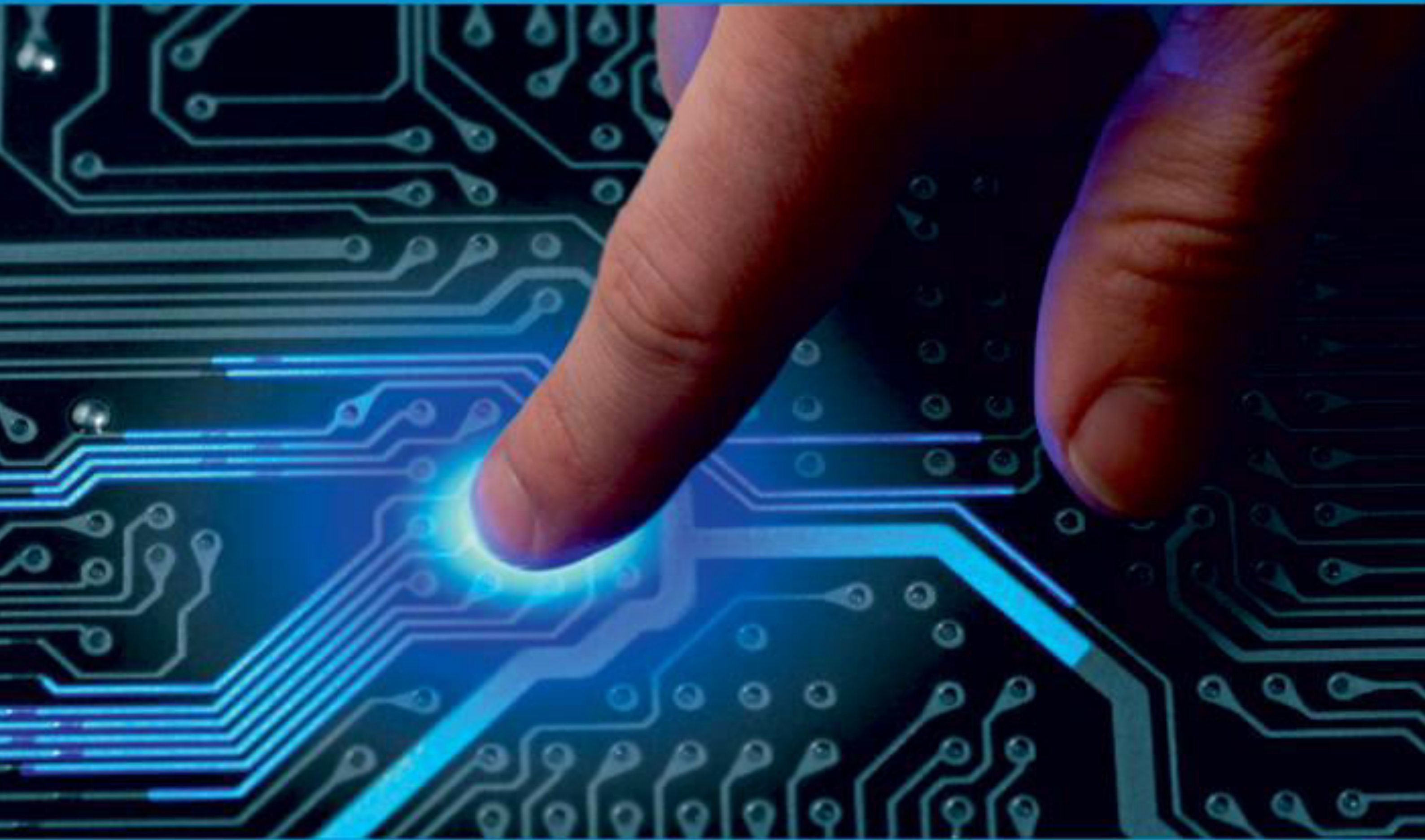
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 1, January 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

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

Heera B M, Anaswara shinil

PG Student, Dept. of Computer Science and Engineering., IES College of Engineering and Technology, Kerala Technological University, Chittilappilly, Thrissur, India

Assistant Professor, Dept. of Computer Science and Engineering., IES College of Engineering and Technology, Kerala Technological University, Chittilappilly, Thrissur, India

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-

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

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

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

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

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

III. IMPLEMENTATION ANALYSIS

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.

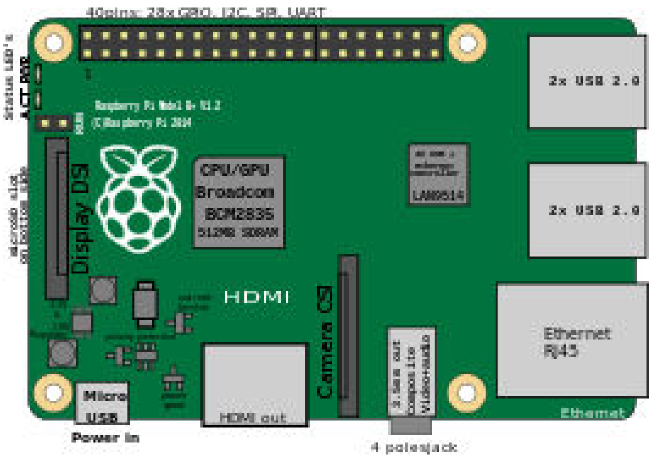


Figure 1: Raspberry pi

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.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

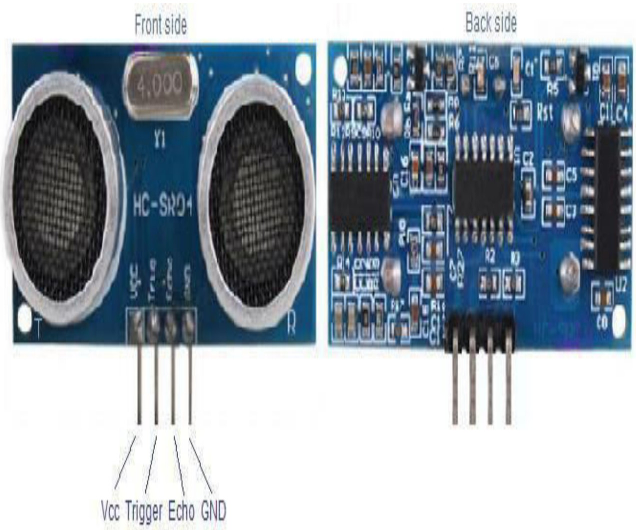


Figure 2: Ultra sonic sensor

C RFID Sensor

The RFID reader and RFID tag are the two primary components of an RFID sensor, also known as radio frequency identification. To transmit data to the RFID reader, the RFID tag is equipped with integrated circuits, digital data, and a small antenna. The typical range of signal frequencies is 140–148.5 kHz for low frequencies, 125–134 kHz for a low frequency, and 2.4–2.5 GHz for a high frequency.Using electromagnetic fields, the RFID reader's primary function is to read data from RFID tags. The radio waves are responsible for transforming the data from the tag to the reader. However, the RFID tag and the RFID reader must be within a range of three to three hundred feet in order for this operation to be successful. When an object is scanned, it can be promptly detected and recognized by the RFID. RFID is used in many different applications, including smart cards, passports, and household appliances. Our approach uses the RFID sensor to attach the RFID reader in the hallway and different classes so that the blind person can identify them

Figure 3: RFID Sensor

D. 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-

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

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 4: Head phone

E Light Emitting Diode

In this case, the traffic signal indication is provided by two LEDs that alternately switch on green and red after a slight delay. When an electric current flows through a light-emitting diode (LED), a semiconductor device, it creates visible light. Although it is not very bright, the light in most LEDs is monochromatic, meaning it only occurs at one wavelength. An LED may produce light in the following wavelength ranges: red (about 700 nanometers) to blue-violet (about 400 nanometers). An infrared-emitting diode (IRED) is a device that emits infrared (IR) light, which is 830 nanometers or longer.

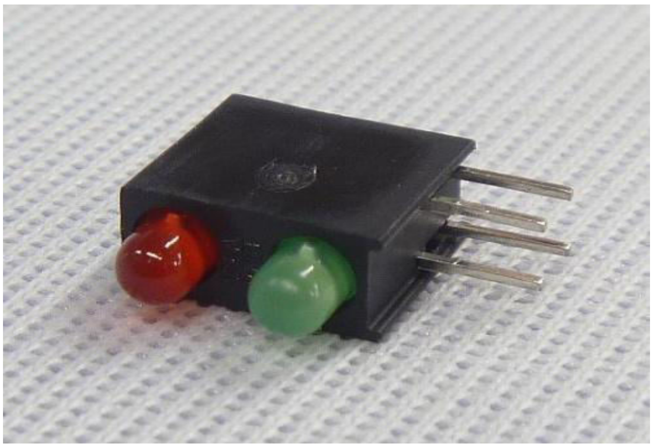


Figure 5: Light emitting diode

F. web cam

Web cameras, sometimes referred to as webcams, are tiny cameras that are usually integrated into laptops and other devices or installed on computer monitors.Real-time video capture and transmission is the main goal, enabling users to record and share videos for use in conferences, video chats, and other applications.The majority of webcams are made up of a microphone, an image sensor, and a lens.The image sensor transforms the visual data that the lens has captured into an electrical signal. Additionally, some webcams have microphones integrated in for recording audio.Webcams can be connected by USB, USB-C, or other interface types to PCs or other devices.Although many contemporary laptops come with built-in webcams, desktop computers and laptops without built-in cameras can still connect to

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

external webcams.The resolution of webcams varies and is commonly expressed in megapixels or pixels (e.g., 720p, 1080p).Video at a higher quality is sharper and more clear.

Figure 6: Web cam

IV. CONCLUSION

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.

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).

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 1, January 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1201029 |

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.

INNO SPACE

SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi crossref

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

Scan to save the contact details