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Implementation of Wearble AI Enabled Glasses and Stick for Blind People

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Abstract - This project aims to develop a cost-effective, portable, and reliable smart device that helps visually impaired individuals with detecting objects, recognizing faces, reading texts, and navigating their surroundings independently. The device will consist of a blind stick containing all hardware components, while the Camera will be fitted in the device. A objective is to improve the quality of life for visually impaired individuals by increasing their independence and access to the surrounding environment. The lightweight smart device system can detect and recognize objects in real-time, this project has the potential to create a case for further investment in creating smarter electronic devices to assist visually impaired individuals with getting around.
Overall, the proposed system delivers a cost-effective, automated, and user-friendly vending solution suitable for cafeterias, hostels, offices, and public environments, offering enhanced convenience through hybrid payment support and smart control functionality.

Key Words: Ai smart glasses, Wearable AI devices, Vision assistance.

1.INTRODUCTION

Engineering innovations often quietly improve our daily routines in ways we recognize. However, the most profound impacts are often found in technologies designed to help people with disabilities, helping them navigate a changing world with independence.
Beyond the physical loss of sight, it creates challenges in communication and limits opportunities to gather knowledge and experience. Unfortunately, the traditional approach of separating visually impaired individuals into "special" educational environments often backfires. Instead of helping, this segregation can isolate them from society, preventing meaningful interaction and restricting access to the wealth of information that sighted people take for granted

2. Body of Paper

Sec 2.1 OBJECTIVES

1. Develop a lightweight smart glass system that can capture real-time video using a Raspberry Pi camera and process it using computer vision algorithms.
2. Implement object recognition algorithms to detect and describe objects in the camera's field of view.
3. Utilize facial recognition algorithms to help the visually impaired identify people they meet or interact with.
4. Use optical character recognition (OCR) algorithms to read text and convert it into an audio format that can be played through an earpiece or speaker.
5. Design a blind stick with integrated hardware components that can communicate with the smart glass to provide additional information about the user's surroundings.

SEC 2.2 METHODOLOGY

The development of AI-enabled glasses and a smart stick for blind users follows a structured, user-centered methodology. The process begins with requirements analysis, where interviews and observations with visually impaired individuals help identify essential needs such as obstacle detection, navigation support, object recognition, and overall ease of use.
The next stage is system design, during which suitable hardware components—cameras, ultrasonic sensors, GPS modules, microcontrollers, and audio output devices—are selected. These components are then integrated into ergonomically designed glasses and a lightweight smart cane. In the AI development phase, computer vision models are trained to perform tasks such as object detection, text recognition (OCR), and facial identification. Sensor-fusion algorithms are implemented to combine inputs from the camera and stick sensors, improving environmental awareness. A low-latency processing pipeline is designed to operate either on-device or through an edge-connected module**.**

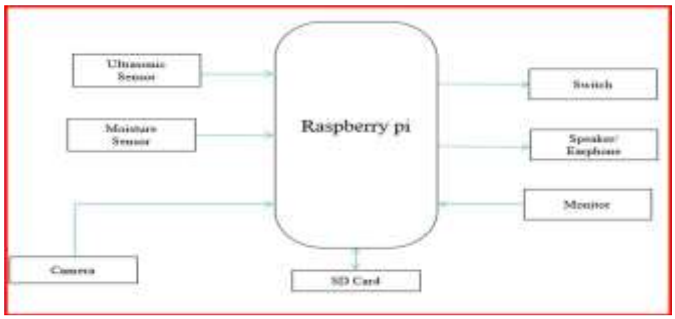

Fig -1: Block diagram of Design and Implementation Wearable AI Enabled Glasses and Stick for Blind People

SEC 2.3 IMPLEMENTATION

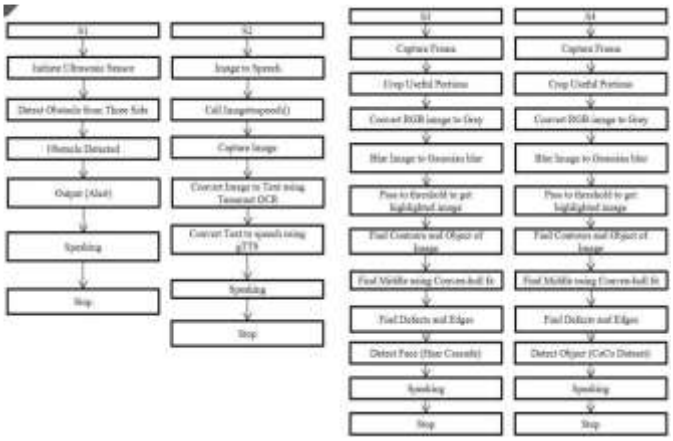

Fig-2: Flow chart for the Proposed Work

System architecture defines overall structure including both software and hardware. This diagram illustrates the components and their interactions. The whole architecture describes how the input is taken, processing of data and the output is displayed. The Camera Module attached to the Raspberry Pi used to take Live feed from the world outside and based in the image captured on the frame Various functions like Object Detection and Facial Recognition is made possible.

SEC 2.4 RESULT

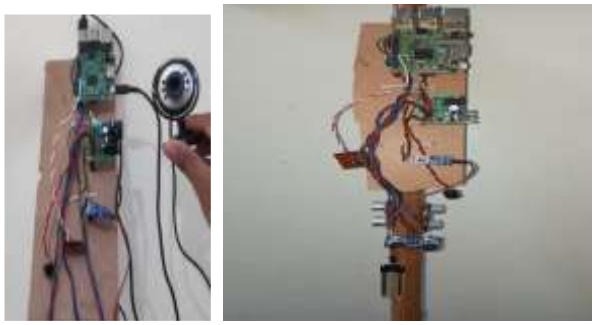

Fig-3 Physical Model of AI Enabled Glasses and Stick

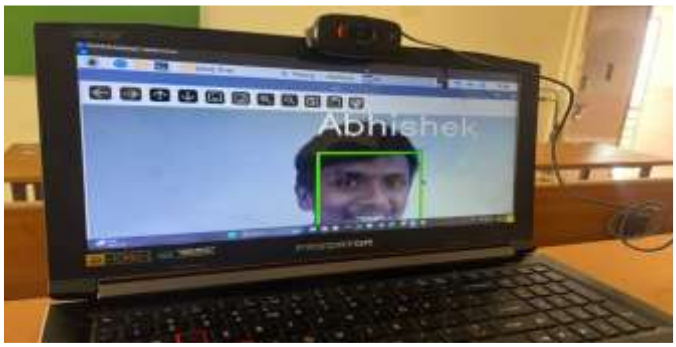

Fig -: Person Detection

Fig-4 Object Detector Web Camera

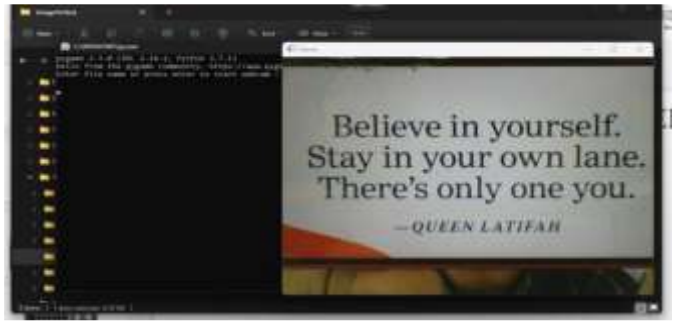

Fig-5 Text Reading

3. CONCLUSIONS

In conclusion, the project was aimed at developing a wearable device for visually impaired people to enhance their daily lives. With the integration of multiple features, such as voice commands, obstacle detection, GPS navigation, and an emergency alert system, the device has the potential to be a game-changer for visually impaired individuals.

Through extensive research and development, we were able to create a prototype that successfully addresses the needs of visually impaired people. The device provides a sense of independence and security, allowing users to navigate their surroundings with ease and alert caretakers in case of an emergency. The voice commands feature enables users to control the device with ease, without having to use their hands, and the obstacle detection system helps users avoid any obstacles on their path.

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