# BLIND CAN SEE


**Project ID : 12**

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**Certification**

This is to certify that **Shahzaib Ashfaq**, **[Se20-257]**, **Unsa Athar**, **[Se20-253], Hafsa Zafar**, **[Se20-249] and Shah Hamza Abdali**, **[Se20-245]** have successfully completed the final project **[Blind Can See],** at the **Sir Syed University of Engineering and Technology**, to fulfill the partial requirement of the degree **Software Engineering.**

**Project Supervisor**

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Department of Software Engineering Department, Sir Syed University of Engineering & Technology

**Project Title (Blind Can See)**

Sustainable Development Goals

(Please tick the relevant SDG(s) linked with FYDP)

| SDG No | Description of SDG | SDG No | Description of SDG |
|---|---|---|---|
| SDG 1 | No Poverty | SDG 9 | Industry, Innovation, and Infrastructure |
| SDG 2 | Zero Hunger | SDG 10 | Reduced Inequalities |
| SDG 3 | Good Health and Well Being | SDG 11 | Sustainable Cities and Communities |
| SDG 4 | Quality Education | SDG 12 | Responsible Consumption and Production |
| SDG 5 | Gender Equality | SDG 13 | Climate Change |
| SDG 6 | Clean Water and Sanitation | SDG 14 | Life Below Water |
| SDG 7 | Affordable and Clean Energy | SDG 15 | Life on Land |
| SDG 8 | Decent Work and Economic Growth | SDG 16 | Peace, Justice and Strong Institutions |
| | | SDG 17 | Partnerships for the Goals |

| Range of Complex Problem Solving | | | |
|---|---|---|---|
| | **Attribute** | **Complex Problem** | |
| 1 | Range of conflicting requirements | Involve wide-ranging or conflicting technical, engineering and other issues. | |
| 2 | Depth of analysis required | Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models. | |
| 3 | Depth of knowledge required | Requires research-based knowledge much of which is at, or informed by, the forefront of the professional discipline and which allows a fundamentals-based, first principles analytical approach. | |
| 4 | Familiarity of issues | Involve infrequently encountered issues | |
| 5 | Extent of applicable codes | Are outside problems encompassed by standards and codes of practice for professional engineering. | |
| 6 | Extent of stakeholder involvement and level of conflicting requirements | Involve diverse groups of stakeholders with widely varying needs. | |
| 7 | Consequences | Have significant consequences in a range of contexts. | |
| 8 | Interdependence | Are high level problems including many component parts or sub-problems | |
| **Range of Complex Problem Activities** | | | |
| | **Attribute** | **Complex Activities** | |
| 1 | Range of resources | Involve the use of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies). | |

| | | | |
|---|---|---|---|
| 2 | Level of interaction | Require resolution of significant problems arising from interactions between wide ranging and conflicting technical, engineering or other issues. | |
| 3 | Innovation | Involve creative use of engineering principles and research-based knowledge in novel ways. | |
| 4 | Consequences to society and the environment | Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation. | |
| 5 | Familiarity | Can extend beyond previous experiences by applying principlesbased approaches. | |

**Abstract**

This research paper presents an innovative solution for visually impaired individuals by utilizing ultrasonic sensors in multiple directions, integrated with the You Only Look Once (YOLO) algorithm and Ultra Sonic Sensor. This approach comprehensively enhances their perception, covering all essential features needed for daily life. It holds the potential to significantly improve inclusivity, communication and autonomy offering a holistic solution to full fill daily life requirements of individuals with visual impairments. Beyond its technical advancements, this study underlines the inspirational aspects of these breakthroughs and their ability to transform impossibilities to possibilities, lighting the way for a brighter and more inclusive future.

**Keywords**: YOLO, ultrasonic sensors

**Undertaking**

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I certify that the project **Blind Can See** is our own work. The work has not, in whole or in part, been presented elsewhere for assessment. Where material has been used from other sources it has been properly acknowledged/ referred.

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We are also thankful to our friends and families whose silent support led us to complete our project.

## Table of Contents

**List of Tables**

**List of Figures**

## List of Acronyms

**YOLO**: You Only Look Once

**Chapter 1**

## 1.1 Introduction

One of the most misunderstood forms of disability, is blindness. Without even having contact with a blind person, the general public has preconceived views about blind people that they firmly hold to be true. The majority of individuals in the nonblind population think that blind people are unable to work or lead regular lives. Blind people do lead regular lives and have unique ways of carrying out tasks. However, they undoubtedly have problems because to societal issues and unavailable infrastructure. For a person who is blind, especially one who has lost all eyesight, finding their way about is the hardest problem.

Finding high-quality reading materials in accessible forms can be challenging for blind individuals. Even if a blind person can use screen reading software, if somehow the websites are not built appropriately, it does not provide for a very seamless online experience. For a blind person to grasp what is depicted by photos, they rely on the visual description. However, websites frequently do not offer a precise visual description. We as being physically fit people cannot understand the 1% of problem faced by the blind people.

We were able to identify the real-world issue statement and present the technologybased solution thanks to the concept of "BLIND CAN SEE." We are still employing technology, so why are we using glasses instead of a stick?

What effects may this have on our society?

Will these spectacles enable blind individuals to move about on their own? You may find the answers to these and many other similar questions below, which will satiate you with the vision and developments taking place for the futuristic approach.

• The blind would be capable of counting the staircases, that will assist them stay on them and prevent falls.

• Offer our customers something that your rivals can't match.

- Providing assistance with hue, form, object, and picture detection
- The blind will be able to examine the nearby population and gender
- The navigation system, which will let people get from one location to another more effortlessly.
- The ability to recognize food is another distinctive quality that aids in enjoyment of the meal.

## 1.2 Statement of the problem

Using a regular blind stick makes it difficult for blind persons to quickly identify stairs or obstacles. The blind traveler is relying on other guides, such as trained dogs, a blind cane, and people's knowledge. Around 90% of people who are blind or visually impaired reside in developing nations. having issues participating in class while reading or learning to read. not be able to follow or focus on objects, squint often, wipe their eyes a lot, or have chronic eye redness or light sensitivity. Frequently bump into objects. To overcome this problem the significant research has been made and the effort to provide the logistic solution for the people.

Blind people find it difficult to get from place to place and rely on predetermined, repeating paths with few impediments to take them there on their own. The pathways they have been accustomed to could, however, include new dangers or be impassable because of bad weather or construction. It is crucial to have navigational aids that enable people who are blind or visually impaired to navigate, follow directions, and determine their whereabouts at any given time.

## 1.3 Goals/Aims & Objectives

Centered around a comprehensive exploration, the core focus of this study lies in gaining a comprehensive understanding of the profound impact wielded by "Blind Can See" technology on the lives of individuals with visual impairments. In delving into its potential to enhance independence, promote inclusivity, and assess its usability and effectiveness across diverse contexts, this research seeks to unearth the transformative power of this technological innovation. By immersing ourselves in the experiences of visually impaired individuals, we aim to unravel the multifaceted

ways in which "Blind Can See" technology empowers them to lead more independent lives, dismantles barriers to inclusion, and cultivates an environment of equal opportunities. Through an in-depth examination of its usability and effectiveness, we strive to glean invaluable insights that will inform the future refinement and implementation of this groundbreaking technology, ultimately fostering a society that champions the rights and potential of visually impaired individuals.

## 1.4 Motivation

The purpose of this smart glass is to alert a blind person who cannot see anything about an accident. Additionally, it benefits them to work independently and do other housework. further color, person, object, and form detection Google search currency detection also makes it simple to communicate with others. Future additions of several other amenities will make living for those who are particularly fortunate somewhat tolerable.

## 1.5 Assumption and Dependencies:

***User Acceptance:***

Assumption: Users will be willing and able to adopt and adapt to the new technology.

***Connectivity:***

Assumption: Reliable internet connectivity will be available for seamless communication between the glasses and external servers or devices.

***Sensor Accuracy:***

Assumption: Sensors (e.g., cameras, proximity sensors) will provide accurate and reliable data in various environmental conditions.

***Dependencies:***

***Software Development Tools:-***

Dependency: Availability of appropriate software development tools and frameworks for IoT application development.

***Regulatory Compliance:-***

Dependency: Compliance with relevant regulations and standards gove

***External APIs:-***

Dependency: Availability and stability of external APIs for mapping, navigation, or any other third-party services integrated into the glasses. ring IoT devices and assistive technologies.

## 1.6 Methods

The “Blind Can See” technology represents a pioneering advancement in the field of assistive devices for the visually impaired, revolutionizing their daily lives through a power integration of hardware and software components. At its core, this technology harnesses the potential of advanced smart glasses, which serve as a trailblazing platform for real- time data capture and interaction. The inclusion of a high-resolution camera enables the recognition of objects, text and faces, while the microphone and speaker facilitate seamless voice commands and auditory feedback. Additionally, the integration of a vibration sensor empowers users with haptic feedback, enhancing their spatial awareness and responsiveness to their environment. Behind the scenes, the software stack, comprising SQL Lite for data storage, Python for its multifaceted capabilities, Jupiter as a user-friendly code editor, and embedded C for low-level programming, orchestrates the smooth functioning and interaction between the hardware components. This fusion of innovative hardware and sophisticated software culminates in a user-centric experience, with qualitative data from interviews and focus group providing invaluable insights into users’ satisfaction and impact. The technology’s quantitative data, collected through surveys and data analysis, establishes the effectiveness and efficiency of the “Blind Can See” system. Likewise, this revolutionary technology takes pride in its dedication to affordability and accessibility, intentionally pricing the finished product to appeal to a larger group of people who are blind, overcoming social and economic hurdles. By utilizing this novel combination of hardware and software, "Blind Can See" aims to empower the community of people who are blind, giving them a greater sense of independence,

mobility, and sensory perception that enhances their interaction with the outside world.

### 1.7 Report Overview

The context, scope, introduction, literature review, related projects, issue statement, information collecting, anticipated features, tools and technology needs, and project planning are all covered in the report. It also explores data collecting via survey questionnaires and interviews, design and development process, and a thorough project plan that outlines important tasks and future considerations.

# Chapter 2

## 2.1. Background

Most people believed that those who are blind or have visual problems cannot live alone and always require assistance. In actuality, they do not always require assistance; in fact, they are often able to rely on themselves and have the opportunity to live their life as a regular person.

The major motivation for implementing "blind can see specs" was to demonstrate to the general public that persons with visual impairments and the blind have the ability to learn at any institution of higher learning without always needing assistance. The proportion of educated people will rise because of these specs.

## 2.2. Scope

Over the past few years, the idea of the Internet of Things, or IoT, has completely transformed our way of life. While our project's wearable technology, "blind can see," enables patients to self-monitor their real-time condition, the sensors and versions employed in the healthcare sector are noticeably more advanced. As IoT-based sensors' accuracy and precision rise, so do the percentage of human mistakes made when assisting blind persons to move around independently.

Additionally, since several blind persons may use the same IoT device, utilizing them might result in a reduction in cost. Individuals can move around with ease, recognize the people they are speaking with, and perceive their surroundings thanks to these spectacles.

## 2.3. Similar Projects and Literature Review

**Project: 01**

**Iris Vision**

Iris Vision electronic glasses for the blind and visually impaired are a highly innovative assistive technology solution, which is registered with the FDA as a Class1 medical device and is redefining the concept of wearable low vision aids.

A combination of a Samsung's VR headset and a smartphone, Iris Vision gives birth to an innovative solution aimed at helping people with eye problems like macular degeneration, cataracts, glaucoma, diabetic retinopathy (DR), retinitis pigmentosa (RP) and so forth.

**Project: 02**

**NuEyes Pro**

NuEyes Pro is a head-worn lightweight and wireless pair of smart glasses, which can be controlled either through a wireless handheld controller or a set of voice commands. It is designed to help visually impaired and legally blind see better. Glaucoma, macular degeneration, and diabetic retinopathy are some of the visual conditions NuEyes Pro can help you with. A camera on the front of the glasses captures the image and displays it magnified inside of the lenses. You can get up to 12X magnified images. There are various other features, which make these eglasses more than just a pair of electronic reading glasses.

**Project:03**

**My Eye2**

These are low vision electronic glasses designed to make reading, writing, recognizing faces and various other daily activities easier for visually impaired people. A light attachable camera distinguishes it from an ordinary pair of glasses, which is mounted on the frame of the glasses by the side.

## THIS IS WHAT OUR PROJECT MAKES A DIFFERENCE!!!

All of the initiatives described above are succeeding in their respective domains. They distinguish themselves from the competitors through the use of new technologies. We get the notion from visiting these sites that there is a lot we can do to better things with new ideas. People appreciate utilizing cutting-edge technology and watching it in action as it allows them to move freely and independently. Seeing the world from various angles enables our blind population to contribute to the advancement of civilization. Technologies are utilized to improve human lives in a variety of ways. We use microprocessors and sensors together with new features for environment detection and Google Map integration to further distinguish this product.

Our project's goal is to make their lives easier by providing them with these features.

## 2.4. Problem Statement

Using a regular blind stick makes it difficult for blind persons to quickly identify stairs or obstacles. The blind traveler is relying on other guides, such as trained dogs, a blind cane, and people's knowledge. Around 90% of people who are blind or visually impaired reside in developing nations. having issues participating in class while reading or learning to read. not be able to follow or focus on objects, squint often, wipe their eyes a lot, or have chronic eye redness or light sensitivity. frequently bump into objects.

To overcome this problem the significant research has been made and the effort to provide the logistic solution for the people.

Blind people find it difficult to get from place to place and rely on predetermined, repeating paths with few impediments to take them there on their own. The pathways they have been accustomed to could, however, include new dangers or be impassable because of bad weather or construction. It is crucial to have navigational aids that enable people who are blind or visually impaired to navigate, follow directions, and determine their whereabouts at any given time.

## 2.5. Features

What distinguishes this place and will contribute to a significant impact in the lives of blind people nearby are its unique features.

- Facial Detection
- Object Detection
- Text Recognition
- Text to Speech Conversion
- Text Translation
- Food Detection
- Danger Detection
- Money Recognition

- Video Conversation (Calling)
- 2D Steps Navigation
- Staircase Navigation
- Color Detection
- Day & Date
- Person counter
- Weather
- Storing Important Information

More feature will be added in the future to enhance the working.

## 2.6. Expected Tools and Technology Requirements

- **Hardware components**

i) Micro Controller

ii)Ultrasonic Sensor

iii)Microphone

iv)Vibrator Sensor

v)Camera Module

- **Software Components**

i) Python

ii)PyCharm

iii)Open CV

## 2.7. Design and Development Methodology

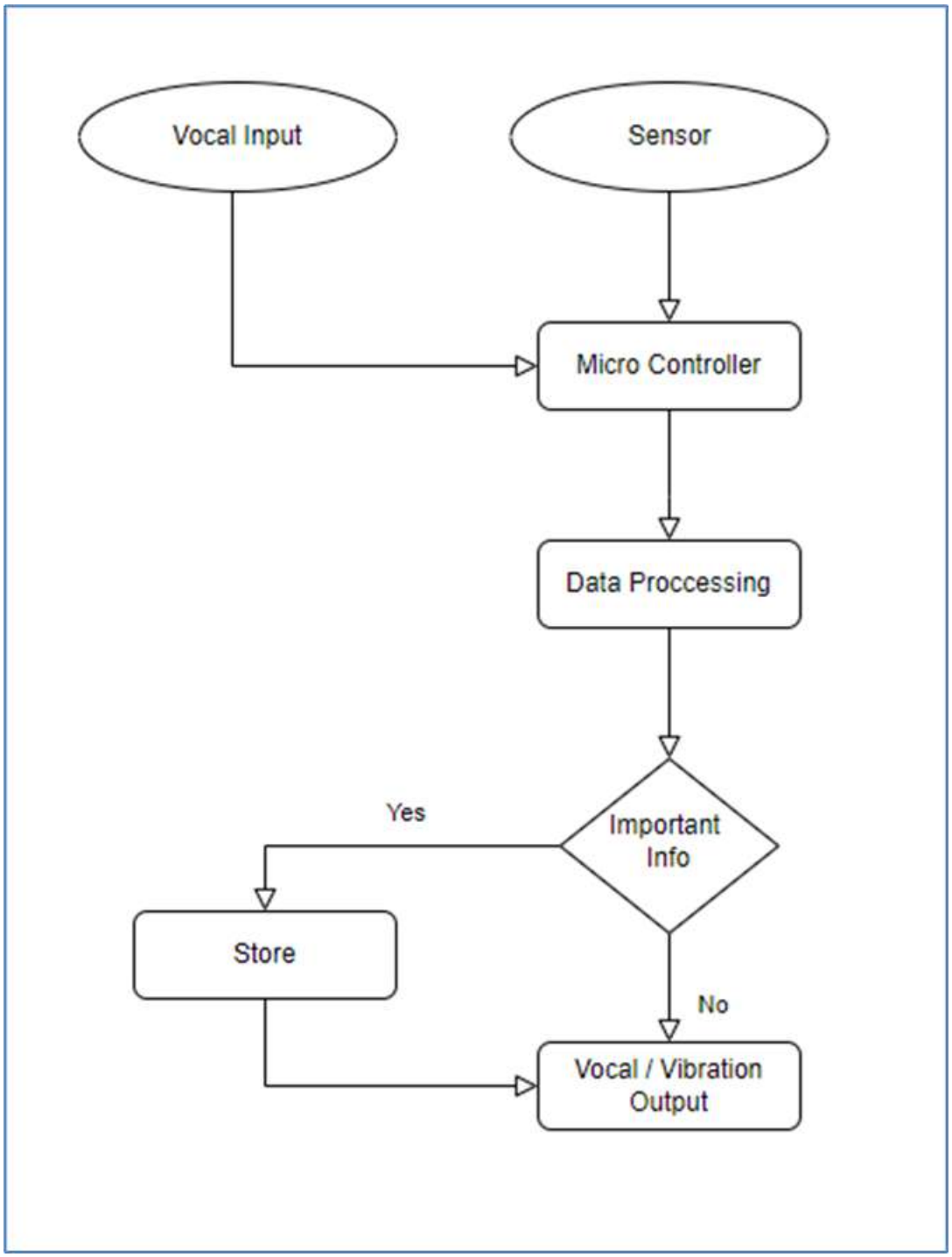
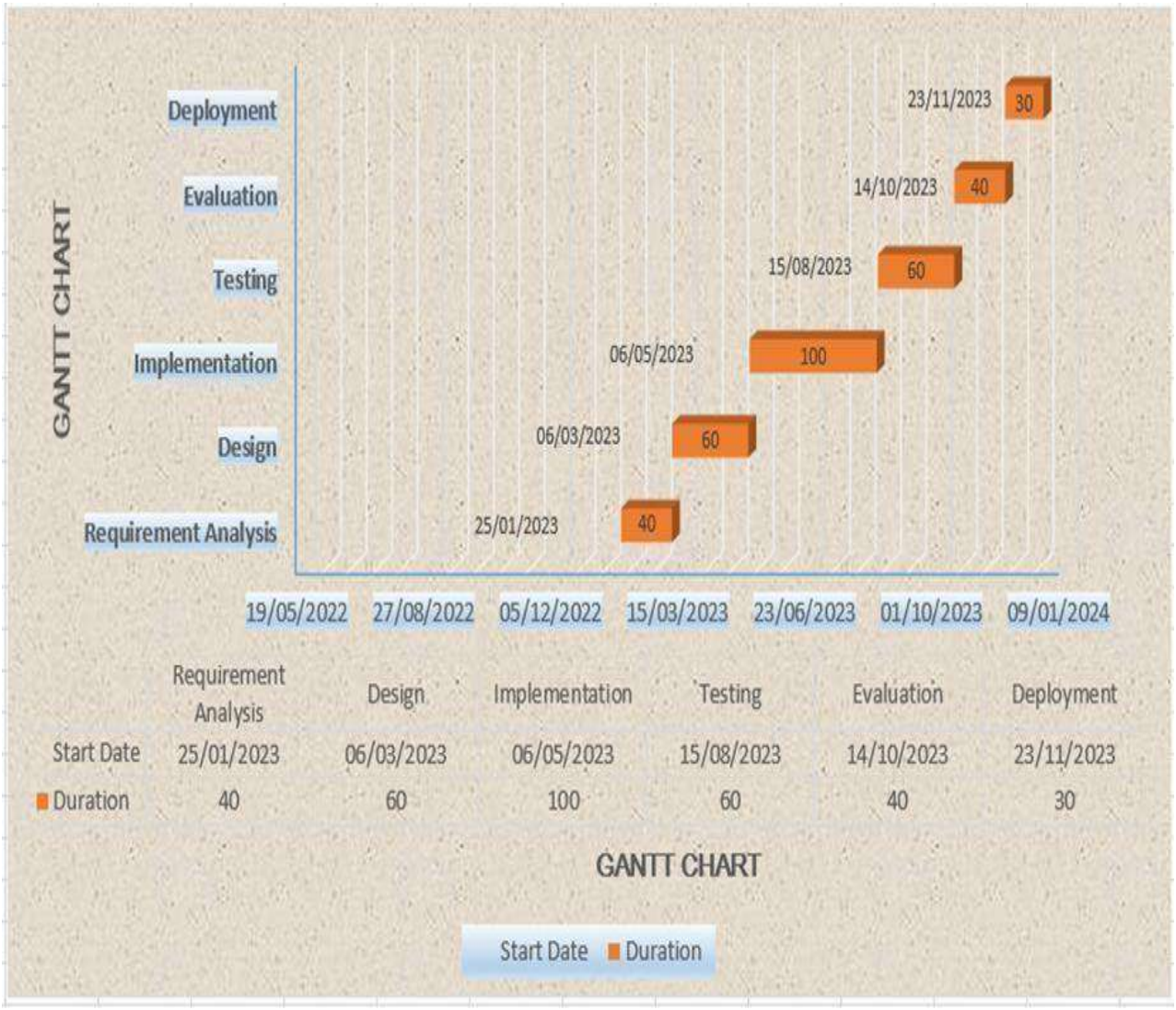



**Fig (1)**

BLIND CAN SEE

| Tasks | Start Date | End Date | Duration |
|---|---|---|---|
| Requirement Analysis | 1/25/2023 | 3/5/2023 | 40 |
| Design | 3/6/2023 | 5/5/2023 | 60 |
| Implementation | 5/6/2023 | 8/14/2023 | 100 |
| Testing | 8/15/2023 | 10/13/2023 | 60 |
| Evaluation | 10/14/2023 | 11/22/2023 | 40 |
| Deployment | 11/23/2023 | 12/23/2023 | 30 |

## 2.8. Project Planning




**Fig(2)**

# Chapter 3

## 3.1 Hardware Connectivity

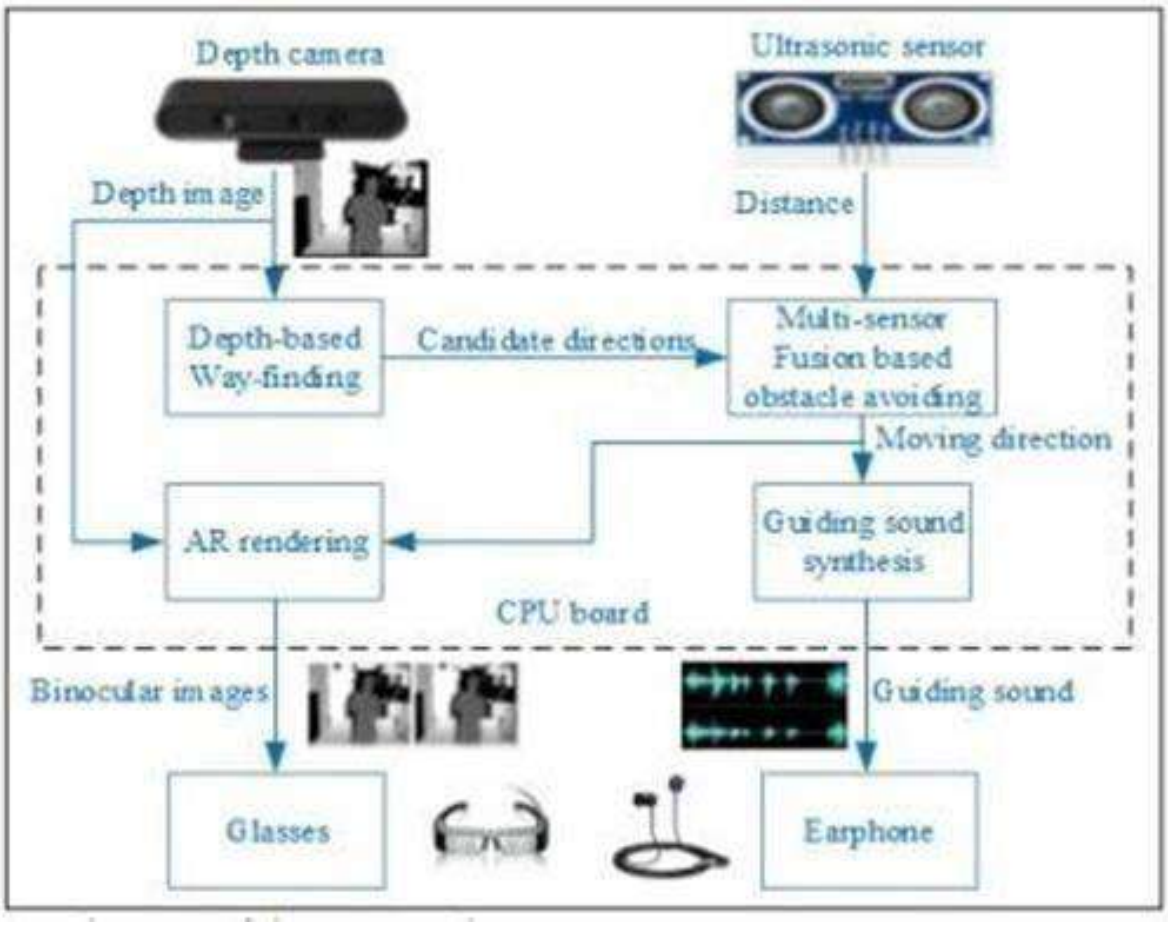



**Figure (3): Integration**

### 3.2 BLIND CAN SEE": A Concept Transforming Possibilities

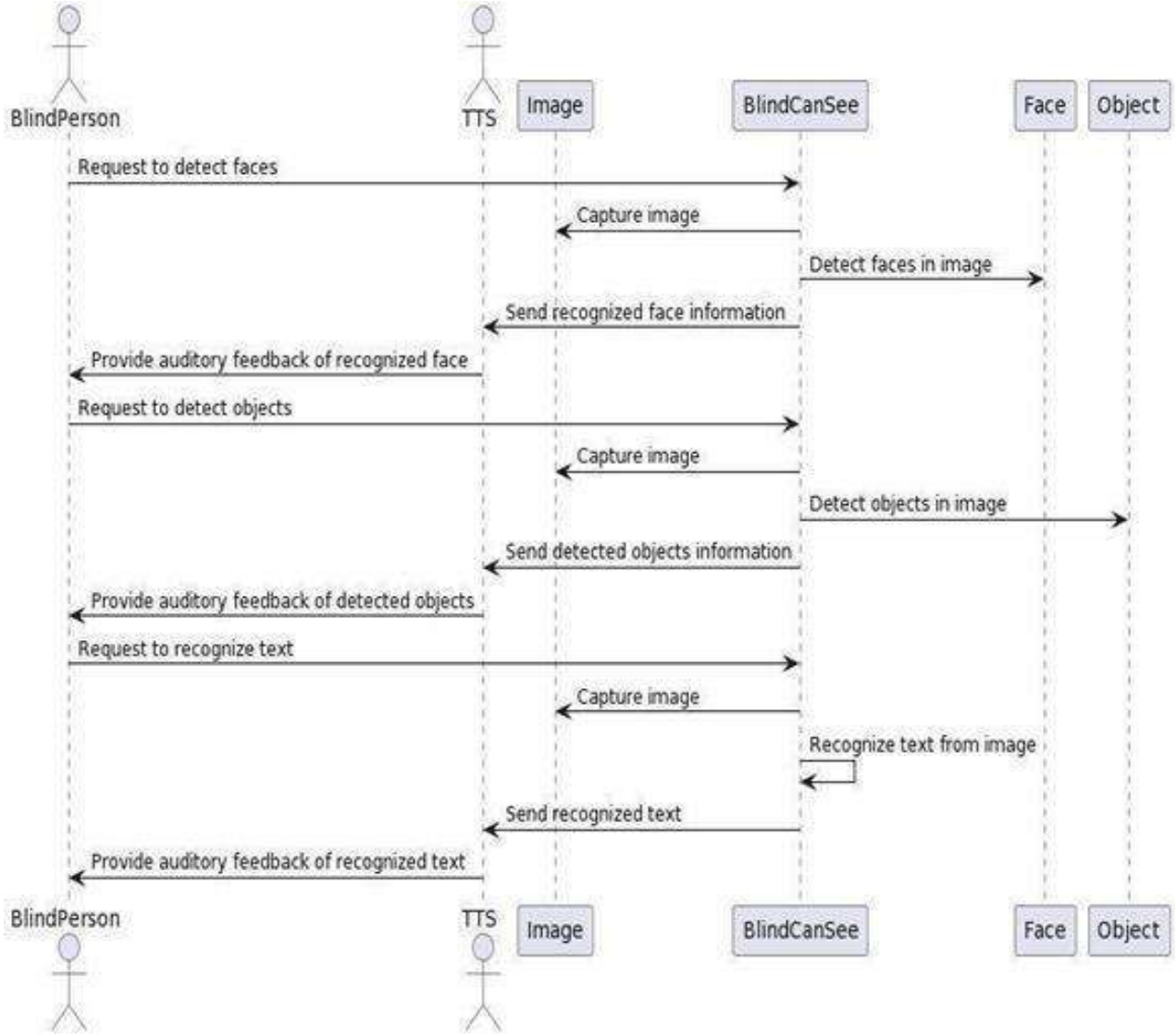



**Fig (4): Sequence diagram**

# Chapter 4

## 4.1 Proposed Solution/Results & Discussion

Your proposed solution should relate the current situation to a desired result and describe the benefits that will accrue when the desired result is achieved. So, begin your proposed solution by briefly describing this desired result.

| Task | Optimistic Time (O) | Most Likely Time (M) | Pessimistic Time (P) | Expected Time (TE) | Variance (V) | Dependency |
|---|---|---|---|---|---|---|
| **Project Proposal** | 2 weeks | 3 weeks | 4 weeks | (O + 4M + P) / 6 | (P - O) / 6 | - |
| **Literature Review** | 3 weeks | 4 weeks | 5 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Project Proposal |
| **Project Planning** | 2 weeks | 3 weeks | 4 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Literature Review |
| **Development Phase** | 8 weeks | 10 weeks | 12 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Project Planning |
| **Documentation** | 4 weeks | 6 weeks | 8 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Development Phase |
| **Finalization** | 2 weeks | 3 weeks | 4 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Documentation |
| **Project Presentation** | 2 weeks | 3 weeks | 4 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Finalization |
| **Submission** | 1 week | 2 weeks | 3 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Project Presentation |
| **Evaluation** | 1 week | 1 week | 2 weeks | (O + 4M + P) / 6 | (P - O) / 6 | Submission |

**Table 1:** PERT Activity Time estimate table

# Chapter 5

## 5.1 Summary and Future work

### Summary

The IoT-based project "Blind Can See" has successfully demonstrated the integration of Internet of Things (IoT) technologies to enhance the daily lives of visually impaired individuals. The system employs a network of sensors and devices to provide real-time environmental information to users, enabling them to navigate and perceive their surroundings more effectively. Throughout the course of this project, we have achieved significant milestones in developing a user-friendly and reliable solution that addresses the challenges faced by the visually impaired.

Our results indicate that the implementation of IoT in assistive technologies for the visually impaired holds great potential. Users of the "Blind Can See" system reported improved spatial awareness, increased independence, and a higher overall quality of life. The successful deployment of this technology underscores the importance of continued research and development in this field to further enhance its capabilities and impact.

### The future work

**Integration with AI and Machine Learning:** Explore the incorporation of artificial intelligence and machine learning algorithms to enhance the system's ability to adapt to diverse environments and user preferences. This can enable the system to provide more personalized and context-aware assistance.

**Wearable Device Development**: Consider the development of dedicated wearable devices that seamlessly integrate with the "Blind Can See" system, providing users with a more convenient and unobtrusive experience.

**User Feedback and Iterative Design:** Continuously gather feedback from users to understand their evolving needs and challenges. Use this feedback to iterate on the system design and functionality, ensuring it remains relevant and effective.

**Accessibility Standards and Collaboration:** Work towards aligning the "Blind Can See" system with accessibility standards and collaborate with relevant stakeholders, including healthcare professionals and accessibility organizations, to ensure widespread adoption and support.

**Expand Functionality:** Explore additional functionalities, such as indoor navigation, object recognition, and facial recognition, to further enhance the user experience and address a broader range of scenarios.

# Chapter 6

## 6.1 Conclusion & Recommendation

In conclusion the research demonstrates the significant positive impact of “Blind Can See” technology on the lives of visually impaired individuals. By harnessing the power of computer vision and the YOLO algorithm, the technology enables real- time object detection and recognition, providing auditory or tactile feedback that enhances the user’s perception of their environment. This transformative assistive technology promotes greater independence, inclusivity, and accessibility offering novel possibilities of individuals with visual impairments to navigate the world with increased confidence and autonomy. The study emphasizes the importance of continued research and development in the field of assistive technologies to create a more inclusive and equitable society, where individuals with visual challenges are empowered to reach their fullest potential and contribute to the community. “Blind Can See” stands as a beacon of progress and hope, Showcasing the remarkable capabilities and adaptability of individuals with visual impairments, and inspiring further innovation in the quest for an inclusive and accessible future for all.

The way we engage with digital information and our environment has been revolutionized by wearable technology, but user comfort is still a key factor in its widespread adoption. Ergonomics and fitness must be given top priority in wearable gadget design to prevent irritation or discomfort during extended use. Smartwatches and fitness trackers should have a user-friendly UI, adjustable bands, and lightweight materials.

Given that wearable technology comes into direct touch with the skin, skin sensitivity and breathability are important considerations as well. Wearable technology may effortlessly integrate into users' life, providing them with individualized information and insights while boosting their general well-being by solving various comfort- related issues.

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