



PROJECT SYNOPSIS

Navigation aid for Visually Impaired (**NAVOS-1**)

Group number: **DFP-039**

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Domain

Healthcare & Safety

Problem Statement

India has over 8 million blind individuals and many more with vision impairments, facing challenges in independent navigation due to limited affordable assistive devices. They often rely on others or memorized routes, lacking access to accessible maps or apps, and struggle with detecting environmental changes like construction or obstacles.

Introduction

NAVOS-1 is an innovative assistive navigation system designed to empower visually impaired individuals with greater independence and confidence in unfamiliar environments. Utilizing LiDAR and camera sensors, it continuously scans surroundings to detect obstacles such as walls, doors, and moving entities in real-time. Users receive intuitive haptic feedback and precise audio alerts via air conduction earphones, helping them navigate safely. Additionally, Wi-Fi and Bluetooth connectivity enable smart updates and customization, ensuring adaptability and improved performance over time.

Salient Features

- **Hands-Free, Ergonomic Concept:** Lightweight, headset-style device offers a comfortable, compact alternative to traditional aids, enabling hands-free navigation and natural movement
- **Multi-Sensory Feedback System:** Combines haptic vibrations (forehead, temples, cheeks) with air conduction audio cues for precise obstacle alerts without blocking environmental sounds.
- **AI-Powered Real-Time Detection:** Integrates LiDAR, AI camera, and sharp distance sensors for accurate object classification and depth perception in dynamic environments.
- **Customizable & Connected Experience:** Users can personalize settings, while Wi-Fi and Bluetooth ensure continuous updates and long-lasting performance with a high-capacity battery.

Technology Used

- **Microcontroller:** Realtek AMB-82 mini and ESP-32 dev board with high I/O capacity and enhanced processing capabilities.
- **High Range Sensors:** LIDAR sensor for object's distance estimation and Vibrational motor for intensity-based output.
- **Imaging:** AMB-82 mini IOT camera with microphone, video transmitter, and OTG receiver for real-time feed and mapping.
- **Haptic Feedback:** Provide feedback using text-to-speech conversion while sound awareness, ensuring users stay active with surrounding.