EchoSight: Intelligent Guidance System for Enhanced Mobility and Safety

Project Overview: EchoSight aims to enhance the daily lives of visually impaired individuals by improving navigation safety and ease. The system features glasses with a camera that detects objects like cars, potholes, and traffic signs in real-time. It provides voice feedback through Bluetooth earbuds, giving users information about the object's distance and location. The device is lightweight and user-friendly, designed to boost confidence and independence.

Key Components:

- **Glasses with Camera:** Captures the user's surroundings continuously.
- **YOLOv8 Model:** Detects and classifies objects in real-time.
- **Raspberry Pi 4:** Processes data from the camera and runs the detection code.
- **Bluetooth Earbuds:** Deliver voice feedback about detected objects.

Functionality:

- **Real-Time Object Detection:** Identifies objects using the YOLOv8 model.
- **Distance Calculation:** Measures how far detected objects are from the user.
- **Spatial Positioning:** Determines the location of objects relative to the user (left, right, straight).
- **Voice Feedback:** Provides audio descriptions of objects, including their name, distance, and position.

Uses and Benefits for the Visually Impaired:

- **Enhanced Mobility:** Helps users navigate more safely and independently with continuous updates.
- **Improved Safety:** Identifies obstacles like vehicles and potholes, alerting users to potential hazards.
- **Increased Confidence:** Offers real-time feedback to help users navigate unfamiliar spaces confidently.
- **Situational Awareness:** Keeps users aware of their surroundings, aiding in activities like crossing streets and navigating crowded areas.
- **Hands-Free Operation:** Allows users to receive guidance without needing additional devices, keeping hands free for other tasks.

How It Helps Blind People:

- **Real-Time Guidance:** Provides immediate feedback for quick responses to environmental changes.
- **Reduced Dependency:** Decreases reliance on others for navigation assistance by providing critical information.

- **Customizable Alerts:** Lets users adjust object detection sensitivity and voice feedback volume to their preferences.
- **Autonomy in Daily Life:** Promotes independent living by facilitating safe and confident movement.

EchoSight is set to make a significant impact by integrating modern technology into a wearable device, offering a practical solution to many challenges faced by visually impaired individuals.