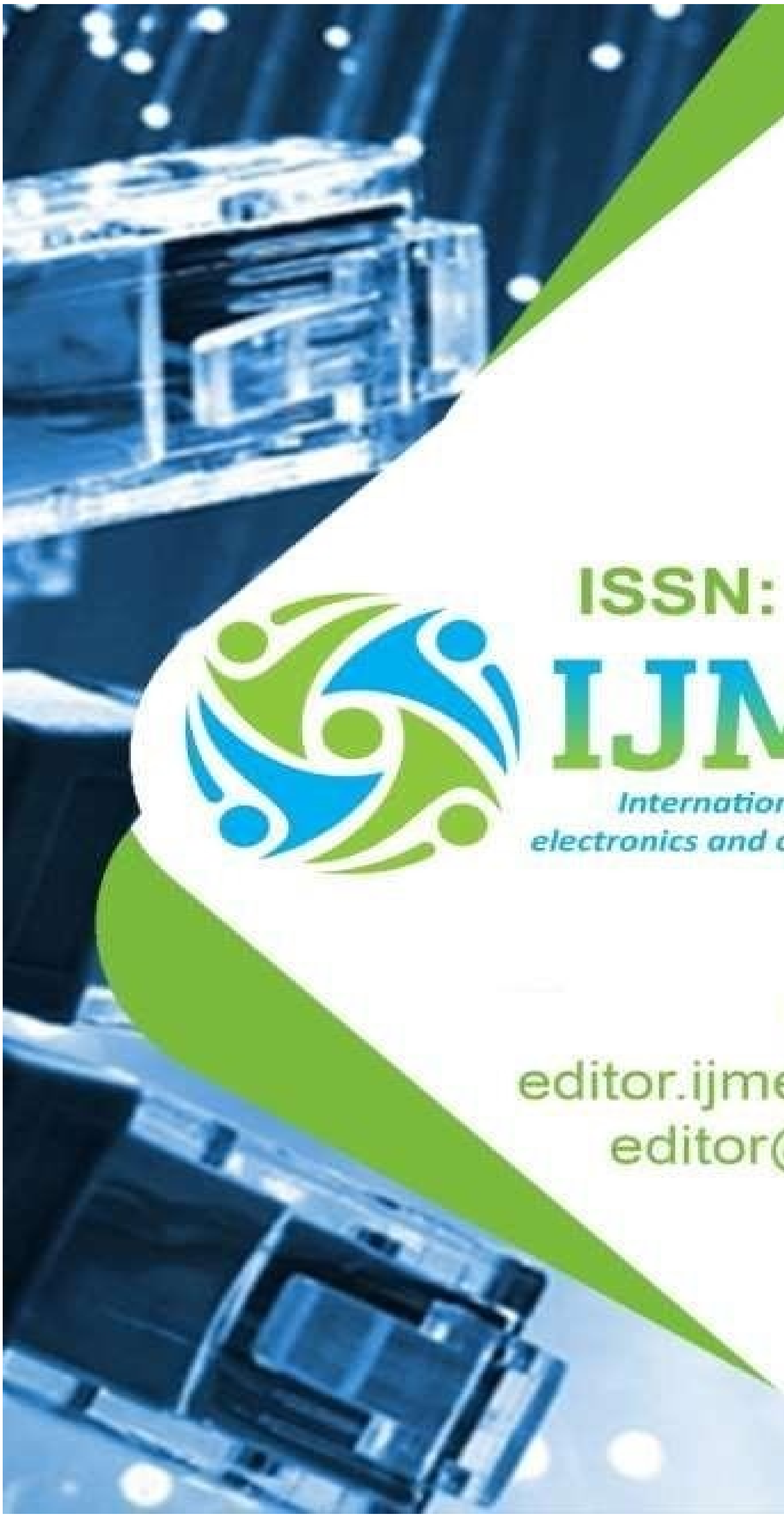

ISSN: 2321-2152

IJMECE

International Journal of modern electronics and communication engineering

E-Mail
editor.ijmece@gmail.com
editor@ijmece.com

www.ijmece.com

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 1, 2025

VISION ASSISTANT SMART GLASSES FOR VISUALLY IMPAIRED PEOPLE

Dr. SUBODH PANDA[1], GUDALA SATYA SAI[2], MALLIDI BHUVANA CHANDRA BOSE REDDY[3], KOLLA MOHANA SUREKHA[4], KANCHIPATI UMA MAHESWARI[5], DASAM VEERA VENKATA SATYA CHAKRA SWAMY[6]

[1]Assistant Professor, Dept. Of ECE, PRAGATI ENGINEERING COLLEGE

[23456]UG Students, Dept. Of ECE, PRAGATI ENGINEERING COLLEGE

ABSTRACT

Blind mobility is one of the major challenges encountered by visually impaired persons in their daily lives. The loss of eyesight significantly restricts their independence and ability to navigate safely. Traditionally, they rely on white canes, guide dogs, or their accumulated spatial memories. However, these methods have limitations, especially in unfamiliar or dynamic environments. The main objective of this work is to develop a low-cost, reliable, portable, user-friendly, low-power, and robust solution to assist visually impaired individuals in smooth and safe navigation.

This project introduces an innovative assistive technology in the form of smart glasses, integrated with multiple sensors and communication modules to enhance safety, mobility, and independence. The system primarily employs ultrasonic sensors to detect obstacles in the user's path, providing real-time feedback through buzzer alerts. Additionally, a secondary ultrasonic sensor is embedded in a walking stick to detect open manholes or other ground-level hazards, reducing the risk of falls and injuries.

To further improve user safety, the system incorporates a panic button that, when activated, triggers the GPS and GSM modules. This feature sends the user’s real-time location to pre-registered emergency contacts, ensuring immediate assistance in critical situations. Moreover, a buzzer is included to attract nearby individuals' attention during emergencies, offering an additional layer of security.

The proposed solution is designed to be lightweight and comfortable for daily use. It operates on a low-power system, ensuring extended battery life. Unlike traditional mobility aids, this system leverages modern technology to provide an intuitive and efficient navigation experience. By integrating smart wearables with real-time hazard detection and emergency response features, this project aims to significantly enhance the independence and confidence of visually impaired individuals.

INTRODUCTION

Mobility is essential for independent living, but visually impaired individuals face significant challenges in navigating their surroundings safely. According to the World Health Organization (WHO), over 285 million people worldwide suffer from visual impairment, with a significant percentage experiencing severe mobility issues. Traditional aids such as white canes and guide dogs help in navigation, but they have limitations, especially in complex, crowded, or unfamiliar environments. White canes require the user to physically tap objects to detect them, while guide dogs are expensive, require extensive training, and may not always be available to everyone in need.

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 1, 2025

With advancements in technology, smart assistive devices are emerging as innovative solutions to enhance the mobility, safety, and confidence of visually impaired individuals. This project introduces an intelligent assistive system in the form of smart glasses integrated with multiple sensors and communication modules. The goal is to create an affordable, user-friendly, and reliable system that helps visually impaired users detect obstacles, navigate their surroundings safely, and seek emergency assistance when needed.

The system primarily employs ultrasonic sensors to detect obstacles in the user's path, providing real-time auditory or haptic feedback via buzzer alerts. Additionally, a secondary ultrasonic sensor is integrated into a smart walking stick to identify ground-level hazards such as open manholes, potholes, and staircases, preventing accidental falls. To ensure user safety in emergencies, the system features a panic button that, when pressed, activates GPS and GSM modules to send the user's real-time location to pre-registered emergency contacts.

This assistive device is designed to be lightweight, power-efficient, and comfortable for daily use, ensuring an extended battery life for long-term functionality. By combining smart wearables with advanced obstacle detection and emergency response features, the proposed system aims to significantly improve the independence, mobility, and confidence of visually impaired individuals.

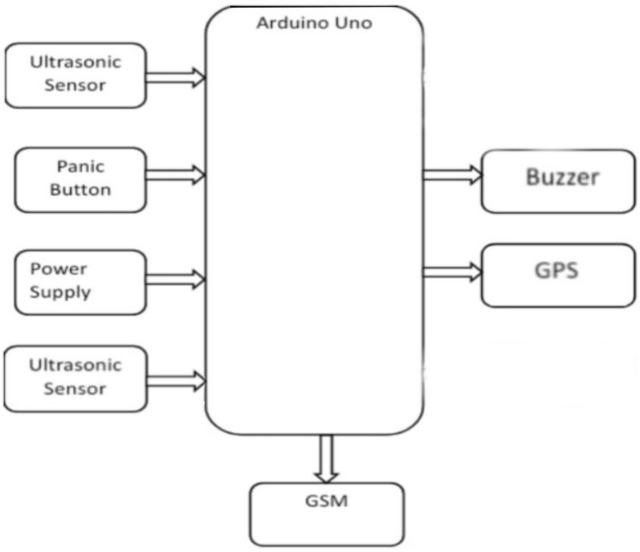

Figure.1 Block Diagram

LITERATURE SURVEY

Current Assistive Technologies

Existing technologies, such as smartphones and braille systems, have provided significant support to visually impaired people. Apps like Be My Eyes and Seeing AI allow users to interact with the environment through voice commands, enabling tasks like object recognition and text reading. While these solutions offer valuable assistance, they still lack the seamless integration and real-time navigation capabilities that would allow for more independent living.

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 1, 2025

The Potential of Smart Glasses

Smart glasses equipped with computer vision and augmented reality (AR) have emerged as a promising solution. These glasses can provide real-time feedback, such as obstacle detection and navigation assistance, through auditory cues or vibrations. By integrating facial recognition, text reading, and situational awareness, smart glasses have the potential to significantly improve the quality of life for visually impaired individuals, offering a more intuitive and hands-free experience.

PROPOSED SYSTEM

The proposed system introduces an innovative smart assistive device that integrates multiple sensor-based technologies, emergency response mechanisms, and user-friendly design to enhance mobility for visually impaired individuals. Unlike existing solutions, this system combines ultrasonic sensors, GPS, GSM communication, and a panic button into a single, cost-effective device.

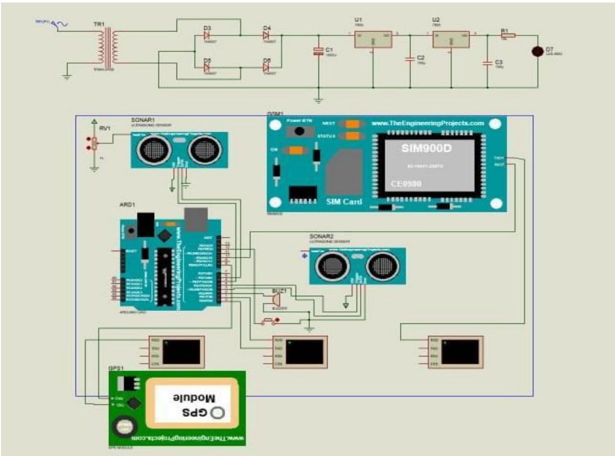

Figure.2 Schematic Diagram

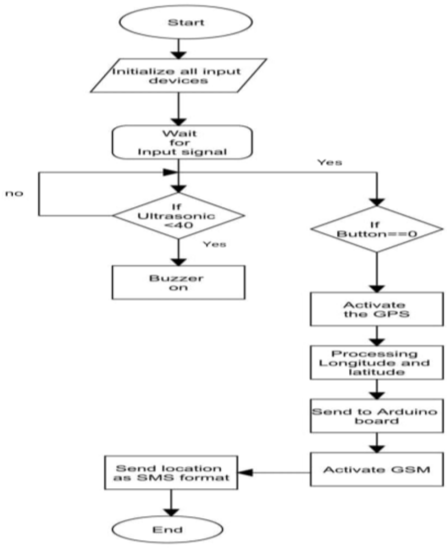

Figure.3 Flow Chart

In addition to obstacle detection, the smart glasses also feature an emergency assistance function. If the user presses an emergency button, the system activates the GPS module to retrieve their longitude and latitude coordinates. These coordinates are then processed by the Arduino board, which sends the data to the GSM module. The GSM module formats the information into an SMS and transmits the user's real-time location to a predefined contact, such as a caregiver or emergency service. This feature ensures that help can be dispatched quickly, providing an added layer of security for the user.

This system is particularly beneficial for independent navigation, reducing reliance on external assistance. It empowers visually impaired individuals by offering a real-time awareness of their surroundings and a reliable emergency communication method. Future improvements, such as AI-based object recognition, voice guidance, and Bluetooth connectivity, could further enhance the system's functionality. By integrating smart technology into wearable devices, these smart glasses aim to significantly improve accessibility, safety, and independence for the visually impaired community.

RESULTS

For the Smart Stick, an additional ultrasonic sensor is placed at a downward-facing angle to detect hazards like manholes, uneven surfaces, or steps. Unlike forward-facing detection, the downward sensor measures the absence of reflected waves or a sudden increase in detected distance (e.g., more than 1 meter). If the stick detects an open manhole or drop, the microcontroller activates a different buzzer sound, alerting the user of a potential fall risk. This combination of airborne obstacle detection (glasses) and ground-level hazard detection (stick) ensures comprehensive safety for visually impaired individuals.

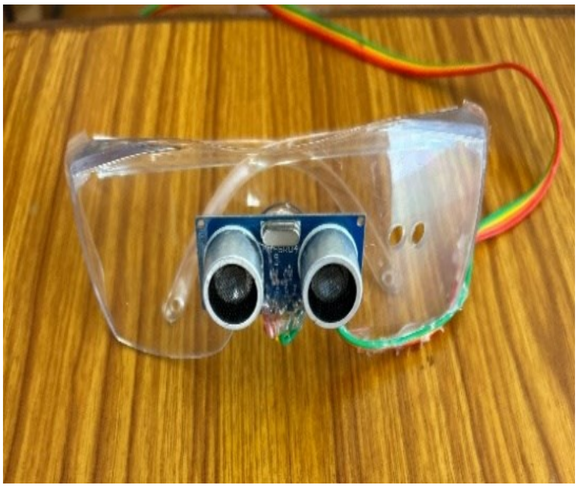

Figure.4 Spects with Ultrasonic sensor

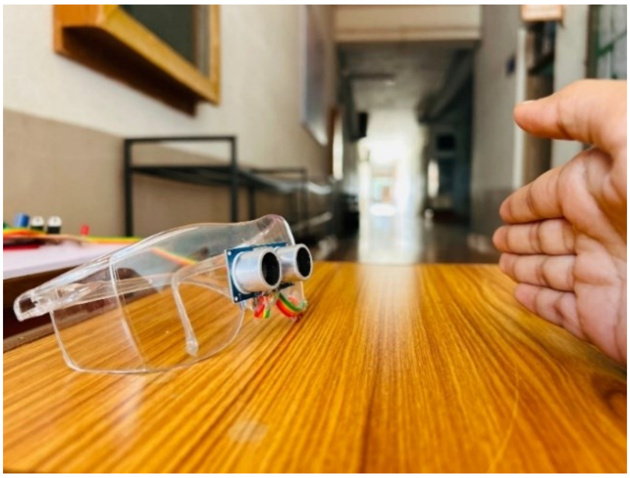

Figure.5 When Ultrasonic sensor detects object

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 1, 2025

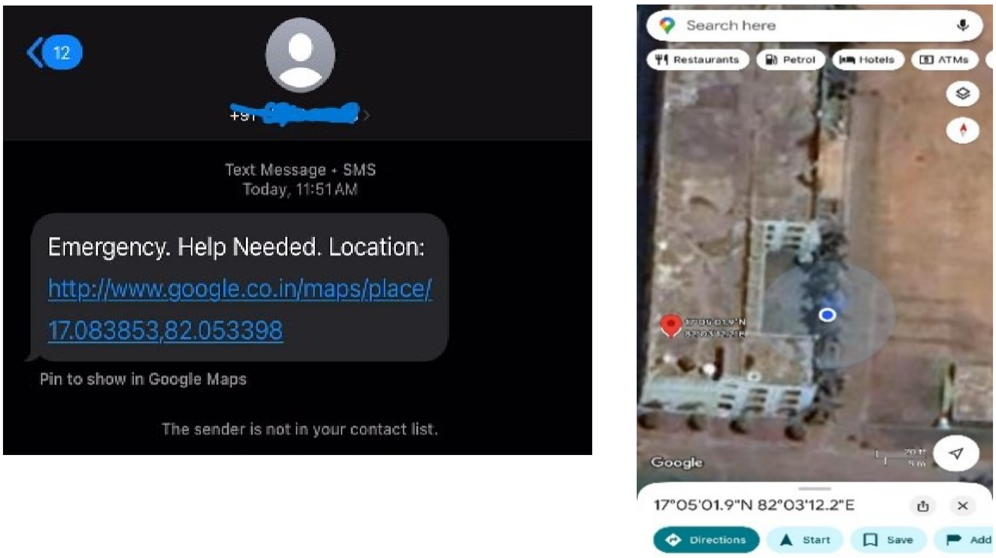

Figure.6 Sends Message and their location

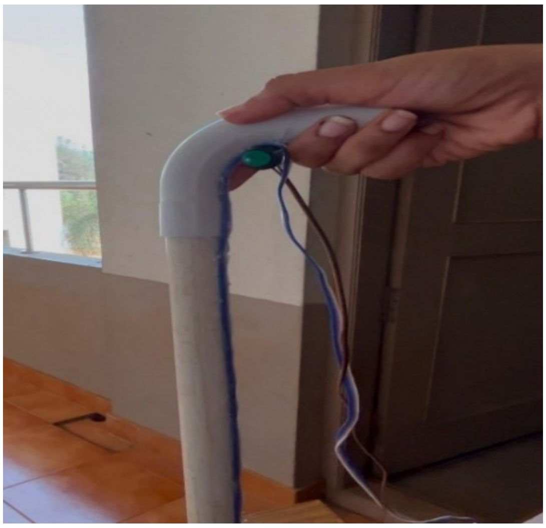

Figure.7 when panic button press

ADVANTAGES

- **Enhances Mobility -** Provides better independence for visually impaired individuals
- **Real Time Obstacle Detection -** Reduces risk of accidents.
- **Emergency Alert Feature -** Ensures quick help in critical situations.
- **Cost-Effective & Portable -** Uses affordable components for accessibility

APPLICATIONS

- **Blind Navigation Assistance -** Helps visually impaired individuals move independently.
- **Smart Walking Aid -** Alternative to traditional white canes.
- **Emergency Alert System -** Ensures safety with GPS and GSM features.
- **Smart City Integration -** Can be enhanced with AI for better navigation

ISSN 2321-2152
www.ijmece.com
Vol 13, Issue 1, 2025

CONCLUSION

The Vision Assistant Smart Glasses and Smart Stick have the potential for significant advancements and real-world applications. With continuous technological improvements, the following future developments can enhance the system's efficiency and usability.

The Vision Assistant Smart Glasses provide an innovative solution for enhancing the mobility and independence of visually impaired individuals. By integrating ultrasonic sensors, GPS, GSM, MEMS, and a panic button, the system assists users in detecting obstacles, navigating safely, and seeking emergency help when needed. The real-time alerts and guidance significantly improve their confidence in daily activities. Additionally, the smart glasses offer a compact, wearable, and user-friendly design, making them a practical assistive technology. Future advancements can focus on integrating AI-based object recognition, voice assistance, and cloud connectivity to further enhance the functionality and accessibility of the system.

FUTURE SCOPE

1. Integration with AI and Machine Learning:

Implementing AI-powered object recognition using a camera and deep learning algorithms could help distinguish between different types of obstacles (e.g., vehicles, people, potholes).

AI could also analyze walking patterns and suggest optimized routes for visually impaired users.

2. Voice Assistance and Smart Navigation:

Adding a voice assistant module that provides audio cues about surroundings (e.g., "Obstacle ahead, turn left") would further improve user interaction. Integration with Google Maps API could allow real-time navigation instructions based on the user's location.

3. Haptic Feedback Mechanism:

Instead of a buzzer sound, vibration motors can be embedded in the glasses or stick to provide silent haptic feedback. Different vibration patterns could indicate the distance and direction of obstacles.

4. IoT-Based Cloud Connectivity:

Storing GPS data on the cloud could allow caregivers to remotely track the user's movement in real time. Integration with a mobile app could provide an interactive interface for caregivers to monitor and receive alerts.

REFERENCES

1. B. Ando, S. Baglio, V. Marletta, and C. Valastro, *"A Smart Sensor-Based Wearable System for Blind Assistance and Obstacle Detection,"* IEEE Sensors Journal, vol. 15, no. 2, pp. 720-728, 2015.
2. S. H. Lee and K. M. Lee, *"Wearable Smart Glasses for the Blind Using Ultrasonic Sensors and Voice Assistance,"* International Journal of Smart Sensor Technologies, vol. 8, no. 1, pp. 45-52, 2019.
3. M. T. Jones and J. K. Smith, *"Navigation Assistance for the Visually Impaired Using GPS and GSM Technologies,"* Journal of Assistive Technologies, vol. 10, no. 3, pp. 112-123, 2018.

4. A. Gupta, R. Sharma, and P. Kumar, *"Development of an Ultrasonic-Based Smart Guide for Visually Impaired Individuals,"* International Conference on Embedded Systems and Assistive Technology, pp. 121-128, 2020.
5. R. K. Yadav and N. Singh, *"Internet of Things (IoT) Enabled Wearable Smart Glasses for Blind Navigation,"* International Journal of IoT Applications, vol. 6, no. 2, pp. 98-104, 2021.
6. T. Nakamura, A. Ito, and M. Kobayashi, *"Integration of MEMS Sensors in Wearable Navigation Systems for Visually Impaired,"* IEEE Transactions on Human-Machine Systems, vol. 45, no. 4, pp. 400-412, 2022.
7. S. K. Das and P. Bhattacharya, *"Design and Implementation of a Smart Glass System for Blind Individuals Using AI and Edge Computing,"* International Journal of Artificial Intelligence in Assistive Technologies, vol. 7, no. 1, pp. 65-78, 2023.