitalRead(D6);
int val2 =digitalRead(D7);
Serial.println("Val:"+String(val));
Serial.println("Va2:"+String(val1));
Serial.println("Va3:"+String(val2));
if(val ==0)
{
digitalWrite(D1,HIGH);
digitalWrite(D4,LOW);
}
else
{
digitalWrite(D4,HIGH);
digitalWrite(D1,LOW);
}
if(val1 ==0)
{
digitalWrite(D1,HIGH);
digitalWrite(D0,LOW);
}
else
{
digitalWrite(D0,HIGH);
digitalWrite(D1,LOW);
```

```
}
if(val2 ==0)
{
digitalWrite(D1,HIGH);
digitalWrite(D2,LOW);
}
else
{
digitalWrite(D2,HIGH);
digitalWrite(D1,LOW);
}
}
```

7.2 Result Analysis

This is the result of what we have found the best choice for optimizing the storage space and upload bandwidth over the cloud is source-based de-duplication. The process of distributed deduplication helps in achieving the process of reliability, confidentiality, and security. Also, a good deduplication ratio can be achieved by modifying the deduplication algorithm further.

7.3 Snapshot

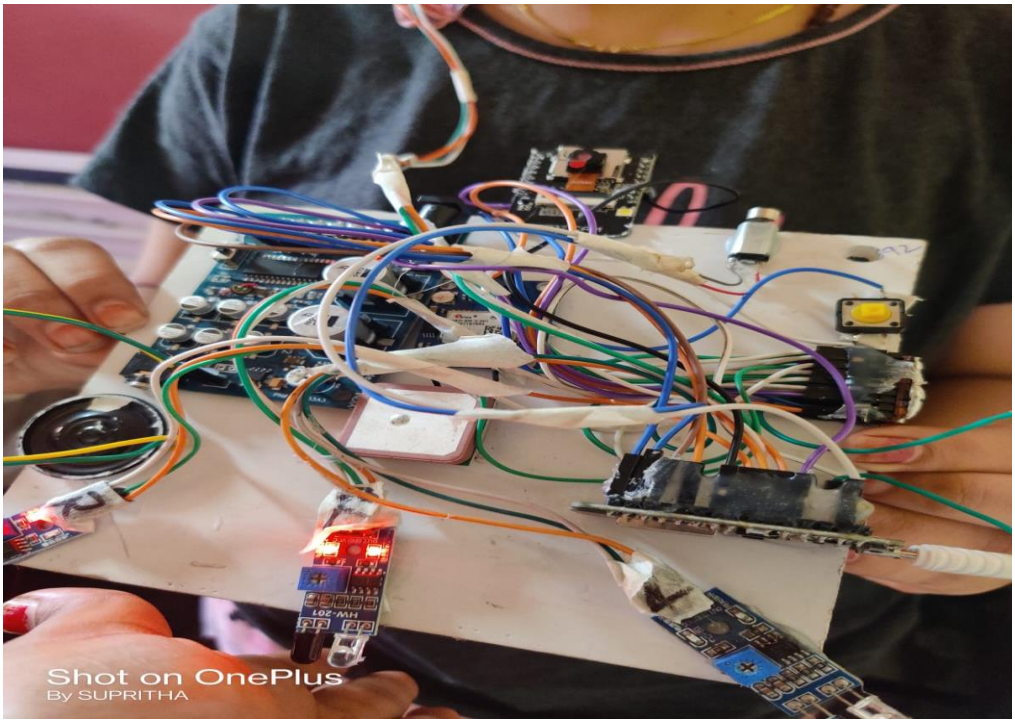


Fig 7.1: Obstacles sensed by sensor

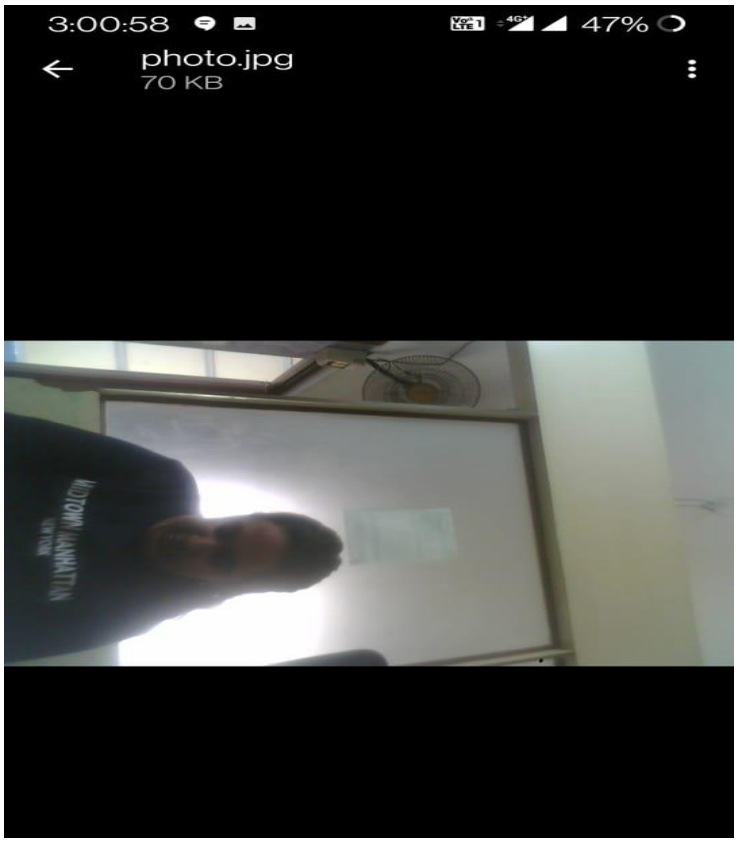


Fig 7.2: Image captured on Pressing Panic Button

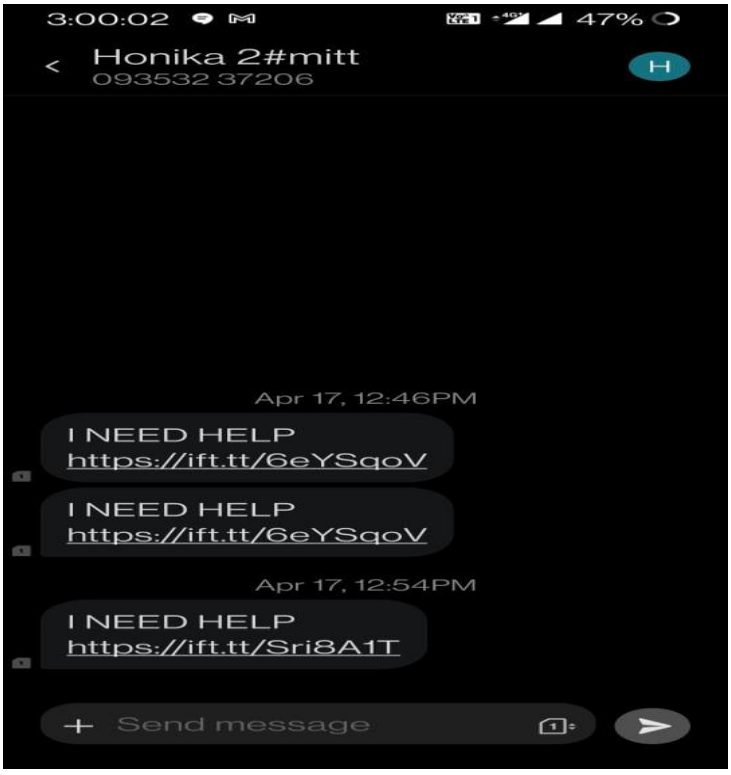


Fig 7.3: Alert msg to the guardian during Panic mode

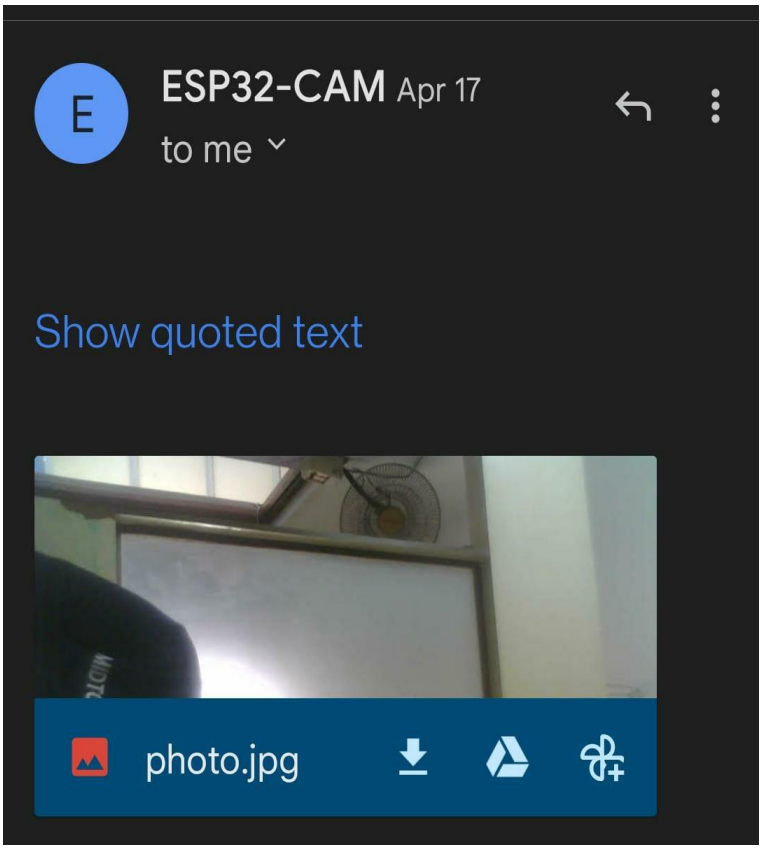


Fig 7.4: Email notification to guardian during Painic Mode

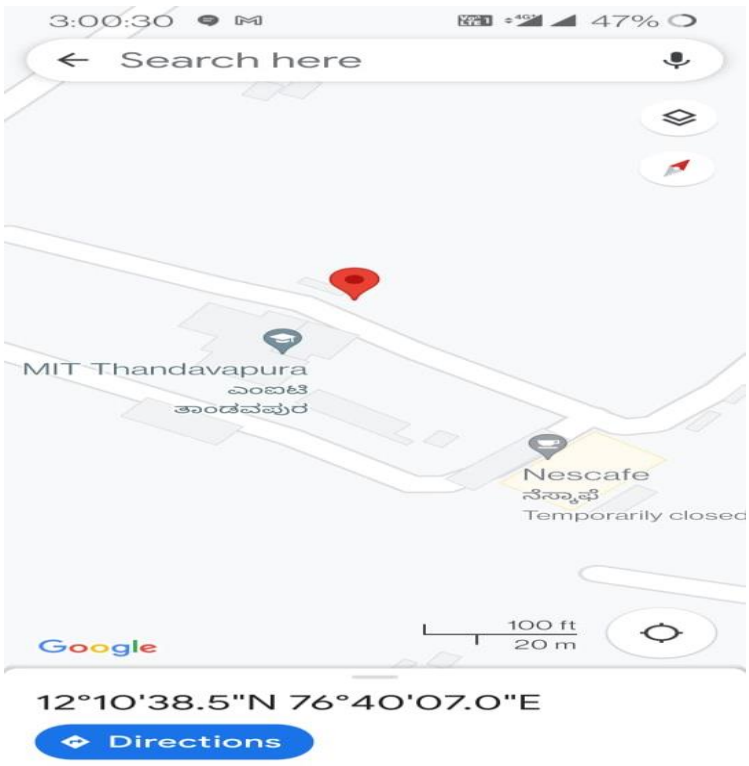


Fig 7.5:Live location sent to guardian during Panic

CONCLUSION AND FUTURE ENHANCEMENT

The study suggested a brand-new Smart Id concept for blind people, complete with architecture and design. The system's benefit is that it may prove to be a very affordable option for millions of blind people throughout the world. The suggested combination of multiple functional elements creates a real-time system that tracks the user's location and gives dual feedback, enhancing navigational security. This project created a smartphone app and server-based user-friendly navigation system for visually impaired persons. While using the system, the smartphone continuously sends pictures of the scene in front of the user to a server over a Wi-Fi or 4G network. The server then goes through the recognition procedure. The final output is returned to the smartphone, which informs the user of obstacles through speech notifications. This project also ensures the safety of the user.

In the future, to provide information on more types of obstacles and more accurate recognition, a broader range of obstacle images and a high-end server equipped with a more powerful graphics processing unit could be used to increase the number of recognition categories and the recognition rate. On the other hand, the feature recognition has extensibility.

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