A SURVEY ON SMART GLASS FOR BLIND

|  |  |  |
| --- | --- | --- |
|  |   |  |
| DR.SOMA PRATHIBHA Dept. of Information Technology Sri siaram engineering collegeChennai,India prathibha.it@sairam.edu.in  | M.THARANI Dept. of Information Technology Sri sairam engineering collegeChennai,India tharanimadhanagopal5@gmail | S.MOHITA Dept. of Information Technology Sri sai ram engineering collegeChennai,India mohitasenthilkumar@gmail.com  |

#  ***Abstract*—: Blindness and vision impairment make it difficult for sufferers to move around on their own and deal with problems in their daily life. Artificial intelligence and computer vision techniques help blind persons carry out their core tasks without being overly reliant on others as a solution. Potential assistive technology for BVI citizens includes smart glasses, which can improve social comfort and safety while assisting with independent travel. Practically speaking, the BVI cannot move by themselves, especially at night and in dimly lit areas. In this research, we demonstrate an object identification, facial expression recognition, and obstacle detection system for blind persons using a smart glass-like device that uses headphones as speakers to communicate object information.. Our study uses the SORDI dataset and a CNN model to detect items using computer vision. It uses a deep learning approach to recognise faces. EAST and EASYOCR models are used to recognise text. We employ an NLP data set for the detection of all regional languages. The glasses come with an ir camera that measures the necessary space between users and objects and plays a voice note as a warning. turning on the night vision feature. Using databases to count money. Audio receiver with Nvidia broadcast is used to analyse the slang of voice and explain human emotions to blind people.Also identifying and preserving the details of somebody they recently met using AI.**

***Keywords—Smartglass; IRcamera; NLP; Audio receiver; CNN; Artificial Intelligence***

**I.INTRODUCTION**

According to the Globe Health Organization (WHO), there are at least 2.2 billion visually impaired or blind persons in the world, and statistics from earlier years indicate that this number is growing. These figures have the greatest impact on the most vulnerable individuals, including the elderly, those with impairments, members of racial and ethnic minorities, members of indigenous groups, and those with low incomes.

|  |
| --- |
|   |

Since sight is the only sense that allows us to see and understand more of our environment than any other, the human eye is the organ that grants sight to humans. There are currently 285 million visually impaired people in the globe, of which 246 have restricted vision and 39 million are blind. A little more than 80% of visually impaired people must work in order to support themselves, with the remaining individuals being old or retired. Systems now have a thorough understanding of the subject of image and video processing thanks to computer vision. Individualswho are partially blind or partially sighted can use the Smart Glasses to recognise andcomprehend theoffice equipment around them. In order to walk safely, blind persons frequently utilise a cane or a dog with extensive training. The current blind cane has the drawback that it cannot adapt fast to any altering circumstance. The cost of managing guiding dogs are expensive. In this study, we suggest smart glasses with an IR camera and deep learning to get over these drawbacks**.**

**1.1.ARTIFICIAL INTELLIGENCE**

The idea of building intelligent machines is known as artificial intelligence. A subset of artificial intelligence called machine learning facilitates the development of AI-driven applications. Deep Learning is a branch of machine learning that trains a model using enormous amounts of data and sophisticated algorithms. Artificial intelligence is the ability of machines, particularly computer systems, to mimic human intellectual functions. Examples of particular AI applications include expert systems, machine learning, natural language processing, speech recognition, and machine vision..Large volumes of labelled training data are ingested by AI systems, which then examine the data for correlations and patterns before employing these patterns to forecast future states.

**1.2. PROBLEM STATEMENT**

People who are blind or visually impaired confront various difficulties in daily life, including obstacles related to low vision that prevent them from fully integrating into society. They are dealing with issues like For a blind person, especially one who has completely lost their eyesight, getting around is the hardest obstacle. We are introducing the smart glass device for the blind to handle these types of situations in order to overcome such challenges.

## **II.A SURVEY ON SMART GLASS FOR BLIND**

In this section,a comprehensive literature survey on the existing research works in this field are presented

**The primary goals of the Smart Glasses assistant are to promote a significant problem in computer vision, such as the routine recognition of objects from the habit of enclosing items by blind people. The blind person's jacket-mounted camera is a large-scale object recognition and segmentation system. A collection of objects gathered from common scenarios is built in order to apply the required recognition. Locating objects in commonplace scenes is done with the use of object recognition. The camera can read out text to the blind and recognise faces. The system also has face recognition capabilities, allowing it to identify adjacent faces of persons with whom it has previously been taught. The text in printed papers can be recognised by the system and read out to the user.** **To help the blind avoid impediments, the system will read out an object's distance.**

1. A smart glass system for venture capitalists that uses computer vision and deep learning for text recognition, salient object extraction, and object detection. This fully autonomous system is powered by a server with artificial intelligence. It assists BVI in a nighttime environment by identifying and detecting objects in photos of low light and dark scenes. Deep learning models were used to expand the capabilities of the original smart glass system, and text recognition for text-to-speech was also added.

|  |  |  |
| --- | --- | --- |
| s.no | Findings  | Drawbacks |
| 1 | improving the contrast of photos when there is little light |  More than 10 items are found using the object detection model. |
| 2 | Accessing text recognition | No reginal text recognition  |

1. The most effective and well-suited guiding instructions include a beeping sound, which aids users in moving more swiftly and safely. The computation is quick enough to allow for obstacle detection and presentation. The proposed smart guiding glasses can improve the travelling experience for those who are blind or visually challenged, according to experimental results of the proposed prototype. It is extensively useable in the consumer market thanks to the use of simple and inexpensive sensors.

|  |  |  |
| --- | --- | --- |
| s.no |  Findings  |  Drawbacks |
| 1 | For Obstacle detection . | This model has a lot of parts and can't support so much weight |

1. Beeping sounds are among the most useful and appropriate guiding instructions because they help users move more quickly and safely. The computation is quick enough to support the presentation and detection of obstacles. According on testing findings of the proposed prototype, the suggested smart guiding glasses can enhance the travelling experience for those who are blind or visually impaired. Because it uses basic and affordable sensors, it may be used widely in the consumer market.

|  |  |  |
| --- | --- | --- |
| S.no  |  Findings  |  Drawbacks |
| 1 | Object detection, Face recognition, | Different languages text detection is not available. |
| 2 | Text detection  and Obstacle detection. | Datasets used for object detection is less |

1. The success rate of evaluating the CNN approach in real-time utilising raspberry while identifying objects in this system is 93.87%. The distance between the objects is measured with an ultrasonic sensor. To achieve a more compiling outcome, the dataset must be improved and the CNN model retrained. Several aspects can be detected and improved in future study, including the advancement of object detection.

|  |  |  |
| --- | --- | --- |
|  S.no  |  Findings  |  Drawbacks |
| 1 | smart glasses that are capable of detecting nearby things. | This model has a lot of parts so the model is heavy |
| 2 | The device can distinguish between inanimate and live items. | raspberry pi 4 camera not very accurate |

1. The design uses object, face, and text recognition to provide VC users with a visual. An eyeglass with a built-in camera, headphones, and a microphone are included in the smart kit. The database of the system contains written descriptions for each image, which when spoken convert to audio streams.

|  |  |  |
| --- | --- | --- |
| S.no |  Findings |  Drawbacks |
| 1 | Converting text to speech through earphone | face recognition ,it cannot store the person detail  |
| 2 | Human face recognition | Machine takes lot of time to train more dataset. |

1. The blind individuals must rely solely on lead sticks to guide them because they are unable to accurately identify the difficulties they meet. The user would have a lot more thorough understanding of the process thanks to the smart glass's processor, which is equipped to process the photos that are collected and detect things to educate the user about the outcomes of the image. Additionally, it can reveal what the challenge is. This smart glass can detect how close an obstruction is and provide a warning to let the user know. This application was created to give the user such a speech-based interface.

|  |  |  |
| --- | --- | --- |
| s.no |  Findings  |  Drawbacks |
| 1 | It provides deatails regarding what the obstacle is | Utilizing a phone application for the blind is incredibly time-consuming |
| 2 | It also detect the distance between the object and give warning | No text recognition |

1. The system suggests smart eyewear with stereo cameras and deep learning. A stereo camera measures the space between the user and the obstruction and then notifies them via sound and vibration. To identify the sort of obstacle facing the user, we employ YOLO, one of the deep learning algorithms. The results of the experiments show that the suggested smart glasses outperform the current blind guide system.

|  |  |  |
| --- | --- | --- |
| S.no | Findings  | Drawbacks |
| 1 | Stereo camera tells which type of obstacle by location | It contains less datas compared to SORDI dataset. |

[8] This gadget consists of a pair of glasses with an obstacle detection module in the middle, a processing unit, an output device (a buzzer component), and a power source. The processing unit is linked to the obstacle detecting module and the output device. The power supply provides electricity to the central processor unit. The obstacle detection module comprises primarily of an ultrasonic sensor, the processing unit of a control module, and the output unit of a buzzer. The control unit activates the ultrasonic sensors, which collect information about the barrier in front of the man and process it before sending the result via the buzzer.

|  |  |  |
| --- | --- | --- |
|  S.no  |  Findings  |  Drawbacks |
| 1 |  Light weight and portable device. | no algorithm is used, |
| 2 | Easy to use, user friendly. |  no dataset is used to train |
| 3 |  Cheap in price. | Low accuracy |

[9] The primary goal of this project is to create a prototype that detects items and provides feedback in the form of spoken messages and vibrating stimuli to lead the hands towards a target item. An intriguing innovation might improve the blind's competency.

|  |  |  |
| --- | --- | --- |
| S.no  | Findings | Drawbacks |
| 1 | App development for speech recognition | Inability handle anything other than currency |
| 2 | It can identify money and also night vision feature available | object detection is not done correctly. |

 **III.IMPLEMENTATION**

Our developed system is a concept that when an object or barrier is detected in front of blind person, an immediate alert signal is sent through voice note. Human or friend recognition using a small camera that, when a person passes in front of it, recognises them and provides a spoken message with their saved name. Turning on the night vision feature Using Look tell money reader databases to count money. Text-to-speech conversion not only in english but also in our local language Identifying and preserving the details of someone they recently met. Taking a photograph with the built-in camera by double tapping the sensor area, and then explaining the image to the user what was captured. Accordingly, traffic signs and signals are seen and explained to them. The audio receiver receives audio and uses nvia broadcast to identify undesired noises. It then concentrates exclusively on the primary speaker and separates the voices based on slang, which allows it to provide information about friends, strangers, or undesirable persons.

Blind person wearing smart glass with ir camera

Face recognization using cnn bells model

Recognize text using nlp

Obstacle detection using sordi dataset

###

Voice note arise equipped with bluetooth

#  ***Fig(a): flowchart***

**3.1.METHODOLOGY**

For the development of the project,we are using a

artificial intelligence using deep learning.

**CNN algorithm :**

 Using a convolutional neural network , it is works by obtaining a picture, assigning it a weight based on the numerous components in the image, and then separating them from one another. In compared to other deep learning algorithms, CNN requires very minimal data pre-processing.Convolutional Neural Networks, also known as CNNs, are a subclass of deep learning artificial neural networks that are often used for object and image identification and categorization.

**IR camera :**

 IR cameras on laptops are often used to detect the facial features of a person. These cameras work in tandem with a regular webcam to detect the user’s face in photos

**3.2.DATASETS:**

**NLP-**Natural language processing is the discipline of computer science—specifically, the branch of artificial intelligence or AI—that is concerned with providing computers the capacity to interpret text and spoken words in much the same manner as humans do.(containing all regional languages)

**SORDI-** A synthesised data collection including 80 object classes and over 800,000 photorealistic photos and associated modalities is known as a synthetic object regognition data set. SORDI.ai is intended for broad image processing applications such as classification, object identification, and segmentation.

**EAST AND EASYOCR**-It contains datasets to

recognize a text

**IV.CONCLUSION**

This study describes a smart eyewear system for BVI people that uses computer vision and deep learning for text recognition, object identification, and salient object extraction. The suggested system utilises an AI server and is entirely automatic. It aids blind people in a nighttime environment by identifying items from low-light and darkscene photos. Deep learning models were used to expand the capabilities of the existing smart glass system, and Text recognition and prominent object extraction for haptic graphics were incorporated.

**V.REFERRENCE**

[1] Steinmetz, J.D.; Bourne, R.R.; Briant, P.S.; Flaxman, S.R.; Taylor, H.R.; Jonas, J.B.; Abdoli, A.A.; Abrha, W.A.; Abualhasan, A.; Abu-Gharbieh, E.G.; et al. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: The Right to Sight: An analysis for the Global Burden of Disease Study. Lancet Glob. Health 2021, 9, e144–e160.

[2] Dunai Dunai, L.; Chillarón Pérez, M.; Peris-Fajarnés, G.; Lengua Lengua, I. Euro banknote recognition system for blind

people. Sensors 2017, 17, 1

 [3] J.; Ahn, J.; Lee, K.Y. Development of a raspberry Pibased banknote recognition system for the visually impaired. J. Soc. E-Bus. Stud. 2018, 23, 21–31

[4] Patrycja, B.-A.; Osin´ski, D.; Wierzchon´, M.; Konieczny, J. Visual Echolocation Concept for the Colorophone Sensory Substitution Device Using Virtual Reality. Sensors 2021.

[5] W.C.S. Simoes, V.F.de Lucena “Blind user wearable audio assistance for indoor navigation based on visual markers and ultrasonic obstacle detection”, Consumer Electronics(ICCE),2016 IEEE International Conference,2016.

[6] Md Sheikh Sadi, Saifudin Mahmud, Md Mostafa Kamal, Abu

Ibne Bayazid “Automated walk-in assistant for blinds”, Electrical Engineering and Information and Communication Technology(ICEEICT), International Conference,2014.

[7] Dariush Forouher, Marvin Grobe Besselmann,”Sensor Fusion Of Depth camera and ultrasound data for obstacle detection and robot navigation”, Control,Automation,Robotics and vision, 2016 14th Internatonal Conference,2016.

[8] T.O.Hoydal,J.A.Zelano,”An alternative mobility aid for the blind :the ultrasonic cane”, Bioengineering Conference Proceedings of the IEEE Seventeenth Annual NorthEast,1991.

[9] Chinese Author “An intelligent auxiliary system blind glasses”, CN106937909A,11th July,2017.

[10] Humberto Orozco Cervantes “Intelligent glasses for he visually impaired”, US20150227778A1,13th Aug,2015.

[11 Hsieh Chishenng “Electronic talking stick for blind”, US5097856A,24th March,1992.