INVENTION REPORT

SMART SPECTACLE FOR BLIND PEOPLE

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INTRODUCTION

Visually impaired people face significant challenges in moving independently, especially in detecting obstacles, steps, and road turns. Traditional aids such as white canes provide limited range and do not offer early warnings about obstacles at head level.

This project introduces a Smart Spectacle designed to assist visually impaired individuals in safe and independent navigation. The spectacle detects obstacles and sudden direction changes and provides voice alerts and vibration feedback to warn the user in real time. The system is developed using Arduino and low-cost sensors, making it affordable, lightweight, and suitable for daily use.

OBJECTIVES

- To assist visually impaired people in independent navigation
- To detect obstacles in front of the user
- To detect road curves or sudden turns
- To provide voice and vibration alerts
- To develop a low-cost, wearable assistive device

WORKING PRINCIPLES

- An ultrasonic sensor mounted on the spectacle continuously measures the distance to objects in front of the user.

- When an obstacle is detected within a predefined safe distance, the system activates

- A vibration motor

- A voice alert through a speaker or earphone

- A gyroscope sensor (MPU6050) detects sudden changes in head movement or direction, indicating a road curve, turn, or slope.

- All sensors are controlled by an Arduino UNO, which processes sensor data and triggers alerts accordingly.

COMPONENTS LIST

- **Hardware Components**
  - Arduino UNO Board
  - HC-SR04 Ultrasonic Sensors
  - MPU6050 Gyroscope Sensor
  - DF Player Mini
  - Speaker / Earphone
  - Vibration Motor
  - Transistor + Diode
  - Battery / Power Bank
  - Jumper Wires
  - Spectacle Frame

- **Software Components**
  - Arduino IDE
  - Embedded C/C++
  - Sensor libraries

ADVANTAGES

- Lightweight and wearable design
- Low-cost and affordable system
- Hands-free operation
- Real-time obstacle detection
- Voice and vibration dual alerts
- Improves user safety and independence

DISADVANTAGES

- Reduced accuracy in heavy rain or fog
- Limited detection range
- No GPS navigation support
- Battery life depends on usage
- Cannot identify object type

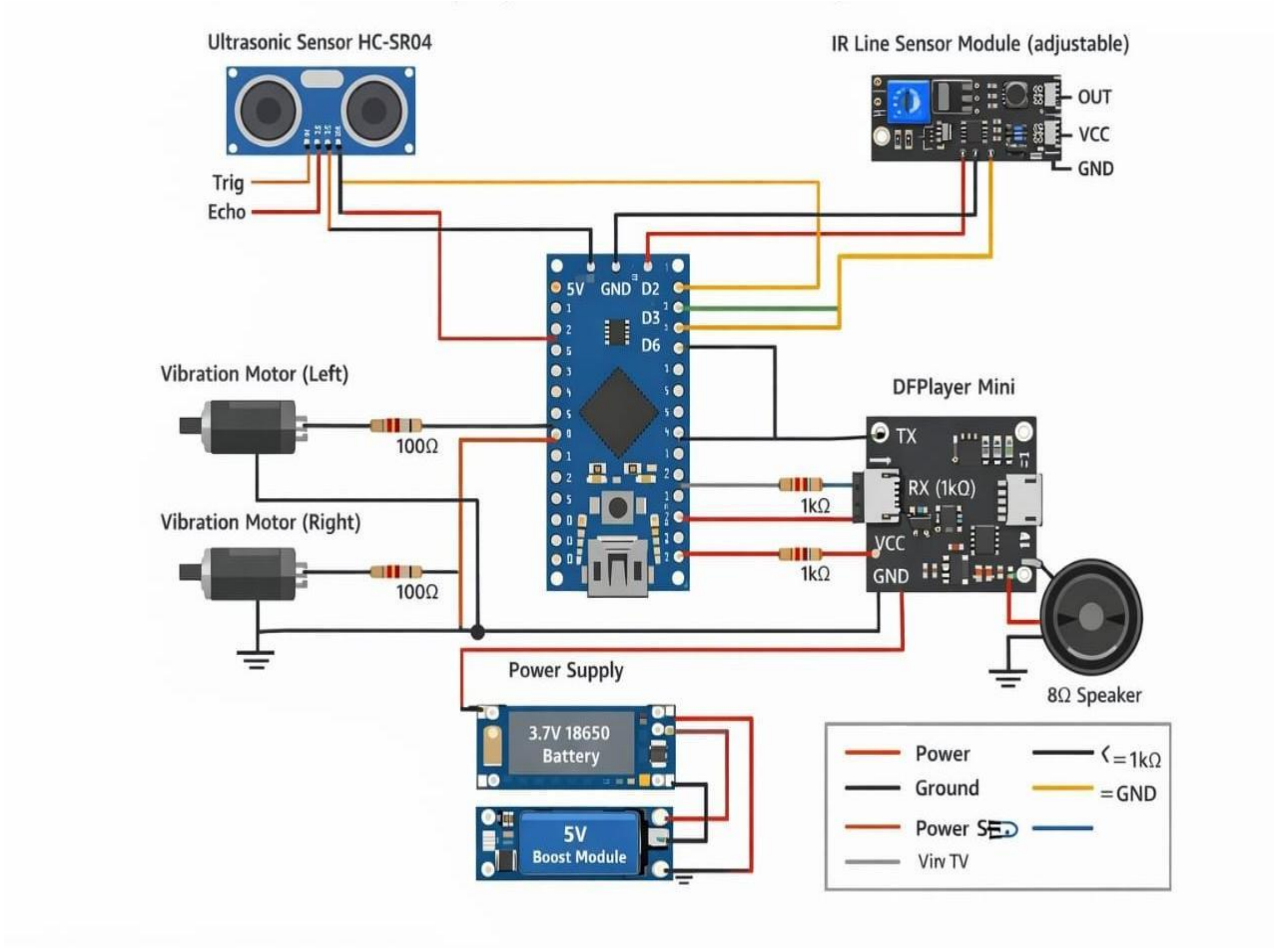
APPLICATIONS

- Visually impaired people
- Elderly people
- Indoor and outdoor navigation
- Smart assistive technology

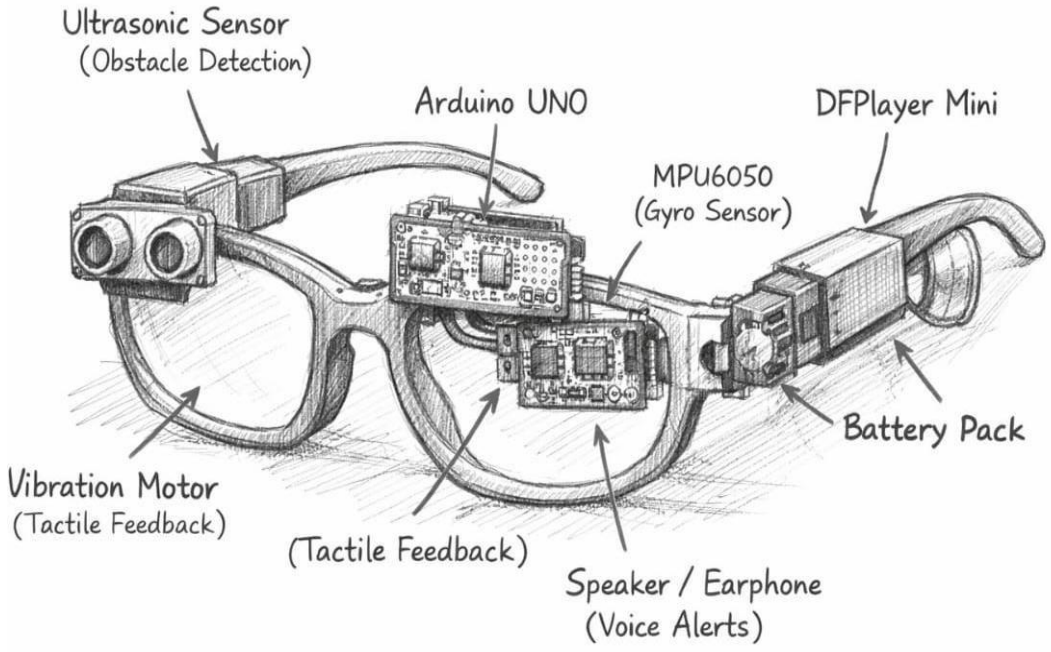
FUTURE IMPROVEMENTS

- GPS-based navigation assistance
- Smartphone app connectivity
- AI-based object recognition
- Improved battery efficiency
- Waterproof sensor enclosure

CIRCUIT DIAGRAM



SKETCH DIAGRAM



BUDGET

NO.	DISCRIPTION	UNIT PRICE (Rs.)	QTY	AMOUNT (Rs.)
01.	Arduino UNO Board	1200.00	1	1200.00
02.	Ultrasonic Sensor (HC-SR04)	500.00	1	500.00
03.	Line Sensor Module (LM393)	300.00	2	600.00
04.	Vibration Motor (3V – DC)	350.00	2	700.00
05.	Resistor (1 kΩ)	25.00	2	50.00
06.	Resistor (100 Ω)	25.00	2	50.00
07.	DF Player Mini	800.00	1	800.00
08.	Speaker (8 Ω)	500.00	1	500.00
09.	Micro SD Card	2000.00	1	2000.00
10.	Li – ion Battery (3.7 V)	600.00	2	1200.00
11.	Jumper Wires	7.50	20	150.00
12.	5 V Boost Module	600.00	1	600.00
13.	Spectacle Frame	1000.00	1	1000.00
14.	Other	-	-	1000.00
		Sub Total		10350.00

Supervised By,

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Date Signature

CONCLUTION

The Smart Spectacle for Visually Impaired People successfully assists users by detecting obstacles and direction changes and providing timely alerts. The system is compact, cost-effective, and easy to use, making it suitable for daily life. This project highlights the importance of embedded systems in enhancing personal safety and improving the quality of life for visually impaired individuals.