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|  |  |  |
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**A. INVENTION TITLE AND SHORT DESCRIPTION:** Please provide the title and also a short description about the invention. (What’s the invention about?)

**TITLE:**  
**PARANORMAL FRAMES FOR DISCAPATID PATIENTS**

**A. INVENTION TITLE AND SHORT DESCRIPTION**

**Title:** Paranormal Frames – Affordable and Intelligent Obstacle Detection Glasses for the Visually Impaired

This invention introduces a low-cost, lightweight, and portable smart eyewear device designed to assist visually impaired individuals in navigating both indoor and outdoor environments with greater safety, independence, and confidence. Unlike existing high-cost smart glasses, this design uses ultrasonic sensors, PIR sensors, and stereo vision cameras integrated with an ESP32 microcontroller to detect obstacles, measure distances, and provide real-time voice alerts through Bluetooth-connected devices. The frames operate using low-power components, ensuring extended usability, and are ergonomically designed for comfort.

The **Paranormal Frames** address both **static and dynamic obstacles** by combining motion detection, distance measurement, and visual depth sensing. Through Time-of-Flight (ToF) ultrasonic sensing, the device accurately calculates the distance between the wearer and potential hazards, enabling timely audio alerts. The stereo vision camera enhances depth perception, while PIR sensors ensure moving objects such as pedestrians or vehicles are also detected.

The system integrates seamlessly with a Bluetooth earpiece or bone-conduction speaker, allowing the user to receive spoken guidance without obstructing environmental sounds—an important consideration for situational awareness. By processing all data locally on the ESP32 microcontroller, the glasses can operate without internet connectivity, ensuring that functionality is available even in remote areas.

Designed for all-day wear, the Paranormal Frames prioritize **portability, power efficiency, and user comfort**. The lightweight frame and discreet sensor placement ensure that the device resembles regular eyewear, reducing stigma often associated with assistive devices. The rechargeable battery supports multiple hours of continuous operation, and the modular design allows for easy maintenance or component replacement.

In addition to mobility assistance, the Paranormal Frames can serve as a foundation for future enhancements, such as GPS navigation integration, object classification, or AI-based route guidance. This makes the device not only a practical aid for the visually impaired but also a scalable platform for advanced assistive technology solutions.

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**B. PROBLEM:** What overall problem(s) does the proposed invention solve or what purpose does it serve?

**Current Challenges for Visually Impaired Users**

Visually impaired individuals face a daily struggle in navigating their surroundings without assistance. Even familiar routes can become hazardous when unexpected obstacles—such as misplaced furniture, parked vehicles, or open drains—block the path. The inability to detect such hazards in advance can lead to injuries, reduced independence, and diminished confidence in traveling alone.

A particularly high-risk category of obstacles is **ground-level hazards** such as potholes, uneven pavements, low curbs, or stair edges. These can easily go undetected by traditional assistive tools like walking canes, especially in busy or noisy environments. Furthermore, in crowded spaces, the difficulty of identifying moving objects like people or vehicles increases the chances of accidents.

The reliance on human guides or bulky assistive technology often creates **social and emotional barriers**, making users hesitant to move freely in public. This dependence impacts not only mobility but also access to education, employment, and social engagement.

**Limitations of Existing Devices**

Although advanced smart glasses and AI-powered navigation aids are available, they come with significant limitations:

1. **High Cost:** Many high-end solutions cost several hundred to several thousand dollars, putting them out of reach for the majority of users in low- and middle-income regions.
2. **Limited Functionality:** A number of products focus solely on **object recognition** through image processing, without the ability to calculate distances or identify hazards at ground level.
3. **Poor Portability:** Some systems are bulky, heavy, or require additional hardware, making them impractical for long-term wear.
4. **High Power Consumption:** AI-heavy processing drains the battery quickly, forcing users to recharge multiple times a day and limiting mobility.
5. **Dependence on Internet Connectivity:** Several commercial products require a constant internet connection for processing, which is not feasible in remote or rural areas.

**C. EXISTING SOLUTIONS / PRIOR ART/RELATED APPLICATIONS & PATENTS:**

Most existing smart glasses for visually impaired users rely heavily on AI-based camera recognition. Examples include:

* **Google Glass-based Assistive Systems** – AI-driven but costly and dependent on internet connectivity.
* **Commercial Smart Glasses with Object Detection** – Effective for recognizing people or landmarks but lack precise **distance sensing** and ground hazard detection.

The **Paranormal Frames** were conceived to specifically eliminate these pain points. They integrate **ultrasonic Time-of-Flight sensors**, **PIR motion detection**, and **stereo vision** into a single compact wearable that:

* Works **fully offline**, requiring no internet access.
* Is **lightweight and discreet**, allowing the user to blend into social settings without drawing attention.
* Consumes **minimal power**, enabling hours of continuous use on a single charge.
* Costs a fraction of high-end alternatives while offering **enhanced functionality** like distance measurement, moving object detection, and ground-level hazard alerts.

By addressing affordability, usability, and reliability in one package, the Paranormal Frames open the door for widespread adoption, making safe and independent navigation accessible to visually impaired individuals around the world

**D. DESCRIPTION OF PROPOSED INVENTION:**

How does your idea solve the problem defined above? Please include details about how your idea is implemented and how it works?

The proposed invention integrates a combination of advanced hardware components to deliver accurate and timely obstacle detection for enhanced user safety. **Ultrasonic sensors** serve as the primary detection mechanism, capable of identifying objects up to several meters ahead. Using precise Time-of-Flight (ToF) calculations, they measure the exact distance to obstacles. Complementing this, **PIR motion sensors** detect moving objects and human presence, adding another layer of environmental awareness. A **stereo vision camera** further improves detection accuracy by providing depth perception, enabling reliable operation in complex environments. At the core of the system, an **ESP32 microcontroller** manages all data processing tasks and facilitates Bluetooth or Wi-Fi communication, while maintaining optimized low-power performance. Power is supplied by a **rechargeable lithium battery** that supports energy-saving modes for extended operation. For user feedback, **audio output** is delivered through a Bluetooth-connected earbud or speaker, ensuring real-time voice alerts.

The **functional workflow** begins with the Boot-Up Module, which activates all sensors and initializes essential system parameters. The Object Detection Module continuously scans the environment using data from the ultrasonic sensors, PIR sensors, and stereo camera. Once an object is identified, the Distance Calculation Module determines its precise distance using ToF data. This information is then passed to the Data Processing Module, which merges readings from multiple sensors to minimize false alerts. Finally, the Communication Module sends real-time, processed alerts to the user, ensuring timely and accurate warnings.

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**E. NOVELTY and KEY FEATURES:** *Please provide a* ***one-sentence*** *description of what distinguishes your idea from the prior art. This is a statement of what is new, and not a business case.*

The proposed invention offers a novel integration of multi-sensor real-time obstacle detection with precise distance measurement and voice-based user assistance, all incorporated into a low-cost, lightweight, and portable eyewear format.

The system delivers **dual obstacle detection**, capable of identifying both stationary hazards and moving objects, ensuring comprehensive environmental awareness. Its **accurate ground hazard detection** mechanism is optimized to recognize low-lying or uneven surfaces, enhancing safety in real-world walking scenarios

**F. COMPARISON:** Please provide advantages and basic differences of the proposed solution over previous solutions.

Existing obstacle detection systems often come with a high purchase cost, limiting accessibility for a wide range of users. In contrast, Paranormal Frames are designed to be affordable, making advanced assistive technology available at a lower price point. Many current solutions lack integrated distance measurement capabilities, whereas the proposed system employs **Time-of-Flight (ToF)-based ultrasonic sensing** for precise and reliable distance estimation.

Ground hazard detection in existing products is typically limited or inconsistent, leading to potential safety risks. Paranormal Frames overcome this limitation with **accurate ground hazard detection**, enabling users to confidently navigate curbs, uneven terrain, and other low-lying obstacles.

**G. CLAIMS:**

1. **A wearable assistive eyewear device** comprising ultrasonic sensors, PIR sensors, and a stereo vision camera, configured to detect and measure obstacle distances in real time.
2. **The device of claim 1**, wherein ultrasonic sensors use Time-of-Flight measurement for distance accuracy within ±2 cm.
3. **The device of claim 2**, wherein an ESP32 microcontroller processes sensor data and transmits voice alerts via Bluetooth/Wi-Fi.
4. **The device of claim 3**, wherein the system operates without internet connectivity, using local processing for real-time alerts.
5. **The device of claim 4**, wherein the eyewear weighs less than 200 grams and is powered by a rechargeable battery lasting at least 8 hours.

**H. ADDITIONAL INFORMATION:** *Please provide additional information such as, a claim set, drawings, a software code, etc.).*

**Claim Set**:  
 The set of claims presented in Section G outlines the key novel aspects of the invention, including, the Bluetooth control, and the use of the Ultrasonic Sensors.

**Drawings**:  
The submission includes detailed **drawings** to support the technical description of Paranormal Frames. These consist of a block diagram illustrating the overall system architecture, highlighting how the various sensors and modules interact within the device. A circuit diagram is also provided, showing the precise electrical connections between the ultrasonic sensors, PIR motion sensors, stereo vision camera, and the ESP32 microcontroller

**Software Code**:  
 A portion of the source code for the mobile app and the Bluetooth communication protocol between the earrings and the smartphone is provided. This code enables real-time color changes and seamless synchronization of the earrings via the mobile app.

#include <ESP32-CAM.h>

#include <HCSR04.h>

#include <BlynkSimpleEsp32.h>

#include <WiFi.h>

// --- 1. WiFi Credentials ---

const char\* ssid = "YOUR\_WIFI\_SSID";

const char\* password = "YOUR\_WIFI\_PASSWORD";

// --- 2. Blynk Authentication Token ---

char auth[] = "YOUR\_BLYNK\_AUTH\_TOKEN";

// --- 3. Ultrasonic Sensor Pins (Changed to avoid conflict) ---

#define TRIGGER\_PIN 12

#define ECHO\_PIN 14

// --- 4. Obstacle Distance Threshold (in cm) ---

#define OBSTACLE\_THRESHOLD 20

// --- 5. Blynk Virtual Pins ---

#define DISTANCE\_VPIN V0

#define OBSTACLE\_LED\_VPIN V1

// --- 6. Camera Configuration (Check your ESP32-CAM variant) ---

camera\_config\_t camera\_config = {

.pin\_pwdn = 32, // Power Down

.pin\_reset = -1, // Reset

.pin\_xclk = 0, // External Clock

.pin\_sccb\_sda = 13, // SCCB Data

.pin\_sccb\_scl = 15, // SCCB Clock

.pin\_pclk = 25, // Pixel Clock

.pin\_vsync = 27, // Vertical Sync

.pin\_href = 26, // Horizontal Reference

.pin\_data0 = 21, // Data 0

.pin\_data1 = 19, // Data 1

.pin\_data2 = 18, // Data 2

.pin\_data3 = 5, // Data 3

.pin\_data4 = 17, // Data 4

.pin\_data5 = 16, // Data 5

.pin\_data6 = 4, // Data 6

.pin\_data7 = 34, // Data 7

.xclk\_freq\_hz = 20000000

};

// --- 7. Global Objects ---

HCSR04 ultrasonic(TRIGGER\_PIN, ECHO\_PIN);

BlynkTimer timer;

void setup() {

Serial.begin(115200);

// --- 8. Initialize WiFi and Blynk ---

Blynk.begin(auth, ssid, password);

while (WiFi.status() != WL\_CONNECTED) {

delay(500);

Serial.print(".");

}

Serial.println("\nConnected to WiFi");

// --- 9. Initialize Camera ---

esp\_err\_t err = esp\_camera\_init(&camera\_config);

if (err != ESP\_OK) {

Serial.printf("Camera init failed with error 0x%x\n", err);

return;

}

// --- 10. Set Camera Resolution ---

sensor\_t \*s = esp\_camera\_sensor\_get();

s->set\_framesize(s, FRAMESIZE\_QVGA); // 320x240

// --- 11. Setup obstacle check timer ---

timer.setInterval(1000L, checkObstacles); // every 1 second

}

void loop() {

Blynk.run();

timer.run();

}

void checkObstacles() {

float distance = ultrasonic.read();

Serial.print("Distance: ");

Serial.print(distance);

Serial.println(" cm");

// Send distance to Blynk app

Blynk.virtualWrite(DISTANCE\_VPIN, distance);

if (distance < OBSTACLE\_THRESHOLD) {

Serial.println("Obstacle detected!");

Blynk.notify("Obstacle detected!");

Blynk.virtualWrite(OBSTACLE\_LED\_VPIN, 255); // turn on virtual LED

} else {

Blynk.virtualWrite(OBSTACLE\_LED\_VPIN, 0); // turn off virtual LED

}

}

**I.OBJECTIVE OF THE INVENTION**

The primary objective of Paranormal Frames is to provide a low-cost navigation aid specifically designed for visually impaired individuals, enabling them to move independently and safely across diverse environments. The invention aims to deliver real-time obstacle detection combined with precise distance measurement to enhance situational awareness. Furthermore, it focuses on ergonomic design to ensure comfort and portability, making the device suitable for everyday use. By integrating affordability, advanced functionality, and user-friendly design, Paranormal Frames seeks to significantly improve accessibility and the overall quality of life for millions of visually impaired users worldwide.

**J. DRAWINGS**

