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A Even-handed Revision on Visual Aid for Unseeing

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Abstract
The Third Eye for the Blind is a wearable device that involves multidisciplinary areas such as computing, electronics engineering, and health science to assist blind individuals in navigating and detecting surrounding hazards utilizing ultrasonic waves and providing audio alerts using a text to speech module. The objective of this project is to style a product that's considerably beneficial to those people that are visually impaired and people who often need to believe others. Globally, 1.1 billion people were visually impaired by the year 2020. Because of population growth and ageing, the number of persons affected by these main causes of vision loss has increased significantly. The device that we have proposed is based on the detection of targets using ultrasonic sound. The device's camera assists the user in identifying and recalling objects from their programmed memory when they reappear in front of them. Even today, blind people use a stick to detect obstacles in their path. However, this stick is inefficient in many ways, and the person who uses it faces numerous difficulties. So, in order to address this issue, we are developing this device using cutting-edge technology.

Keywords: Index Terms-Raspberry, Pi 4, Pi Camera, Ultrasonic Sensors, Text to Speech Module

1. Introduction
We know that even today, in the computerized era, the blind person uses a stick as a navigational tool, but we are also designing a gadget that is efficient in many ways, and the person who uses this gadget will be able to overcome many of the problems that arise while moving around to ful fill their basic day-to-day needs. The Third Eye, which we will implement, is far more advanced than the traditional walking stick. In this project, we will use a Pi camera and the Raspberry Pi Board. The main idea behind using a Pi Camera with a Raspberry Pi is to identify objects and send the data to the Raspberry Pi so that it can recall the objects from the Tensor flow package's programmed memory. The Pi camera distinguishes between objects based on their shape and other characteristics. Each of those objects is given a text to identify and communicate with the user. In this paper, we will look at how this device is made and how it can help blind people.

2. Literature Survey
In this research paper, Image-to-speech conversion technique using raspberry pi was implemented. The algorithm-driven has successfully processed and the image read was clearly out. They have applied algorithms to many images and found that conversion was successful. The aim of a smart shopping assistant text reading system with voice output was for the document that would be available for reading to be placed on a plain as well as clear, dark surfaces, with mostly black text printed on a white background. The purpose of the Navigation System was to enable a blind person to navigate safely and quickly by detecting and recognizing obstacles using ultrasonic sensors and a camera. Obstacles were detected up to 300 cm away using ultrasonic sensors, and feedback was sent in the form of a sound via earphones to alert the user of the obstacle. The other proposal was of Automatic detection and recognition of signs from natural surroundings in this an approach to automatic detection and recognition of signs from natural surroundings and its application to a sign translation task was done.

A common computer vision task is An Improved Adaptive Gaussian Mixture Model for Background Subtraction. We examine the conventional pixel-level approach and create an efficient adaptive algorithm based on Gaussian mixture probability density. Recursive equations were used to constantly update the parameters so that the appropriate number of components for each pixel could be selected at the same time. Raspberry pi is a small processing device that works as a computer at a relatively low cost. The system is intended to provide artificial

vision and object detection, as well as real-time assistance, by utilizing the Raspberry Pi. The system is made up of a pi camera module, ultrasonic sensors, and headsets to receive audio instructions. TTS is used for voice output (text to speech). This system detects an object in its environment and determines the type of object that sends feedback in the form of speech warning messages via earphones. This system's overall goal is to provide a sense of artificial vision by providing information about the natural scenario of an object around them so that they can walk independently. The functionalities of stick for blind people increases as compared to the existing system as it has added opportunities that will help the blind for free. Object detection is computer-aided learning correlated to computer vision and image processing that grapple with espying instances of semantic objects of a certain class(such as humans, buildings, or cars) in digital images and videos.

Pi Camera is used to take images of pages that visually impaired people want to read. This image is pre-processed using Tensor flow. The pre-processing stage consists of seven steps: Resizing, Gray scaling, Gaussian Blurring, Edge Detection, Perspective Transformation, Noise Removal, and Adaptive Thresholding. The captured image is resized and gray scaled. For the removal of noise, Gaussian Blurring is done. Wearable technology is used in the proposed system for visually impaired people, allowing them to read printed text documents and inform them about obstacles in their surroundings, allowing them to navigate easily. This device will be a useful tool not only for people who have such a disability naturally, but also for people who have such a disability as a result of diseases or an accident. It also allows them to send their location to a guardian in the event of an emergency. After the implementation of this project, a raspberry pi camera which has been used for detection and recognition of text from image and conversion to respective text which is again converted into speech through headphones using TTS Engine has been achieved. With the use of wearable equipment that consists of ultrasonic sensors to detect obstacles and their distance from the user, visually impaired people can navigate easily, safely, and avoid any accidents that may occur due to obstacles encountered on their way. In any emergency situation, SMS to their authorized people can be sent with the assistance of the SIM808 Module. After the project is completed, the device created for visually impaired people will be able to convert text into speech, detect obstacles during navigation, and even send emergency SMS about location when in an emergency situation.

Many new technologies have been developed for the visually impaired person, but they are difficult to use and inaccurate. For example, the object detection system detects the object and the direction of the object but does not tell the distance between the person and the object. A three-direction detectable laser cane is one example of a device that can make contacts and send messages to another person. The angle is 45 degrees over and parallel to the ground, with asharp depth. Introducing voice assistants that only tell the user the output of the sensors, such as distance, direction, and the name of the object navigate. In this system, the ultrasonic sensor will detect the object, and the camera will scan the object using object detection technique and predict the object by using speech, recognized object name is converted into sound and the client can know the object with the assistance of headset. Many devices have been developed to assist the visually impaired, such as devices that detect objects through vibrations and devices that can detect text on objects to identify door signs. In the existing system, the devices that alert the user to an upcoming obstacle have sensors attached to them that detect the object in front of the user and produce a vibration. A stick or a belt has sensors mounted on it so that the user has that with him at all times whenever he or she needs it. By detecting text on objects, the visually impaired person will be able to purchase items without the assistance of others.

The system includes a camera attached to a cap, but it may take some time for the camera to detect text on objects. When the blind person needs to go through doors or enter a room, as previously discussed, the person can use that system to read signs on doors, assisting in the identification of exits, restrooms, and so on. These devices can alert the user to the presence of an obstacle ahead or read the text on objects, but the user has no idea what type of object it is or whether the obstacle is a person or not. Whenever an obstacle is detected on the path, the camera captures it and sends it to the processor to identify the type of object, which is then given as a voice command via earphones connected to the Raspberry Pi. Blind people will be able to identify the object in front of them in this manner. In terms of authenticity, the user can identify the person in front of him using Face Recognition, which can distinguish between a known and unknown person. For face recognition, they used a k-nearest neighbour algorithm. When a person is recognized, an email with the person's name and picture is sent to the caretaker. Similarly, if an unknown person is recognized, an email with the unknown person's picture is sent. The distance measurement module's generated text is saved in a folder. The speechmaker spells the text in this folder and produces a voiced signal. Through the microphone, a blind person can hear this output. The Raspberry Pi speech synthesizer is a system used for this purpose that can be implemented in both software and hardware. The similarity of the speech synthesizer to the human voice and its clarity to understand are used to assess its quality. Festival is a multilingual speech synthesis workbench that runs on multiple platforms and includes a full text-to-speech system with various APIs as well as an environment for developing and researching speech synthesis techniques. It is written in C++ and includes a Scheme-style command interpreter for general customization and extension. Our project is an innovative idea for an intelligent system with an Obstacle Detection feature that will provide safety and assistance to visually impaired people. The ultrasonic sensors in the system will sense their surroundings, detect obstacles, and provide feedback to the raspberry pi speech synthesizer in order to change the path. The power supply activates the circuit. The sensor transmitter transmits the frequency, which reacts from the obstacle.

The sensor receiver receives the react frequency and gives it to raspberry pi. The Raspberry Pi processes it and sends a signal to the speech synthesizer. The Raspberry Pi speech synthesizer generates sound and begins to notify the user that an obstacle has been detected via headphones. It can scan areas to the left, right, and in front of the blind person regardless of height. [6]This project proposes the development of a portable AI-based guidance system for the blind, which benefits the visually impaired community and aids in their daily mobility. The whole system is controlled by Raspberry Pi's microcontroller. This system employs a variety of sensors, including infrared sensors, sonar sensors, and a camera module, to assist it in gathering the necessary data. In addition, the text-to-speech module is used to converse with the user. The system is made up of three parts: a sonar sensor, an infrared sensor, and a camera. The data from all three components is sent to the raspberry pi, which processes it and displays the results to the user. Sonar and infrared sensors have similar structure, implementation, and execution. The camera employs a distinct structure and algorithm. The system's features include: detecting the object's distance and direction using sonar and infrared sensors, Using an object detection algorithm, determine the type of object and communicate the result to the user via headphones. The following sections elaborate on the complete process. Detect the distance of the object (Sonar Sensor).Two sonar sensors are placed in each direction to determine the distance of an object from different directions (left or right). After a sound wave hits an object and bounces back, each sonar sensor calculates the distance. However, due to the concurrent operation of other components, the system in this work is configured to calculate the distance every three seconds.

The Raspberry Pi circuit is used in this system to provide object identification. The input process involves capturing every object within a 10m radius and converting it into the output processing in voice command, which is implemented in a Bluetooth headset used by blind people and powered by a Raspberry Pi component. There are three main components namely: Raspberry Pi, Camera, and Headset. Camera Pi is an excellent choice for Raspberry Pi to take pictures and record quality videos to apply a considerable range of configurations and effects. There are some tools helpful for acquiring images and configuring and obtaining useful information from images. The usage of Tensor flow (Open Computer Vision) and Simple CV (Simple Computer Vision) frameworks allows simplified usage with Python language. Tensor flow is a specific library for computer vision, Simple CV is usable in Python for easy to use and enhance functionalities of the Tensor flow library and image processing algorithms into higher-level 'bricks' that simplify the life of the developer that wishes to create artificial vision applications without the necessity to possess a deep knowledge of computer vision. The headset is used to receive the audio voice generated by the python coding after identification of the object to a user. The system is designed to read printed or typed texts on hand-held objects for helping blind people. The automatic ROI detection and text localization algorithms were used to make sure the effectiveness and robustness of the entire system. They next assessed this prototype system of usable text reading using images of hand-held objects captured by ten blind users face-to-face. To extract text regions from advanced backgrounds, a totally unique text localization formula was supported for models of stroke orientation and edge distributions. To prepare text patches for text classification, an adjacent character grouping is performed. OCR is used to identify localised text regions and convert them into audio output for blind users. Throughout this analysis, the camera serves as the paper's input. The camera begins streaming as a result of the Raspberry Pi board's high power. Once the item for text reading is placed earlier than the camera then the capture button is clicked to supply the image to the board.

3. Limitation Of The Existing System

The previous project concept was a moderate budget navigational aid for visually impaired people. The project's limitations were as follows: -¬Heavy to transport and Does not provide protection from obstacles at the body or face level.¬Because electronic components are used, any malfunction will be difficult for a blind person to identify and repair on the spot.¬It is not waterproof and has less mechanical strength, and ultrasonic obstacle detection is limited to detecting stationary and slow-moving objects. So, in the future, it can be optimized to detect fast-moving objects with greater accuracy providing a more convenient navigation system.¬Not designed for underwater use ultrasonic sensors get spoiled when used underwater, this means that the user is not permitted to use this device when it is raining.

4. Methodology

The goal is to provide third-type assistance to the blind. The Third Eye for the Blind includes ultrasonic sensors as well as a Pi Camera. To determine the distance between obstacles, an ultrasonic sensor is used. The proposed system will detect the upcoming obstacles in the path of a blind person using ultrasonic waves. Ultrasonic sound waves are generated by Ultrasonic sensors which are reflected through obstacles. The signals which get reflected are then received by the module. According to the distance obtained he or she will be suggested to move in the direction with fewer or no obstacles. Pi Camera is used to recognize images of objects that visually impaired people want to see. This image is pre-processed using Tensor flow which will help to identify the objects and to recall them from the programmed memory.

5. Conclusion

People who are visually impaired find it difficult to complete their daily tasks; they require someone to guide and assist them. Therefore, our system which is camera-based visual assistance with Raspberry Pi which can detect objects differentiate between known and unknown person, give the latest real-time updates on objects detected, can assist the visually impaired lead their life with some independence. In general, work can be classified on the basis of Ultrasonic Sensors for detecting obstacles and determining distance, a Pi Camera for identifying objects and notifying the user in the form of speech .All the studies which had been reviewed show that there are a number of techniques for designing this gadget for blind people. The literature related to this topic was reviewed and analysed. In the future, further modifications to enhance the performance of the system can be added.

The technologies will be upgrading day by day in the field of innovating the devices for people who are visually impaired. And our model ensures that the task of moving a blind person is simple and comfortable. The developed device will be light and easy to transport. The components or parts used in this gadget will also be readily available and inexpensive. The manufacturing cost of this model will also be quite low, making the device affordable to people of allages. Some of the techniques for customising this gadget are listed below:¬In the future, the number of sensors can be increased as needed.¬Image processing can be used to determine the volume of obstacles and object patterns.¬Ultrasonic detectors with a greater range and accuracy can be used.¬Text extraction can be improved to detect multiple languages as well as written text.

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