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Smart Computer Vision System for Vision Loss Person

Associate Prof. D. Baskaran, S. Aravind, S. V. Naveen Kumar, P. Sneka, S. Syndhiya
Department of Electronics and Communication Engineering,
Nandha College of Technology,
Perundurai – 638052, Tamilnadu, India

Abstract- With the help of the image processing technique we designed an intelligent assistive system for the visually impaired. Project vision is to focus on the field of medical science, which paves a way to the next level of medical technology. It is a blind assistive device, the Gadget is engaged with microcontroller, camera module, speaker and spectacles. This device is way easier to handle. Therefore, it can be used by all kind of people. The device works by detecting the known person's recognition, texts to speech, obstacles detections and distance measurement with signal identification. This helps to rectify the visual problem of blind people. This paper discusses about the design of such a system and the challenges involved in designing the device. The gadget works by distinguishing the known people acknowledgment, writings to discourse, impediments recognitions and distance estimation with signal ID. This assists with correcting the visual issue of visually impaired individuals. It helps in increment of fearlessness inside the visually impaired. This framework depends on raspberry pi, a solitary board process model and Tensor Flow light system. The calculation created is tried for recognizing objects like a table, a seat, a TV, a PC, a mouse, a phone, a jug and so forth .This framework is fit for distinguishing individuals just as items. The testing is done in shifting light, foundation, and distance in inside just as open air situations. This framework utilizes Google based example quantized SSDLite-MobileNet-v2 object identification model, which is prepared of the MSCOCO dataset and changed over to run on open CV. We propose a camera based visual help system for text pursuing, movement of articles and the sensations of people and so on It changes over into a voice yield to help daze people groups. Hence, we propose this frame work from a solitary camera-caught picture just as more number of casings and feature some example applications being worked on and possible thoughts for future turn of events.

Keywords:- Raspberry pi, object detection, face detection, text recognition, visual assistance, assistive system.

I. INTRODUCTION

Among 36 million people around the world who are visually impaired, about 15.0 million are found in India. India is the world's largest blind populated nation. India requires 2-2.5 lakh pair of eyes every year, it has 109 eye banks that manages to collect a round 25,000 pair of eyes out of which 30% can't be utilized. Many people cannot afford such eyes treatments. To be categorized as blind, there is a complete loss of vision. Blindness cannot be treated by simple visual aids. Whether due to congenital inheritance, acquired diseases, accidental injuries or other reasons, visual impairment causes a certain

level of inconvenience to these lives. It is very difficult for visually impaired people to walk independently in strange and complex areas.

In particular aerial obstacles such as awnings, tree branches and similar objects, typically have no projection on the ground or floor. When a visually impaired person walks alone and falls, he may feel less confident and helpless when walking alone, potentially resulting in serious injury.

There is a need of smart solution using the image processing technique. Even though most of the research labs and a few startups have come up with advanced devices to assist the visually impaired people but only a handful are affordable to most of the people due to higher prices and lower availability widely.

Thus, to address the problem, this paper provides a cost effective solution to help the visually impaired people in face recognition, object recognition and in reading out texts easily with full depth analysis of the textual content.

II. THE PROPOSED SYSTEM

The proposed system comprises of three main methods in which we can guide the blind people to survive in the real world. Object Recognition: Object Recognition is an important process which will aid visually impaired persons to locate their frequently used day to day objects and measure the distance.

Work process for execution of item identified model is clarified in Fig. 3 first raspberry pi is refreshed. Subsequent stage is to introduce conditions for pi camera, at that point it is expected to establish climate.

A climate is made to evade adaptation intricacies and to disengage bundle establishment from the framework. In that climate introduce Tensor Flow and open CV. The following stage is to set Tensor Flow model with dataset and last yet significant advance is test results. Picture catching is finished with the assistance of Web camera or pi cam.

The model takes input picture. It is required to have picture with 300x300 pixels and there are 3 channels for each pixel (Red, Green, and Blue). An object discovery model can recognize which of a known arrangement of articles may be available and give data about their situations inside the picture. The distinguished item model has smoothed support of 270,000 byte esteems (300x300x3) and model is quantized addressing an incentive between 0 to 255.

Open CV library is utilized for constant PC vision created by Intel, incorporates measurable AI library which contains SVM (support vector machine), DNN (Deep neural organization), K-NN, innocent neural organization and so on utilized for some, ongoing applications like feeling acknowledgment, face acknowledgment, object location, portable mechanical technology, movement following and so on allude area 1 for Tensor Flow subtleties.

Text-to-Speech: This module comprises of image and speech processing. The real image of any text constraints area and to convert this image into text, followed by providing audio output using speech processing. Here they proposed a camera-based assistive system to assist dazzle people with perusing text marks from chamber objects in their everyday life.

To begin with, the article is identified from the foundation or other encompassing items in the camera see by shaking the item. At that point we propose a mosaic model to open up the content name on the chamber object surface and remake the entire mark for perceiving text data. This model can deal with chamber objects in any directions and scales.

The content data is then removed from the opened up and flatted marks. The perceived content codes are then yield to dazzle clients in discourse. Trial results show the productivity and viability of the proposed system from various chamber objects with complex foundations. Here they proposed a camera-based assistive system to assist dazzle people with perusing text names from chamber objects in their day by day life.

In the first place, the article is identified from the foundation or other encompassing items in the camera see by shaking the article. At that point they proposed a mosaic model to unwarp the content mark on the chamber object surface and recreate the entire name for perceiving text data. This model can deal with chamber objects in any directions and scales. The content data is then removed from the

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unwrapped and flatted names. The perceived content codes are then yield to dazzle clients in discourse. Trial results show the proficiency and adequacy of the proposed structure from various chamber objects with 3rcomplex foundations. Face recognition: Some face recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face to determine the known persons.

The Face and Interaction Models address the models utilized for facial and social cooperation recognition, separately. Practically speaking, each are prepared once, before framework use, and seldom refreshed. The Acquaintance Model, in its present structure, is essentially a face acknowledgment model, and is refreshed oftentimes. While associates are perceived progressively per the green work process, the current work performs Interaction Detection, and the resulting client naming of sound subsamples for the normal refreshing of the Acquaintance Model.

We set out to plan a wearable FR gadget that can learn and help with a (possibly visually impaired) wearer's social co-operations. Its expected utility is to subtly advise the wearer about the presence regarding close by associates.

Every situation necessitates that the gadget have the option to precisely recognize associates from non-colleagues. The gadget can convey data to the wearer in an ideal and private way as a complete name. Warning of complete names is cultivated by communicating a sound message over headphone. Recognizable proof of colleagues is taken care of by face identification and acknowledgment. The first API (application convention interface) gave in IRU gadget permits us to catch pictures.

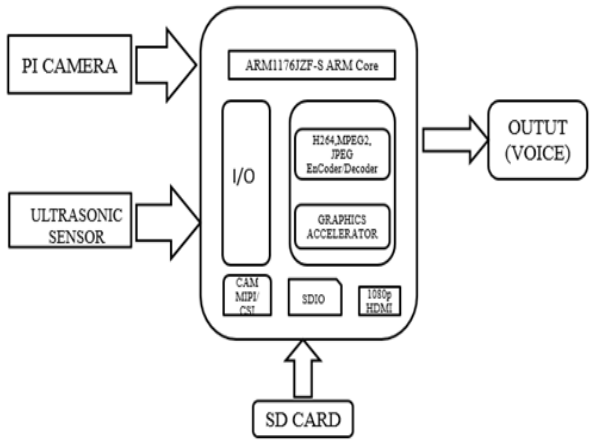

Fig 1. Block diagram of smart assistive system.

Initially, Open CV face indicator is applied to discover faces in the approaching pictures. It is vigorous in discovering frontal appearances, as it is prepared with an immense number of preparing tests. The Open CV indicator can distinguish the faces (frontal faces) in the stances of taking a gander at the camera. Face identifier which is prepared by Haar Cascade Classifier are applied to discover faces in the info picture outline.

Smart assistive system design depends mainly on the processing unit, which is the raspberry pi.A raspberry pi camera was used for image acquisition. It was connected to the raspberry pi using aflex cable and was fixed on the top middle of the glasses for optimal image capturing. The raspberry pi has an audio port which connects to an earpiece.

The raspberry pi GPIO port was configured to receive input from push button switch. To identify the text easier the reading material is placed within custom designed frame with red borders. The general principle of operation for such glasses is by giving instructions via switches and listening to the output through an earpiece. Similarly in this case, the user starts the task mode by a push of the button.

1. Raspberry Pi:

It is a series of small single board computers developed in the United Kingdom by the Raspberry Pi Foundation in association with Broadcom. It is a credit card sized computer that plugs into a computer monitor or a television and uses a standard keyboard and mouse.

The Image processing is basically a set of functions that is used upon an image format to deduce some information from it. The input is an image while the output can be an image or set of parameters obtained from the image.

Raspbian is the recommended operating system for normal use on a Raspberry Pi. Raspbian is a free operating system based on Debian, optimized for the Raspberry Pi hardware.

2. Web Cam:

It is a portable light weight camera that supports Rasperry Pi.It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

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3. Ear Phone:

The ear phone plays a major role in delivering the audio commands to the blind person via commands from the visuals obtained by web cam by the controller.

4. Ultrasonic Sensor:

This sensor senses the obstacles within few meters of range. There is a pair of eyes, Transmitter and Receiver. Transmitter transmits pulse signals with velocity v and Receiver receives the transmitted signals after time t (this is called Time of Flight).So, the distance will be (v*t)/2.

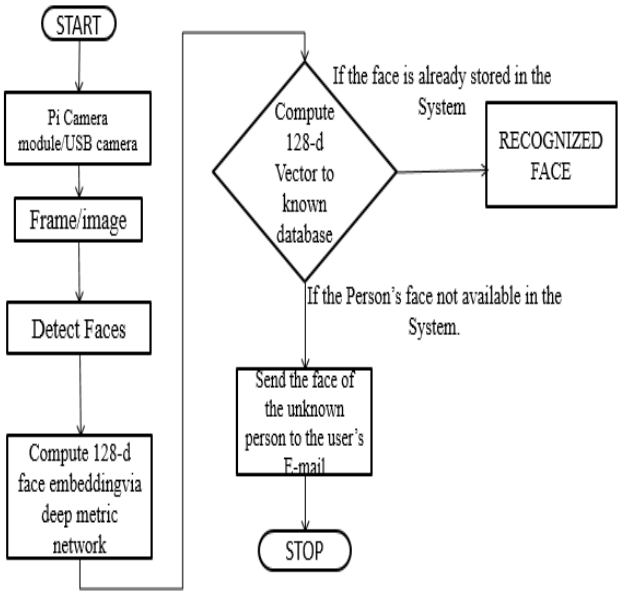

Fig 2. The flow diagram for the smart assistive vision system for the visionloss person.

III. PROTOTYPE DEMONSTRATION AND EXPERIMENTS

Fig 3. Raspberry pie powered hardware.

This project helps in identifying the obstacles along with distance, so that the visually impaired can analyse the distance and can perform his action. The audio commands helps them in recognizing an object and in recognizing the person standing in front of them. And with the help of the translation tools he can convert the text to the desired language and then again by using the Google speech recognition tool he/she can convert that changed text into voice. By that they can be independent. And it is less cost compared to other implementations.

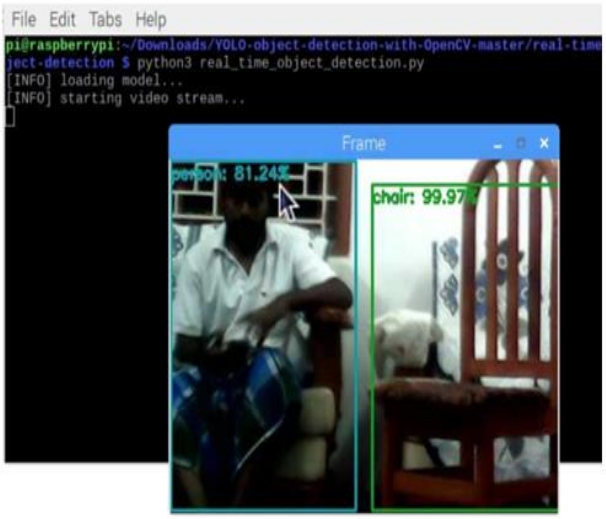

Fig 4. Streaming the image captured by the webcam in the monitor.

The first step is to load up a video scene containing objects; then we have the feature extraction. The features we find are described in a way which makes them invariant to size changes, rotation and position. These are quite powerful features and are used in a variety of tasks.

In the step of matching, the basic matcher finds many matches, many of which are clearly incorrect. We will be following the available standard trained data to identify the object which is detected as the training will require more amount of data that has to be trained. The proposed framework is uncommonly intended to manage the visually impaired individuals by giving data about fitting or deterrent freeway.

The intelligent design of our framework. This can be separated into three primary parts: the client control, sensor control and the yield to the client. An ultrasonic sensor is the principle segment utilized for obstruction discovery. It comprises of a transmitter and a beneficiary in tube shaped design put corresponding to each other. The ultrasonic sensor will filter the total zone in the scope of the ultrasonic

shaft. Any hindrance that lies in the examining scope of the shaft will be reflected and picked back by the collector unit in the sensor.

The distance assurance relies upon the body that has caused the bar reflection. The microcontroller controls the imparting and gathering of the signs to different parts. The mp3 module plays the necessary distance cut into the earphones. It utilizes a SD card as memory for putting away the recorded clasps. It utilizes ultrasonic sensors, a memory chip, a microcontroller and earphones. The model is intended to detect an impediment inside 1.8m.

IV. CONCLUSION AND FUTURE WORK

Due to the increased use of digital technology, availability of economical image capturing devices there is a need for advanced solution to aid the visually impaired people which led to the research of recognizing text in images and in recognizing the face and objects.

Detecting text from an image is more difficult when compared to detecting text from printed documents. Lots of research has been done on detecting text to overcome certain challenges like perspective distortion, aspect ratio, font size, etc. Speed, complexity, cost and accuracy are important parameters must be taken into consideration while designing such systems.

The smart assistive system is one of the emerging technologies that can be used to aid visually impaired people for navigation (both indoor and outdoor), accessing printed material, in recognizing the person's face and in object recognition and it can be incorporated with hardware to develop Electronic travel aid for visually impaired people in future.

In future there is a scope for it can also extend for the long distance capturing, and it can also implement for vertical reading of the image. The device will change the life of blind people to live a better life than before.

REFERENCES

[1] Yelamarthi, K., Haas, D., Nielsen, D., & Mothersell, S. (2010, August). RFID and GPS integrated navigation system for the visually impaired. In Circuits and Systems (MWSCAS), 2010 53rd IEEE International Midwest Symposium on (pp. 1149-1152). IEEE.

[2] Zubaľ, M., Lojka, T., &Zolotová, I. (2016, January). IoT gateway and industrial safety with computer vision. In Applied Machine Intelligence and Informatics (SAMI), 2016 IEEE 14th International Symposium on (pp.183-186). IEEE.

[3] Walsh, R., & Hornsby, A. (2011, January). Towards off-the-shelf computer vision for user interaction in consumer homes. In Consumer Electronics (ICCE), 2011 IEEE International Conference on (pp. 121-122). IEEE.

[4] Mekhalfi, M. L., Melgani, F., Bazi, Y., & Alajlan, N. (2015). A compressive sensing approach to describe indoor scenes for blind people. IEEE Transactions on Circuits and Systems for Video Technology, 25(7), 1246-1257.

[5] Hub, A., Diepstraten, J., & Ertl, T. (2004, October). Design and development of an indoor navigation and object identification system for the blind. In ACM Sigaccess Accessibility and Computing (No. 77-78, pp.147-152). ACM.

[6] Eyes of things (IEEE 2017) by Noelia Vallez,THALES Communications & Security, 4 Avenue des Louvresses, 92230 Gennevilliers, France.

[7] Camera based analysis of text and documents by Jian Liang, David Doermann. In Proceedings of the IEEE International Conference on Robotics and Automation, 2004.

[8] Context-based Indoor Object Detection as an Aid to Blind Persons Accessing Unfamiliar Environments by Xiaodong Yang, Yingli Tian from The city of newyork, USA. IEEE Trans PAMI 24(9):1167–1183.

[9] Reading labels of cylinder objects for blind persons by Ze Ye, Chucai Yi and Yingli Tian. Dept. of Electrical Engineering, The City College of New York,The City University of New York, USA. e-mail: zye01@ccny.cuny.edu.

[10] Blind people guidance system by Ljupko-simunovic, VelimirAndelic, Ivan Pavlinusic at Central European conference on information and intelligent system.

[11] Auditory Feedback and Sensory Substitution DuringTeleoperated Navigation by Rong Liu, Member, IEEE, and Yong-Xuan Wang.