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Survey: Third Eye – A Smart Wearable Glass with Deep Learning Technology Powered with Artificial Intelligence for Visually Impaired People

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ABSTRACT
Our goal is to serve as a "THIRD EYE" to empower people who are visually impaired by helping them through their challenges. This cutting-edge glass has several add-on features, an AI assistant, an image detector (with mobile net), and a sensor. This concept suggests an intelligent guiding device in the shape of eyeglasses that would give visually impaired people safe and effective assistance, thereby easing their travel challenges. Recognizes the spoken instructions given by the user and sends audio feedback via micro speakers with the relevant information. It is therefore an easy-to-use tool that helps those with vision impairments travel in safety.

KEYWORDS*:* Machine Learning, Speech Recognition, Image Recognition, Pysttx3

I. INTRODUCTION

If not the most misunderstood disability, blindness is certainly one of the most. For a disabled individual, achieving independence is the most crucial thing. With certain specifically designed adaptive devices, a blind person can lead an independent life. We have therefore come up with a plan to enhance their way of life by creating an adapted gadget that has cutting-edge features. Because they may be operated with little or no hand movement, wearable assistive devices are the most useful. The most common kind is a head-mounted display. Their key advantage is that they don't require extra monitoring cues because, unlike other gadgets, theirs is intrinsic and points in the direction of outlook. An innovative smart eyewear design that can help is shown in this study.

II. RELATED SURVEY

A photodiode and LED are used to create an active optical pathfinder, an electronic travel aid that increases blind people's movement. Radiometric computations are used to optimize the shielded path. Protection zones consisting of an opening, a side panel, a front panel, and a post are investigated for common obstacle configurations. Additionally, the findings are shown in actual setups with parked automobiles, trees, and trash cans. Lastly, we describe how the gadget can be utilized by visually challenged individuals in the actual world in addition to the standard white stick [1]. It's a difficult task to provide a single assisting system to those with visual, hearing, and vocal impairments. Many studies conducted in the present day concentrate on solving some of the aforementioned problems, but not all of them. The goal of the effort is to develop a novel method that enables visually impaired people to hear text representations. This is accomplished by using a camera to capture an image, which is then converted into audio signals. This work presents a method that enables individuals with hearing impairments to read and see material in audio format through the use of speech to text conversion technique. Additionally, it offers a method that enables those who are vocally handicapped to represent their voice through text to voice conversion technique. These three solutions were all combined to form a single, special system. The Raspberry Pi is used to coordinate all of these tasks. The Tesseract OCR (online character recognition) technology, which converts images to text and text to audio, is helpful to those who are visually impaired. The deaf individuals assist with the app's operation, enabling them to comprehend what is said and have it appear as a message [2]. In order to prevent people from seeing indoor objects, this research proposes an additional small camera-based method. Unlike best-in-class systems, which typically execute the recognition task by limiting it to a single preset class of articles, we present here a completely different option plan, which we refer to as coarse depiction. It moves toward expanding the acknowledgement task to multiple items while controlling the handling time by sacrificing a small number of interesting data points. The benefit is that it heightens the visually impaired person's awareness of and perception of his immediate, rational surroundings. Two picture multi-labeling schemes that differ in how picture similarity is calculated address the coarse portrayal problem. While the second relies on a semantic closeness measure presented by technique for Gaussian process estimation, the first uses the Euclidean separation measure. Both techniques rely on a reduced picture representation in view of compressive detection in order to achieve fast calculation capacity. Two indoor datasets representing a range of indoor environments were used to assess the suggested philosophy. Positive outcomes in terms of timeliness and accuracy were achieved [3]. In this work, we build and implement a smart cap that allows visually handicapped and blind people to freely move by feeling their environment. A NoIR camera will be used to record the environment around the subject and identify any items in it. A voice description of the things observed will be broadcast through the earbuds. A power source, earbuds, a NoIR camera, and a Raspberry Pi 3 processor are all part of the system's architecture. The processor gathers the environmental frame information and converts it to voice output. For object identification and classification, the device makes use of the TensorFlow API, an open-source machine learning library created by the Google Brain Team. TensorFlow facilitates the development of machine learning models that can recognize and categorize several items in a single picture. TensorFlow API is thus used to retrieve details related to different objects that are present in a single frame. The details of the detected object (in text format) are converted to vocal output using a Text to vocal Synthesiser (TTS) program named eSpeak. Thus, the NoIR camera's recorded video is ultimately translated into speech signals, enabling the narration of the scene to describe its numerous items. Detected objects include cell phones, couches, vases, people, and 90 other classifications [4]. A recognition mechanism is presented in this paper that may be useful to the blind. In this research, a face recognition system and a hand gesture recognition system that may be used for a variety of applications are implemented. Dynamic pictures are extracted from dynamic videos and subjected to specific algorithmic processing. The Hand Gesture System uses YCbCr color space for skin color identification, and uses the hand's character point—where several information, such as the angle between fingers and fingertips, are extracted—to find the hand's convex defect. Gesture Recognition allows for the execution of a number of actions, such as turning on the lights or the fan. While LBPH recognizer and Haar Cascade Classifiers are employed for face detection and recognition, respectively, in face recognition. The research has been applied, thanks to OpenCV. This technique has been used to recognize and identify different hand motions and human faces. 92% accuracy was attained in facial recognition and 95.2% accuracy was attained in hand gesture recognition [5].This study represents an attempt to develop a revolutionary smart glass that can extract text from an image, recognize it, and translate it into speech. It is made up of a Raspberry Pi 3 B+ microcontroller that processes a webcam image superimposed over the blind person's spectacles. The OpenCV software and the open-source Tesseract and Efficient and Accurate Scene Text Detector (EAST) OCR tools—both of which are based on Deep Learning techniques—are used to recognize text. Google's Text to Speech (gTTS) API processes the identified text further and converts it into an audio signal for the user. This method also uses RFID technology to identify places within an academic building so that blind persons can receive location-based services. This method for supporting visually challenged pupils has undergone rigorous testing in an academic setting. The developed method is new because it offers the required computer vision functionalities—text and picture recognition—in an affordable, portable, precise, and open-source software-driven manner. This solution may find utility in both commercial and educational contexts [6]. The proposed work introduce a brand-new visual assistance method for total blindness. The Raspberry Pi 3 Model B+ has been utilized to show the functionality of the suggested prototype due to its low cost, small size, and ease of integration. In order to avoid obstacles and recognize objects, the design integrates a camera, sensors, and sophisticated image processing algorithms. Both the camera and the ultrasonic sensors measure the distance between the user and the barrier. The image-to-text converter in the system serves as an integrated reading assistant, and it is followed by an audio feedback system. There are no extra costs or complicated steps involved in mounting the lightweight, portable equipment onto a standard pair of eyeglasses. Sixty people who are fully blind are used in the experiments to compare the performance of the suggested device to the conventional white cane. The assessments are carried out in controlled settings that replicate situations that a blind person could encounter in the real world. The suggested gadget, in comparison to the white cane, provides the visually impaired with increased accessibility, comfort, and ease of navigation, according to the results [7]. In order to adjust the detection angle of the sensors and reduce false warnings to the user, a model-based state-feedback control technique is presented in this research for a multi-sensor obstacle detection system for a smart cane. After reorganizing the entire system into an appropriate state-space model, a controller based on a linear quadratic regulator is created to further improve the actuator's control actions while maintaining position tracking [8].In order to support and facilitate the activities of blind people, this study proposes the use of smart glasses as a device for object detection and as a system for detecting barriers / obstacles in front of blind people that are equipped with earphones as speakers to relay object information. The system consists of an ultrasonic sensor to measure an object's distance from the user and a Pi Noir V2 camera for taking images of items. The Raspberry Pi is used to process data, and through headphones, it outputs a sound that indicates the position and results of picture processing [9]. In this study, a mechanism for obtaining information about nearby objects is created. To make using it easier for blind users, this gadget can also determine the distance of an object spotted using a camera that is coupled with glasses. They can develop their skill and ability and identify objects around them with the help of this tool. This device provides real-time video as visual data by using a camera as its primary sensor, which functions similarly to human eyes. A convolutional neural network with two convolutions is used to handle the RGB visual data, giving it dimensions of 176 x 132 pixels. It yields smaller pixels, measuring 41 by 33, thus weights are derived for classification using a predetermined dataset and back propagation. Finding the centroid value—the center point for calculating the distance between objects and stereo vision cameras—comes next after receiving the detection result. The output is transformed into audio and linked to headphones, enabling visually impaired individuals to perceive the data. The test results demonstrate that this tool has an average accuracy of 93.33% in detecting predefined objects, such as individuals, tables, chairs, automobiles, bicycles, and motorbikes. Its measuring error for distances between 50 and 300 cm is approximately 6.1% [10]. The suggested effort aims to inform blind individuals about objects on their route, so transforming the visual world into an auditory one. By using the real-time object detection technology, this will enable visually impaired persons to navigate autonomously without the need for outside support. Through the use of image processing and machine learning techniques, the program uses the camera to identify items in real-time and uses the audio output to notify blind users of the object's location. The current approach's inability to distinguish between objects has resulted in several shortcomings, including low performance and accuracy. The primary goal of the proposed study is to give visually impaired individuals a viable option, the greatest performance outcomes, and good accuracy [11]. This system combines the power of TensorFlow (YOLO), OpenCV, Noir camera, ultrasonic sensor, and Raspberry Pi to recognize items in real time and give the user audible input on what kinds of objects have been discovered. By giving real-time feedback about the user's surroundings, TensorFlow (YOLO), OpenCV, Noir Camera, ultrasonic sensors, and Raspberry Pi, in particular, have made it possible to develop a highly accurate and successful system for visually impaired people. By enhancing the user's confidence and independence when navigating their environment, this system can significantly improve their quality of life [12]

Ref	**Year**	**Name**	**Accuracy**
1	2012	Optical device indicating a safe free path to Blind people	NA
2	2017	Assistive device for blind, deaf& dumb people using Raspberry pi	NA
3	2017	Assistive technologies for blond people to describe indoor sensing by raspberry pi	NA
4	2018	Smart cap wearable visual guidance system for blind	NA
5	2019	Static hand gesture & face recognition system for blind people	95.2 %
6	2019	Deep learning assisted smart glasses as educational aid for visually challenged students	NA
7	2020	An AI based visual aid with integrated reading assistant for the completely blind	NA
8	2018	Multi sensor obstacle system via model based state feedback control in smart cane design for the visually challenged	NA
9	2022	Design & implementation of real time object detection for blind using convolutional neural network	NA

10	2019	Object detection & distance estimation tool for blind people using convolutional methods with stereovision	93.33 %
11	2020	Real time object detection for visually challenged people	94.4 %
12	2023	Blind navigation support system using raspberry pi& Yolo	NA

III. PROPOSED METHODOLOGY

This article designed a wearable gadget to assist those with vision impairments. Our system will use depth and ultrasonic sensors to ascertain the obstruction's distance from the user after first identifying the obstacle and its kind using a Raspberry Pi camera. After analysing the sensor stream, an AI assistant will send the information to the user via ear buds. created a wearable gadget to aid those who are blind or visually handicapped. The ultrasonic depth sensor will be the first tool used by this system to identify any object or face in front of the blind individual. In my project, I mostly used two techniques: facial recognition and object detection. Object detection aims to find instances of semantic items of a given class in digital photographs, such as people, buildings, cars, vegetables, and fruits. A subfield of computer vision and image processing is object detection. Snapshot linked to the Raspberry Pi's USB port. After capturing the photos, it is sent on to the trained model. Mobile Net, a deep learning model, is utilized to forecast the objects The model first predicts the visuals, then converts them into sound using text-to-speech libraries. Through ear buds, this voice was able to hear the blind individual. Family members and close acquaintances will have their faces recorded in the memory chip through the same facial recognition process. It was installed on the inside. The face is captured by the camera and sent to the Lbph algorithm for prediction. Voice is the predicted output that is sent to the earphones.

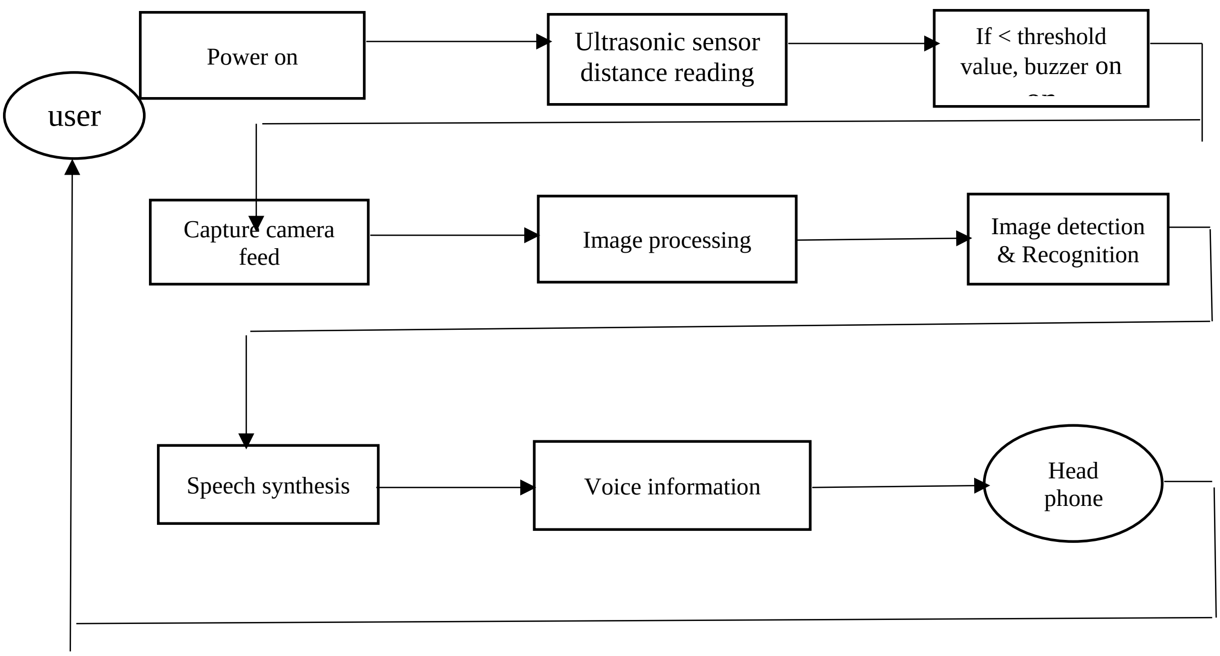


Figure 1: block diagram

1. Object detection and Face recognition

With an understanding of computer vision principles, they will be able to detect objects in real time using models. Using pre-trained models and choosing suitable detection frameworks, such as SSD, are important ideas. When identifying objects Identifying and classifying the objects comes next after they have been detected. In order to extract item names and improve detection results, post-processing processes are included. Text to speech interprets text into speech and knows how to pronounce object names. Ideas include choosing suitable text to speech libraries or APIs, setting up voice preferences, and adjusting pitch and tempo of speaking

Figure 2 : Real World Objects

In face recognition to recognize family members and close friends, and their faces will be stored in the memory chip installed internally.

Data collection

One step in the data collection process is recognizing faces from video feeds and organizing them into folders. At this point, employing the Haarcascade technique. The algorithm is quick, efficient, and reasonably accurate. Features are scanned using filters. Haarcascade is the name of the algorithm for sliding windows. Each face has been saved and assigned a unique ID within a folder. The data gathering stage in face recognition is essential to creating a reliable and accurate model. Gather a varied dataset including faces from different age groups, races, and lighting situations. This guarantees that the model acquires strong generalization across various contexts. Obtain photos with a high quality, optimal lighting, and little noise. The identification system's performance may suffer from poor image quality.

Take pictures of faces with a range of expressions and from varied perspectives to help the model identify faces in a variety of scenarios. For supervised learning tasks, annotate the gathered photos with pertinent metadata, such as identification labels, facial landmarks, and attributes (e.g., gender, age). Sufficient annotations are necessary to train a trustworthy model. Make sure people give their informed consent before using their face data, and follow privacy laws and policies to safeguard personal data. Utilize data augmentation methods to enhance the dataset's diversity, such as rotation, scaling, and flipping.This strengthens the model's capacity for generalization and helps avoid overfitting. To avoid biases during the model's training process, keep the dataset balanced and substantially equal for each identity. Update the dataset frequently to incorporate new faces and take appearance changes into consideration. This aids in the model's ability to adjust to changing identities and face feature variances. Think about the moral ramifications of gathering data, such as possible biases in the dataset and the appropriate application of facial recognition software to prevent prejudice or injury. In light of the sensitivity of facial biometric data, take the necessary security precautions to guard the gathered data from misuse or illegal access.

Figure 3 : Data collection

Training

There are a number of important factors and procedures to take into account when training a face recognition system in order to guarantee its efficacy. It is critical that your training data be of a high caliber and diversity. To ensure robustness, gather a sizable dataset of face photos that reflect different ages, genders, races, and lighting conditions. Make sure the photographs are preprocessed before training so that the lighting, size, and orientation are all consistent. Preprocessing techniques that are frequently used are histogram equalization, alignment, and normalizing. Use methods like deep learning to extract features that are discriminative from pictures of faces. Because Convolutional Neural Networks (CNNs) can learn hierarchical representations, they are frequently employed for this kind of application. a suitable model architecture for facial recognition that takes accuracy and computing economy into account.Siamese networks, Triplet networks, and Deep Metric Learning models are common options. Establish an appropriate loss function that motivates the model to acquire discriminative face embeddings. Three popular options are Center Loss, Triplet Loss, and Contrastive Loss. Use stochastic gradient descent (SGD) or one of its variations to train the model.Employ strategies like dropout and data augmentation to enhance generalization and avoid overfitting. Retrain and update the model often with fresh data so that it can adjust to environmental changes and continue to function well over time. This section uses the LBPH technique to train the model. In this instance, the model received the saved face and the training portion began.

Testing

During the testing phase, the trained model receives the first face it detects from the camera feed.The trained model predicts saved faces and displays unknowns for unsaved faces. Evaluating the accuracy of the wearable device's facial recognition system is known as accuracy testing. Faces of known people should be accurately recognized by the gadget, whereas faces of unfamiliar people should be rejected. Examine how resilient the face recognition system is to changes in image quality, occlusion, position, expression, and lighting. Given that visually impaired users may come into contact with a variety of environmental variables, the system ought to function consistently in all situations. In Practical Examination Test the wearable smart glasses in real-world scenarios with visually challenged people who are wearing them in different settings. In practical settings, this aids in identifying usability problems, performance constraints, and areas in need of development. Analyze the facial recognition algorithm's performance in real-time situations. The system ought to be able to identify faces rapidly and give the user fast access to pertinent information .Make sure the facial recognition system respects users' privacy and protects their personal information. Examine the system for weaknesses including improper use of face recognition data or illegal access to databases containing facial recognition information. Check to see if the smart wearable glasses' voice control, object recognition, and navigation support are integrated with the facial recognition capability. To offer a consistent user experience, make sure that all of the device's components work together seamlessly.

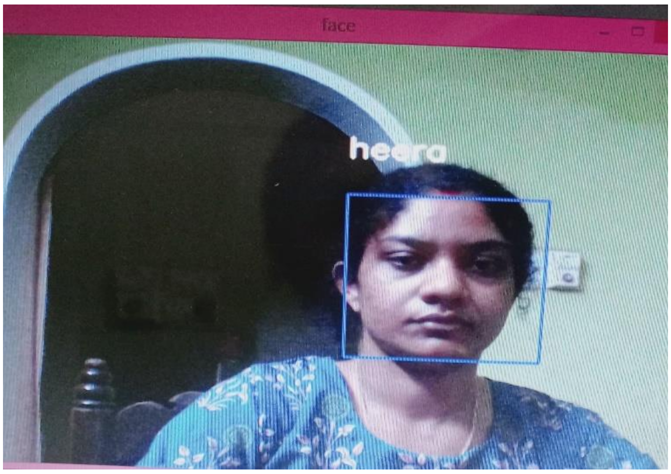


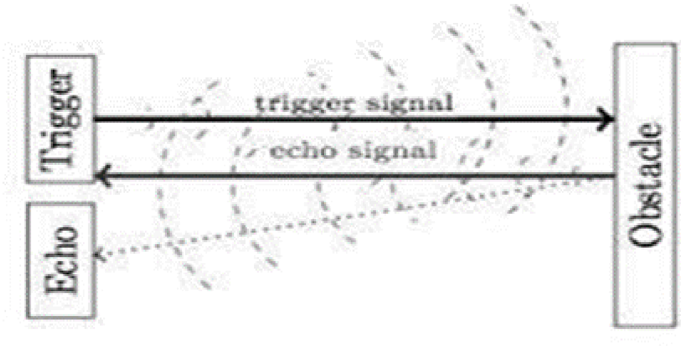
Figure 4: testing result

2.Coco dataset

The COCO (Common Objects in Context) dataset is a large-scale dataset for object detection, segmentation, and captioning. COCO is one of the largest and most widely used datasets in computer vision. It contains a diverse set of images with complex scenes and a wide variety of objects. As of its latest version, COCO contains over 200,000 images across 80 object categories.Each image in the COCO dataset is annotated with object bounding boxes, segmentation masks, and keypoints. This rich annotation enables training and evaluation of algorithms for tasks such as object detection, instance segmentation, and keypoint detection. The COCO dataset covers a broad range of object categories, including common everyday objects such as person, car, bicycle, chair, etc. The diversity of object categories makes COCO suitable for training models that need to recognize a wide variety of objects in different contexts. Images in the COCO dataset often contain multiple objects in cluttered scenes, with varying poses, scales, and occlusions. This complexity reflects real-world scenarios and challenges in computer vision tasks like object detection and segmentation.COCO provides standard evaluation metrics for object detection, instance segmentation, and keypoint detection tasks. These metrics include measures like Average Precision (AP) and Average Recall (AR), which help quantitatively assess the performance of algorithms on the dataset.Challenges: The complexity and diversity of the COCO dataset pose challenges for computer vision algorithms, particularly in accurately detecting and segmenting objects in crowded scenes with overlapping instances and intricate shapes.Community Impact: Due to its scale, diversity, and rich annotations, the COCO dataset has become a benchmark for evaluating and comparing the performance of state-of-the-art algorithms in various computer vision tasks. It has spurred significant research progress in areas like object detection, instance segmentation, and image captioning.

Figure 5: Coco dataset

3. Distance measurement between obstacle and user using sensors:
When a user is blind, we use mobile net to determine the kind of impediment or image in front of them. To precisely determine the distance between the user and the obstruction, though, we employ sensors. Ultrasonic sensors are capable of measuring an object's distance from you regardless of its size, color, or surface roughness. They might gauge an object that is traveling away from them or in their direction. "Non-contact" ultrasonic sensors allow for the calculation of distances without putting the target in danger.



IV. METHODOLOGY

1. Computer vision

The goal of computer vision, a branch of computer science, is to develop digital systems that can process, comprehend, and evaluate visual input (such as pictures or videos) in a manner similar to that of humans. The foundation of computer vision is the ability to educate computers to comprehend and analyse images at the pixel level. In theory, machines use specialized software algorithms to retrieve, process, and interpret visual input. Technical information regarding the steps that machines take to interpret images may be found in Image Processing and Computer Vision. To put it briefly, computers perceive images as a collection of pixels, each having a unique set of colour values. For instance, the image of Abraham Lincoln is shown below. This graphic uses a single 8-bit value, ranging from 0 (black) to 255 (white), to represent the brightness of each pixel. When you enter an image, the software displays these numbers. The computer vision algorithm that will be in charge of additional analysis and decision-making receives this data as an input. The application of machine learning is another essential component of computer vision (ML). Machine learning (ML) is the study of teaching computers how to carry out specific tasks using a set of examples known as training data.

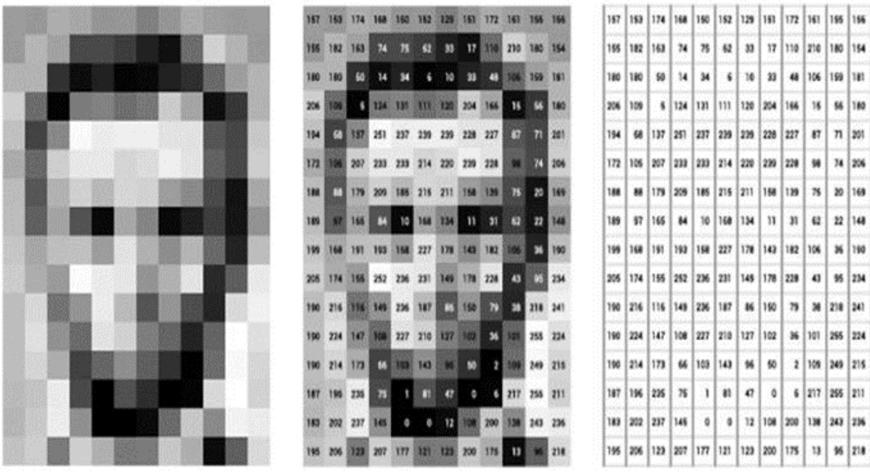


Figure 6: computer vision

2. Mobile net

The bounding box and category of an object are calculated using the object detection model MobilenetSSD from an input image. Using Mobile Net as its backbone, this Single Shot Detector (SSD) object detection model may accomplish quick object detection that is optimized for mobile devices. A convolutional neural network (CNN) architecture called MobileNetV2 is lightweight and intended for mobile and edge devices with constrained processing power. It was unveiled with the goal of outperforming the original MobileNetV1 in terms of efficiency and performance. MobileNetV2 is computationally efficient since it is composed of inverted residuals with linear bottlenecks. In order to reduce the amount of parameters and calculations, it uses depth-wise separable convolutions, which divide spatial and channel-wise convolutions. MobileNetV2 is appropriate for real-time applications on mobile and edge devices because of its computationally efficient design. Because of the architecture's ability to balance speed and accuracy, it works well for tasks like segmentation, object detection, and image categorization.

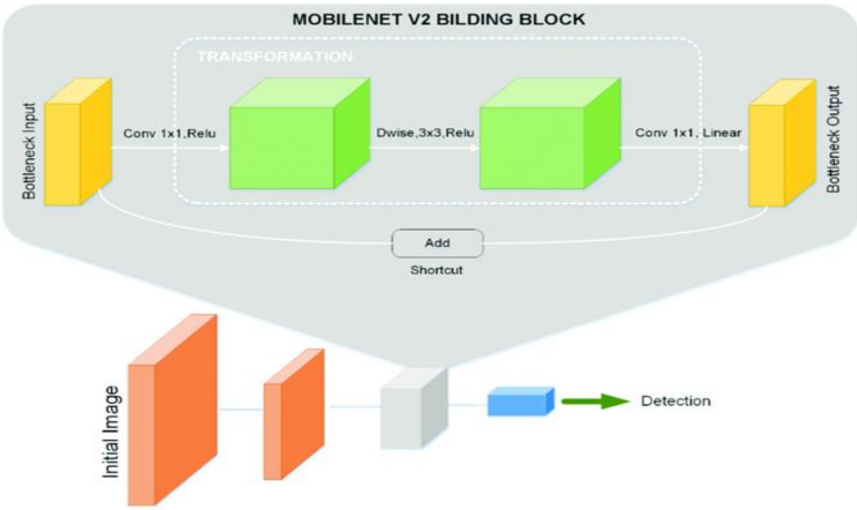


Figure 7 : Architecture of mobile net v2

V. HARDWARE IMPLEMENTATION

The hardware implementation of the "Third Eye" smart wearable glass involves careful selection and integration of advanced components to create a functional and reliable assistive device for visually impaired individuals. Through meticulous design, testing, and calibration, the "Third Eye" aims to enhance users' autonomy and quality of life by leveraging the latest in deep learning and AI technology. The hardware implementation of the "Third Eye" smart wearable glass involves integrating various components that work together to capture, process, and convey information to visually impaired users. In Camera Module using High-resolution miniature camera for Captures real-time visual data from the user's surroundings. Resolution At least 1080p for clear image capture and Frame Rate Minimum 30 frames per second (fps) to ensure smooth video. Field of View Wide-angle lens to cover a broader area. Then Ultrasonic Sensors Detects obstacles and measures distances to aid in navigation. Range 2 cm to 4 meters and Accuracy ±1 cm for precise detection. Field of Detection Up to 180 degrees. Processing Unit to Processes data from the camera and sensors using deep learning algorithms. Specifications **is** Multi-core ARM Cortex-A series and GPU is Integrated GPU for accelerated AI computations. Then Power Supply Provides power to all components of the device. Capacity 3000mAh to ensure several hours of continuous use and Charging Time Approximately 2 hours for a full charge. Battery Life At least 8 hours of typical use.

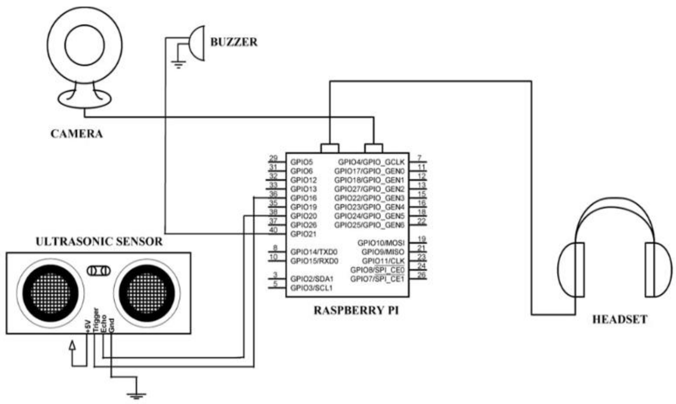


Figure 8: circuit diagram

VI. HARDWARE COMPONENTS

A Raspberry Pi

A Raspberry Pi is a computer the size of a credit card. Keyboard, mouse, display, power supply, SD card, and operating system installation are required. The Raspberry Pi is an inexpensive embedded system capable of performing numerous important functions. It can be used as a simple PC, a small computer for scripting, a hub for custom devices, and much more. General Purpose Input/Output (GPIO) pins are included for controlling a range of actuators and sensors. Raspberry Pi 3 is used for a variety of tasks, including making hardware projects, teaching, and coding. All of the I/O components are connected and controlled by it as a low-cost embedded system. It runs on the Raspbian or NOOBs operating system, which is capable of completing a number of significant tasks. But we choose to work with Raspbian as the operating system for our solution. Numerous operating systems, such as Ubuntu and Raspbian (now called Raspberry Pi OS), are supported by Raspberry Pi.The official operating system designed specifically for the Raspberry Pi is called Raspberry Pi OS.

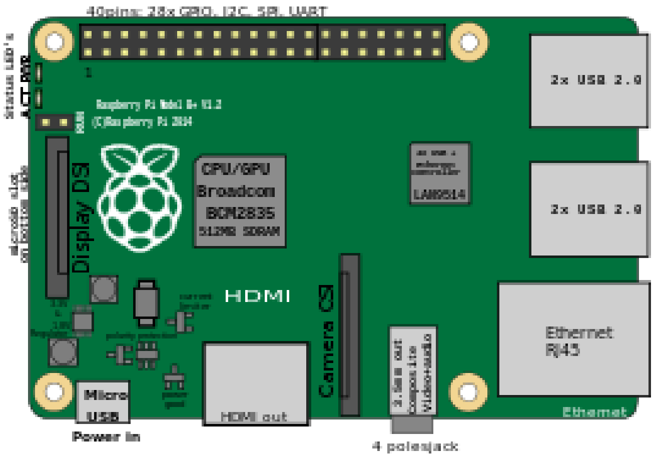


Figure 9: Raspberry pi

B. ultra sonic sensor

Ultrasonic sensors are designed to use ultrasonic waves to measure distance. Ultrasonic sensors generate ultrasonic waves and then pick up the reflected waves. Thus, the ultrasonic sensor will determine the object's distance by monitoring its duration. Its sensing range is between 2 and 400 cm. The ultrasonic sensor in the smart glasses measures the separation between an object and the camera in order to identify text from text images. Experiments revealed that in order to obtain a clear image, the distance to the item needed to be between 40 and 150 cm. Ultrasonic sensors are widely employed in robotics, automation, and diverse industrial applications to facilitate tasks such as obstacle avoidance, object detection, and distance measuring. They are also used in several medical devices, liquid level measurement, and car parking assistance systems. Within their designated range, ultrasonic sensors are often precise and dependable when measuring distances. However, the accuracy of measurements can be impacted by variables including humidity, temperature, and the type of reflecting surface .Ultrasonic sensors have a limited maximum range, and they might not function effectively in areas with a lot of auditory interference.

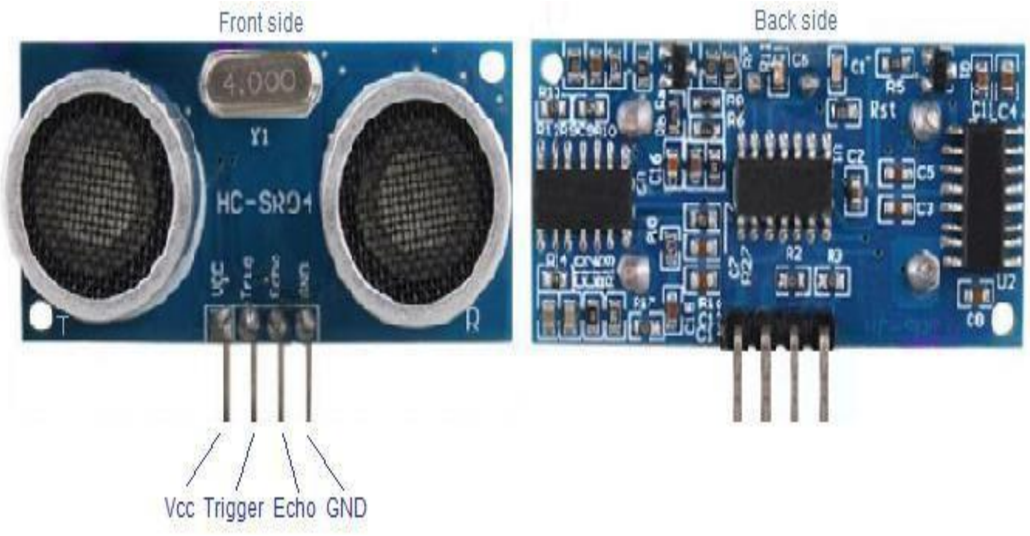


Figure 10: Ultra sonic sensor

C. Head phone

Since the Raspberry Pi 3 Model B & B+ include an audio jack, we chose to use wired headphones instead of using up one of the four USB ports that could be used for other peripherals in our solution. The headphones will be utilized to assist the user in listening to the text translation or text that has been converted to audio after being photographed by the camera. The user won't have to worry about misplacing or uncomfortable wearing the headphones because they are lightweight, compact, and integrated into the glasses. For portable devices, low-impedance headphones (less than 32 ohms) are appropriate .For best results, headphones with high impedance (more than 100 ohms) would need a headphone amplifier. Open-Back: Promote airflow through the ear cups to produce a less isolating but more lifelike sound. Closed-Back: Close the ear cups to provide improved noise reduction but maybe a smaller soundstage. For long-term comfort, take into account the headband and ear cushion material. A comfortable fit is enhanced by swiveling ear cups and adjustable headbands. For portability, look for headphones with collapsible designs, strong construction, and reinforced cords. While wireless headphones offer convenience, wired headphones frequently give higher audio quality. For optimal communication, Bluetooth headphones ought to support the appropriate version.

Figure 11: Head phone

D. Camera

USB cameras, also known as webcams, are digital cameras that connect to a computer via a USB port. Here are some key points about USB cameras: USB cameras connect to computers, laptops, or other devices with USB ports. They typically use USB 2.0 or USB 3.0 interfaces for data transfer. USB cameras are commonly used for video conferencing, live streaming, online meetings, and recording videos. They are integrated into laptops, or they can be external devices that connect to desktop computers. USB cameras come in various resolutions, ranging from standard definition (SD) to high definition (HD) and even 4K resolution. Higher resolutions offer better image quality but may require more bandwidth and processing . Frame rate refers to the number of frames per second (fps) that the camera can capture. Higher frame rates result in smoother motion. Common frame rates for USB cameras range from 30 fps to 60 fps. Many USB cameras come with built-in microphones for audio capture, autofocus capabilities for sharp images, and automatic low-light correction for better performance in dimly lit environments. Some advanced models also offer features like pan, tilt, and zoom.USB cameras are typically plug-and-play devices, meaning they can be easily connected to a computer without the need for additional drivers or software installation. They are compatible with various operating systems, including Windows, macOS, and Linux. USB cameras have a wide range of applications beyond video conferencing, including home security monitoring, telemedicine, education, and content creation for platforms like YouTube and Twitch.The price of USB cameras varies depending on factors such as resolution, frame rate, and additional features. Entry-level models can be quite affordable, while professional-grade cameras with advanced features can be more expensive. Since USB cameras are connected to computers, there are privacy concerns related to unauthorized access to the camera feed. It's essential to use security measures like covering the camera lens when not in use and ensuring that software and firmware are up to date to protect against potential vulnerabilities.

Figure 12: camera

E. Buzzer

A buzzer is an electrical component that generates sound when an electrical current passes through it. It typically consists of a coil of wire and a magnet, which creates a vibrating motion to produce sound. There are different types of buzzers, including electromagnetic buzzers, piezoelectric buzzers, and mechanical buzzers. Each type has its own mechanism for generating sound and characteristics. Electromagnetic buzzers use an electromagnet to produce sound. When an electrical current flows through the coil, it creates a magnetic field that attracts a metal diaphragm, causing it to vibrate and produce sound.Buzzers are used in various applications where an audible alert or notification is required. Common applications include alarms, timers, doorbells, electronic games, and industrial equipment.Buzzers have specific operating voltage and frequency requirements. It's essential to choose a buzzer that matches the voltage and frequency of the electrical system it will be connected to.Buzzers come in different sound output levels, measured in decibels (dB). The sound output of a buzzer depends on factors such as its design, operating voltage, and construction material. Buzzers require a drive circuit to provide the necessary electrical current for sound generation. The drive circuit can be a simple direct current (DC) power source or a more complex circuit with additional features like tone generation and volume control. Some buzzers offer customization options such as different tones, frequencies, and mounting configurations to suit specific application requirements.

Figure 13 : buzzer

VII. RESULT AND DISCUSSION

The Third Eye A wearable smart glass that uses artificial intelligence and deep learning technologies for those who are blind or visually impaired The "Third Eye" smart wearable's performance data are probably displayed by the system. Accuracy, reaction time, and other pertinent metrics may be examples of this. Specifics regarding the deep learning model's ability to identify and comprehend visual data. Metrics such as precision, recall, and F1 score may be discussed. User Interface Testing It would be vital to hear from visually challenged people who evaluated the wearable. This could involve general happiness, comfort, and usability. comprehensive technical details about the wearable device, including the hardware parts, sensors that are used, and any software algorithms that are used. The limitations of the suggested system and any difficulties encountered during development may be acknowledged in the study. For example, restrictions in particular settings or situations. recommendations for upcoming improvements or changes to address the noted drawbacks and difficulties. Talk about how workable and realistic the method is in actual situations. Take care of any possible problems that might occur during actual use. If appropriate, the study may address privacy, security, and social implications when discussing ethical issues surrounding the application of AI to help the blind.

VIII. CONCLUSION AND FUTUREWORK

Every publication provides a method for aiding the blind in various ways. Primarily facial recognition, object detection, and indoor object detection. One paper presents an instructional tool. The process of turning text to speech is mostly carried out in all publications. To forecast the item, however, various ML models or training models are employed. At that point, the accuracy range is flexible. It was not possible to use both object detection and facial recognition techniques in all of the publications. This work proposes the usage of mobile net as a deep learning model, as well as implementation in a single system. Hence in the end, the highly accurate result was projected.

One of the first innovative steps toward improving the lives of those with visual impairments is the "Third Eye" smart wearable glasses. Nonetheless, there exist ample opportunities for prospective investigation and advancement to enhance its usefulness, accessibility, and user experience even further. Create artificial intelligence (AI) models that can comprehend context more fully and offer more precise support in challenging situations, such congested streets or strange interiors. Incorporate more sophisticated natural language processing (NLP) techniques to create more conversational and interactive interfaces that let users ask questions and get in-depth answers about their environment. Use on-device learning algorithms to enhance tailored assistance by adapting to the user's preferences and commonly encountered environments. Next Improved Hardware Features Investigate the use of different sensor types (such as LiDAR and infrared) to improve spatial awareness and obstacle identification. To make the device more pleasant to wear for extended periods of time, hardware components should continue to be smaller and lighter. To increase the device's operating time between charges, look into new battery technology and power management strategies. Accessibility and User Experience Improve the user interface by adding more sophisticated haptic and audio feedback choices that are specific to the various kinds of information and alerts. Provide more user-customizable interface settings so that consumers can change the kind and volume of information they get to suit their requirements and preferences. To make sure the gadget satisfies a wide range of needs and preferences, do comprehensive usability testing with a diverse set of visually impaired users. Including Integration with Additional Helping Technologies Assure smooth connectivity with other platforms and assistive devices, including public navigation aids, smart home systems, and smartphones. Improve the device's resilience to different weather conditions, such as severe rain, dust, and temperature swings. enhance the hardware to ensure long-term dependability by making it more resilient to unintentional drops and impacts. Look for ways to lower production costs without sacrificing quality so that more people can purchase the item. Create plans for large-scale implementation, such as collaborations with government initiatives, insurance providers, and healthcare providers, to encourage broad acceptance. By following these potential work options, the "Third Eye" project can continue to improve and better serve the requirements of visually impaired individuals, ultimately leading to more independence, safety, and quality of life.

REFERENCES

1. Joselin Villanueva, and René Farcy,,2012, optical device indicting a safe free path to blind people. student member IEE
2. K. Naveen Kumar, P. Surendranath & K.Shekar..2017 Assistive device for blind ,deaf &dumb people using Raspberry pi
3. G. Sampath kumar, N. Ramesh, Ventrapragada Teju..2017.Assistive technologies for blind people to describe indoor sensing by raspberry pi. International journal of scientific Engineering and Technology reaearch.
4. Nishajith.A, Nivedha J, Shilpa S Nair, 2018, Smart cap wearable visual Guidance system for blind. Proceeding of the international Conference on Inventive Research in computing Applications (ICIRCA 2018).
5. Saransh Sharma,Samyak Jain&Khushboo,. Static hand Gesture & face recognition system for blind people. 2019 6th International Conference on signal processing & integrated Network (SPIN).
6. Hawra AlSaid, Lina AlKhatib, Aqeela AlOraidh, Shoaa AlHaidar, Abul Bashar..2019. Deep learning Assisted smart Glasses as educational Aid for visually Challenged students.
7. Muiz Ahmed Khan, Pias Paul, Mahmudur Rashid.. An AI Based visual Aid with interated Reading Assistant for the completely blind.2020 IEEE Transactions on human machine system.
8. Nur Syazreen Ahmad, Ng Lai Boon..Multi sensor obstacle Detection system Via model based state feedback control in smart cane design for the visually challenged..28 october 2018published in IEEE Access.
9. Kartika Merdekawati Mulyono, Tri Budi Santoso., Design& Implementation of Real time object detection for blind using convolutional neural network...2022 International Electronics symposium (IES).
10. Rais Bastomi,Firza putra Ariatama.Object detection &distance estimation Tool for Blind people using Convolutional methods with stereovisin.2019 International Symposium on electronics &smart devices (ISESD) conference paper.
11. Sunit Vaidya , Naisha Shah.2020. Real time object detection for visually challenged people, 4th International conference on Intelligent computing &control system.
12. Pankhuri Santoshi, Blind Navigation support system using Raspberry pi& YOLO.,2023 2nd International conference on Applied Artificial intelligence&computing.