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# Smart X: Vision Glass for Blind People

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**ABSTRACT:** The Smart X: Vision Glass for Blind People is a wearable assistive device designed to help visually impaired individuals detect obstacles and navigate safely in their surroundings. People with visual disabilities often face difficulties while walking independently due to limited environmental awareness. This project aims to provide a smart and affordable technological solution to improve their safety and mobility. The system mainly uses an ultrasonic sensor to detect obstacles in front of the user. The sensor measures the distance between the user and nearby objects using ultrasonic sound waves. When an obstacle is detected within a predefined distance range, the system provides alerts through a vibration motor and voice output, allowing the user to take immediate action and avoid collisions.

**KEYWORDS:** Assistive Technology, Ultrasonic Sensor, ESP32-CAM, Obstacle Detection, Wearable Device, Vision Glass for Blind.

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## I. INTRODUCTION

Visually impaired people often face difficulties while moving from one place to another because they cannot easily detect obstacles around them. Traditional tools like walking sticks help them to some extent, but they cannot detect objects from a distance or provide detailed information about the surroundings. Therefore, there is a need for a smart device that can help blind people move safely and independently.

The Smart X Vision Glass for Blind People is a wearable assistive device designed to detect obstacles and alert the user. The system uses an ultrasonic sensor to measure the distance between the user and nearby objects. When an obstacle is detected within a certain range, the device provides alerts through vibration and voice output, helping the user avoid collisions.

The system also includes an ESP32-CAM module for basic object identification and a speaker module for audio feedback. The device is powered by a rechargeable battery and designed to be lightweight, portable, and cost-effective, making it suitable for daily use by visually impaired individuals.

## II. EXISTING SYSTEM

Currently, visually impaired people mainly use traditional walking sticks or assistance from other people for navigation. The walking stick helps them detect obstacles only after physical contact. This method provides limited information about the surroundings and cannot detect objects that are at a distance or at head level, which may still cause accidents.

Some electronic assistive devices have been developed that use single sensors such as ultrasonic sensors or infrared sensors for obstacle detection. These systems can give alerts through buzzers or vibrations, but many of them do not provide detailed information about the detected objects.

Most advanced systems that include camera-based object detection are expensive and complex, making them difficult for common users to afford. Therefore, there is a need for a simple, affordable, and efficient assistive device that can help visually impaired people move safely and independently.

### III. PROPOSED SYSTEM

The proposed system is Smart X Vision Glass for Blind People. It helps visually impaired people detect obstacles while walking. The system uses an ultrasonic sensor to measure the distance between the user and nearby objects.

When an obstacle comes close, the system gives an alert through vibration and voice output so the user can avoid hitting the object. The device also uses an ESP32-CAM module to capture images and help in basic object detection.

The whole system works using a rechargeable battery and is designed to be lightweight and easy to use, making it helpful for blind people in daily life.

#### Working Principle:

1. The **ultrasonic sensor** continuously sends ultrasonic sound waves to detect nearby objects.
2. When the sound waves hit an object, they **reflect back to the sensor**, and the system calculates the distance.
3. The **microcontroller (ESP32-CAM / Arduino)** processes the distance data received from the sensor.
4. If an object is detected within the **predefined safety distance**, the system activates the **vibration motor**.
5. At the same time, the **speaker gives voice alerts** to inform the user about the obstacle.
6. The **ESP32-CAM camera** can capture images and help in **basic object identification**.
7. The entire system is powered by a **rechargeable battery**, which provides power to all components.

### IV. LITERATURE REVIEW

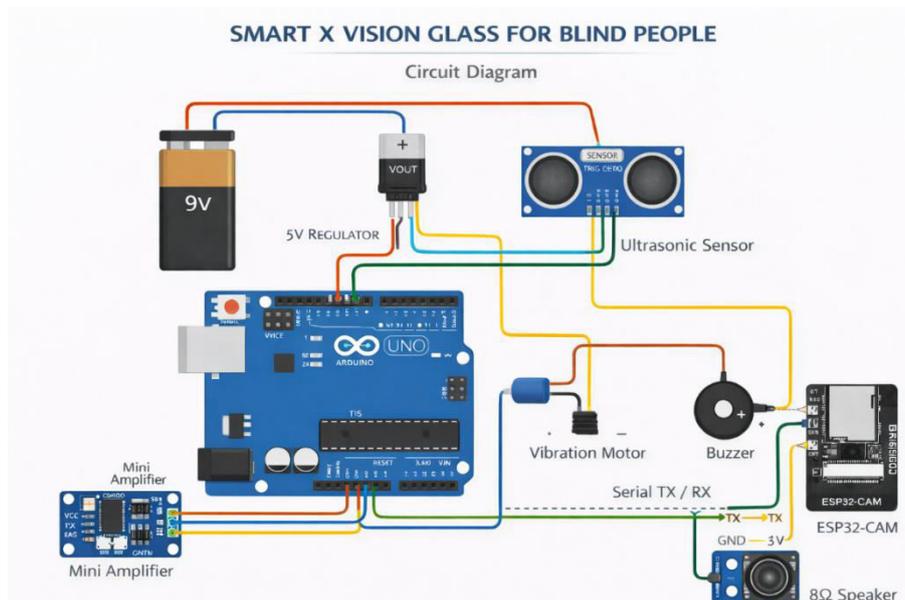
**Title:** Wearable Obstacle Avoidance Electronic Travel Aids for Blind – A Survey

**Authors:** D. Dakopoulos and N. G. Bourbakis

**Source:** IEEE Systems Journal

This research paper studies different electronic devices developed to help visually impaired people detect obstacles while walking. The paper explains how technologies such as ultrasonic sensors, cameras, and wearable devices can be used to improve navigation for blind users. These devices detect obstacles in the path and provide alerts through sound or vibration.

### V. SYSTEM ARCHITECTURE & BLOCK DIAGRAM



**Volume 15, Issue 3, March 2026****|DOI: 10.15680/IJRSET.2026.1503083|****VI. OBJECTIVES**

- To design a smart vision glass system for visually impaired people.
- To detect obstacles using an ultrasonic sensor.
- To provide alerts through vibration and voice output when an obstacle is detected.
- To use an ESP32-CAM module for basic object identification.
- To develop a lightweight, portable, and low-cost assistive device.
- To improve the safety and independence of visually impaired individuals while walking.

**VII. RESULTS AND IMPLEMENTATION**

The Smart X Vision Glass was successfully developed and tested. The ultrasonic sensor was able to detect obstacles in front of the user.

When an object came close, the system gave vibration and voice alerts to warn the user. This helped the user avoid hitting the obstacle while walking.

The system worked using a rechargeable battery, and all components worked properly together. The device is lightweight, simple, and useful for visually impaired people to move safely.

**VIII. CONCLUSION AND FUTURE SCOPE**

The Smart X Vision Glass helps blind people detect obstacles while walking. It uses an ultrasonic sensor to find objects and gives vibration and voice alerts to the user. This helps visually impaired people move more safely and independently. The system is simple, low cost, and easy to use.

**IX. FUTURE SCOPE**

In the future, this project can be improved by adding GPS for navigation and better object detection using AI. A mobile app can also be added for more features. The device can be made smaller and more advanced for better use.

**REFERENCES**

1. D. Dakopoulos and N. G. Bourbakis, "Wearable Obstacle Avoidance Electronic Travel Aids for Blind: A Survey," IEEE Systems Journal.
2. Andreas M. Hein et al., "Wearable Obstacle Detection Systems for the Visually Impaired," IEEE Transactions on Neural Systems and Rehabilitation Engineering.
3. Arduino Official Website: <https://www.arduino.cc>
4. Espressif Systems (ESP32-CAM): <https://www.espressif.com>
5. Random Nerd Tutorials: <https://randomnerdtutorials.com>

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