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SMART ASSISTANT FOR BLIND AND VISUALLY CHALLENGED WITH OBJECT, VOICE, TEXT AND COLOR RECOGNITION

ABDUL HALIK Y[1], JUSTIN PENIKS M[2], BHARATHIDASN G[3], AKASH V[4],

DR. S KRISHNAVENI[5], SUJATHA[6]

1 Department of Biomedical Engineering/EEE, Dr. M.G.R Educational and Research Institute
Maduravoyal, Chennai 600095, India. E-mail: abuiphone8@gmail.com
2 Department of Biomedical Engineering/EEE, Dr. M.G.R Educational and Research Institute
Maduravoyal, Chennai 600095, India. E-mail: justinpeniks782003@gmail.com
3 Department of Biomedical Engineering/EEE, Dr. M.G.R Educational and Research Institute
Maduravoyal, Chennai 600095, India. E-mail: justinbharathi06123@gmail.com
4 Department of Biomedical Engineering/EEE, Dr. M.G.R Educational and Research Institute
Maduravoyal, Chennai 600095, India. E-mail: akashvijayakumar2003@gmail.com
5 Professor, Department of Biomedical Engineering/EEE, Dr. M.G.R Educational and Research Institute
Maduravoyal, Chennai 600095, India. E-mail: krishnaveni.eee@gmail.com
6 Professor, Department of Biomedical Engineering/EEE, Dr. M.G.R Educational and Research Institute
Maduravoyal, Chennai 600095, India. E-mail: sujatha.eee@drmgrdu.ac.in

ABSTRACT:

Independence is crucial for visually impaired people to lead fulfilling lives and participate fully in society. It enables them to navigate their surroundings, make independent decisions, and engage in various activities without constant reliance on others. Independence fosters self-confidence, self-esteem, and a sense of control over one's life. It also promotes equal opportunities and inclusion, allowing visually impaired individuals to pursue education, employment, and social interactions on their terms. Among these, the focus on creating assistive technologies for the blind and visually challenged community has gained significant attention. This paper presents smart assistant system for blind and visually challenged to live their life to the fullest. This proposed model ensures to work with an ability to recognize objects, text recognition and color recognition. Additionally we included inbuilt voice assistant system that is AI powered technologies that can respond and understand the spoken language commands. The Smart Assistant for blind and visually challenged individuals presents a comprehensive solution to empower this community with increased independence and enhanced access to information.

Keywords: visually impaired, object recognition, color recognition, voice assistant.

1. INTRODUCTION:

Visual impairment is a condition in which a person experiences partial or a complete loss of vision. It encompasses a wide range of visual problems that are due to various factors including congenital diseases, eye diseases, disorders etc.Visual impairment is one the most faced impairment in the world. In this advanced era technology has paved a way to provide a link between those disabilities. A smart assistant for blind and visually impaired would be more beneficial to bridge the gap between them. The advent of voice assistant has revolutionized the way we interact with technology. Those who feel difficulty in accessing technology and information smart assistant enables them to bridge those gaps creating a great impact than we expected. Additionally this system is built with object text and color recognition system which makes it better for the usage of people.

BACKGROUND:

The approached system intends to help persons who are visually impaired and promotes their life to live with independence. It also lessens the burden for the people surrounding them and makes an effective way to live their life with independence. The inbuilt voice assistant technology enables to interact with the technology making it much easier for the users to obtain required information from technology. This system consists of 4 slots for the buttons, slot for the camera, slot for the ultrasonic sensor and slot for the USB plug that's charges the power bank and two air vents. It also has a cover case to hold the power bank to prevent it from falling on the other components. There are also 4 areas dedicated for putting the Raspberry Pi and the 3 breadboards. Along with this it has voice assistant system which would enable the user to obtain and use information from the technology.

2. OBJECTIVES:

The suggested system's main goal is to aid visually challenged people and lessen the load on their caretakers. The technology provides help for individuals for object, text and color recognition and provides a support to live their life independent. If a visually challenged person wanders lost the location of the object which would be in regular place this system will help them recognize the object. Also if the person needs to buy a new object this would help them recognize the color and text on the object. With the help of voice assistant this system be capable of communicate this to the users.

3. LITERATURE REVIEW:

3.1 OBJECT, COLOR AND TEXT RECOGNITION USING RASPBERRY PI

(2022 three-year International Conference on on Electronics and Sustainable Communication Systems (ICESC))

Reading is the essential life skill in today's society as the reports, bills, bank-related files, classroom worksheets, pharmaceutical product instructions, and other printed documents are presents everywhere. The main objective of this research work is to convert a real text into speech and to develop collision avoidance for the blind. It entails capturing the image using the camera on the Raspberry Pi, processing it with image processing, and then simply reading it aloud. The text in the captured image is predicted by an artificial neural network. The output generated by the proposed device will be in the form of speech, with OCR to assist those who are blind to understand it. The speech output of the software is sent to the blind's headphones, allowing them to hear the

information from the text present in front of them. If you're blind, this technology is both effective and cost-effective. Moreover, this technology is highly beneficial to blind students in schools and colleges. As an artificial intelligence application, the developed application is useful for illiterate people, as well as extremely important to society.

3.2 VOICE ASSISTANT BASED SYSTEM FOR VISUALLY IMPAIRED PEOPLE

(2018 International Conference on Artificial Intelligence and Big Data (ICAIBD))
The rapid development of artificial intelligence and mobile computation brings more convenient life to the blind and visually impaired people with a voice assistant prototype created specifically for them is shown in this paper. To make life easier for users, the system primarily offers basic features including falling detection, safety monitoring, mobile phone accessibility, daily information broadcasts, and view descriptions for them. Natural language understanding, voice recognition and synthesis have been integrated to enable users operate majority of mobile phones' functions. Also, the built-in falling based on a detection algorithm on tri-axis accelerometer and object based on a detection algorithm Mask R-CNN can enrich sense of users and at the same time keep the safety of users.

4. EXISTING SYSTEM:

The features of the existing system for visual impairment are as follows:

- Raspberry pi based smart mechanism for people who are blind
- Sensor based smart assistant for intelligent guide for the blind and visually impaired
- Object and text recognition using software

The Major Drawbacks of visual impairment system are as follows: All the above mentioned system is separately present which is more inconvenient for the users to handle everything separately. Also if the systems are provided separately there would more gadgets and devices to be carried which also make the person to feel discomfort.

5. NEED FOR THE PROJECT

1. Convenient: Blind people usually memorize the location of the object. The proposed system makes it easier when the object is misplaced or replaced.

2. Easy to carry: The recommended system is a portable and convenient system allowing easy access for the individuals.

3. Indpendence: The proposed system offers some sort of individuality for visually impaired persons in case of buying or recognizing an object they are not used to before.

4. Cost-Effective: The recommended system is cost-effective compared to other assistive technologies, making it accessible to a larger variety of patients and caregivers.

6. PROPOSED METHODOLOGY:

For the prototype our device was presented as a black box 3D model. The device has 4 slots for the buttons, slot for the camera, slot for the ultrasonic sensor and slot for the USB plug that's charges the power bank and two air vents. It also has a cover case to hold the power bank to prevent it from falling on the other components. There are also 4 areas dedicated for putting both the Raspberry Pi and 3 breadboards. As we mentioned the smart assistant device consist of 4 push button slots. The first push button will recognize objects, the second push button will recognize text written on objects, the third push button will recognize colors and the fourth push button will measure the distance between the object and the camera to make sure that the item is in a certain range for better recognition. Images are captured using Night Vision Fisheye Camera Module Adjustable Focal Lens. The whole device is powered by 10000 mA Anker Power Bank. Along with this voice assistant will guide the user for obtaining information's from the system. The result will be delivered to the blind person using a Bluetooth headset.

Software requirements:

- RASPBERRY PI
- VOICE ASSISTANCE
- OCR
- Bluetooth

Hardware requirements:

- Camera
- Bluetooth headset
- Ultrasonic sensor

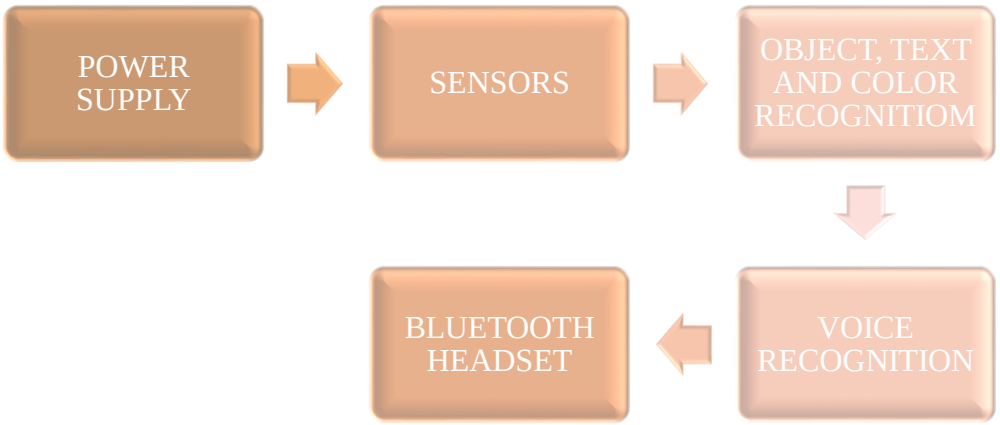
BENEFITS:

The proposed system has several benefits, including improved individuality, convenient, cost effective and portable system which makes it easier to carry. It also enables to interact and obtain information from the system which makes it easier for them to guide them.

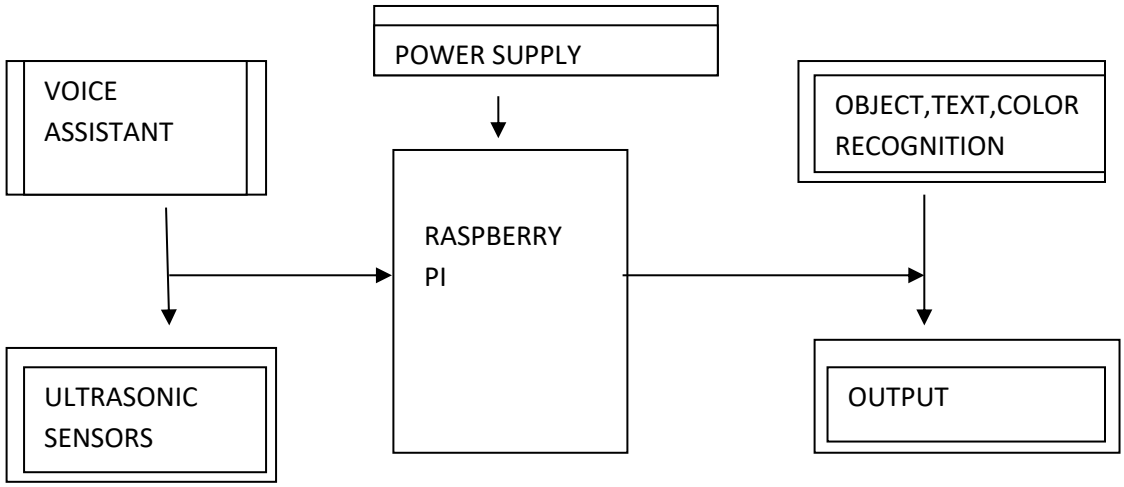
SCOPE

The suggested method is intended to provide assistance to patients with visual impairment. The system is designed to be easy to use and accessible. The system can be easily integrated into the patient's daily routine and is cost-effective.

BLOCK DIAGRAM OF METHODOLOGY:



BLOCK DIAGRAM FOR HARDWARE



RESULT & DISCUSSION:

AI-based wearable device for patients with visual impairment has the potential to significantly improve their well-being, and independence while providing peace of mind to caregivers and loved ones. However, it's essential to design the device with privacy and security measures to ensure the user's data remains protected. Additionally, continuous user feedback and updates are crucial to refining and enhancing the device's functionality over time. The convergence of AI technologies in wearable devices holds tremendous potential to revolutionize patient care for individuals with visual impairment.By providing enhanced safety, personalized assistance these smart wearable can empower patients to lead more independent and fulfilling lives. However, addressing ethical concerns, data privacy, and ensuring accessibility for all remains critical in realizing the full potential of AI in healthcare. Collaborative efforts among healthcare professionals, technologists, policymakers, and patient communities will be pivotal in fostering innovation while upholding ethical principles and patient welfare.

CONCLUSION:

In conclusion, AI-based wearable devices tailored for patients with visual impairment have the potential to revolutionize healthcare and significantly improve the lives of these individuals. By enhancing accessibility, providing personalized care, offering cognitive support, ensuring safety, and maintaining a user-friendly interface, these devices can empower patients more independent leadership and fulfilling lives while providing peace of mind to their caregivers and loved ones. Nevertheless, careful attention must be paid to ethical considerations to build trust and ensure the responsible and beneficial implementation of these technologies in healthcare settings.

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