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NAVIGATION BY IMAGE ACQUISITION (ARTI-EYE)

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Abstract:

The day-to-day activities are getting simplified for the people who are leading their normal life. But, it is very different for the other community of people with blindness and other sight related disabilities. The Blind people navigate through many manual ways which may sometimes lead to wrong path. Keeping this as a concern, we have come up with a solution which can help them to navigate even through crowded area through image acquisition through vision camera and GPS. This enables the person to reach the destination without any problems. The circuit will be designed such a way that the battery can last long and there will be charge remainder so that the person will not miss anything to watch. This paper explains the working of our project work.

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I. INTRODUCTION

As per the World Health Organization (WHO), The estimated number of people visually impaired in the world is **285 million**, **39 million** blind and **246 million** having low vision;**65%** of people are visually impaired and **82%** of all blind people are 50 years and older. Our system **aRTI-EYE** will be a better option for the sight related problems.This system is very much better than the other modes of navigation such as **OrCAM** and other manual way finding techniques. The system basically consists of a vision camera, a GPS, a Microphone, Bone Conduction Speaker, a Battery backup unit. This processes the frame by frame images taken by the camera and gives the person a clear view of the

surroundings by the bone conduction speaker. The person can also use the microphone to search for the places and navigate to that place using the GPS. This system can be implemented in low cost that even a middle class people can afford.

II. PROBLEM STATEMENT

The Blind people cannot recognize what they are approaching and they cannot travel through the crowded areas without the help of a guardian. Most of the people stay at home because of this serious problem. This requires a technology based solution which might break this barrier and help them travel and navigate wherever they need. For this, we have come up with a GPS enabled Image acquisition system.

III. OBJECTIVES

1. To make the camera take the images of surroundings and feed the images to the processing unit.
2. To make the unit to recognize the image and send the data to the output devices.
3. Using **GPS** find the route to the preferred location and make a readable text about the path.
4. Informing the person about the overcoming obstacles using bone-conduction speakers.

IV. VISION CAMERA

Vision cameras are used to capture image data from the surrounding object or location for a number ofimage examining applications such as machine vision or industrial manufacturing surveillance. Cameras are imaging components that interface with image capturing lenses. The Cameras features sensors designed to image focused light. Cameras are offered in many different sensor formats, as well as Charge Coupled Device (**CCD**) or Complementary-Mosfet (**CMOS**) sensor types suitable for nearly any camera imaging application.

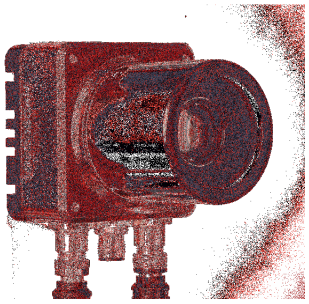

Fig.1Machine vision camera

Fig 1 shows the image of Machine Vision Camera. Machine vision cameras use images captured by the camera to determine the presence, orientation, and accuracy of the objects. This camera sensor differs from the system in other cameras in that the camera, controller, and light are contained in a single part, which makes the unit's construction and simple operation. There are differences between these camera sensor and other general-purpose camera sensors. For example, multi-point inspections of the single target can be done with a single sensor. In addition, thanks to the wide field of area view, detection of the target object is possible even when the position is varying. There are two types of application based cameras available in the market.

1. Monochrome model
2. Colour model

Monochrome model:

The image captured by the sensor head piece (camera lens) passes through the lens part and the image is converted into an electrical signal by the light receiving element (which is CMOS in the majority of cases). Then, the brightness and shape of the target object is determined according to the brightness and intensity information from each pixel of the light receiving element in the camera. Fig 2 shows the working of a monochrome model.

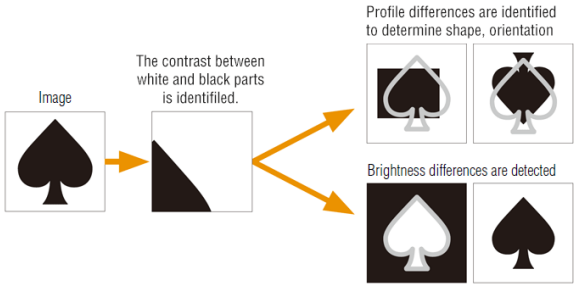

Fig.2.Working of monochrome model

Colour model:

The light receiving element is a colour type in this sensor. Unlike the monochrome type sensor, which identifies the intensity range between the extremes of black and white, then the received light information is separated into three basic colours RED, GREEN, BLUE (RGB). After this, the intensity range of each of these colours is identified by the sensor, which makes it possible to distinguish between target objects even if their colours have minimum colour intensity differences. This camera has major advantages than the other conventional cameras available in the market. Fig 3 shows the working of the colour model.

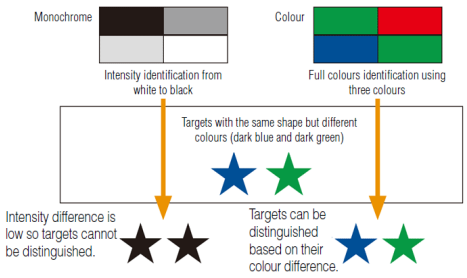

Fig.3 working of colour model

V. BONE CONDUCTION SPEAKER

The principle used in **bone conduction speaker** is the conduction of sound into the inner ear primarily through the bones present in the skull. In this the hearer ear canal is not affected. Bone conduction signal transmission occurs constantly as sound waves vibrate the bones, to be precise the bones in the skull, Even though it is little hard for the average individual to distinguish the sound being conveyed through the bone and the sound being conveyed through the ear canal. Intentional transmission of sound through bone can be used with the persons. Bone conduction generally conveys lower-frequency sounds better than higher frequency sound. Fig 4 shows the picture of a bone conduction speaker.

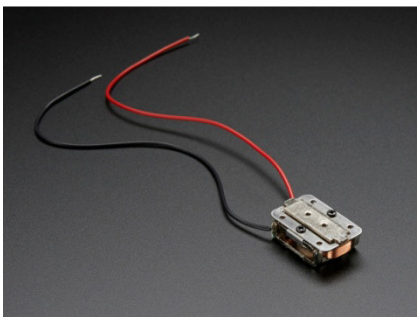

Fig.4 Bone Conduction Speaker

Bone conduction technique is one of the reasons why a person's voice sounds different to them when it is recorded and played back again. Because, the bones in the skull conducts lower frequencies better than air, people notice that their own voices to be lower and fuller than actually hear, and when the voice of other person is recorded usually sounds higher than the expected output. In fig 5, the spots for the signal conduction is given.

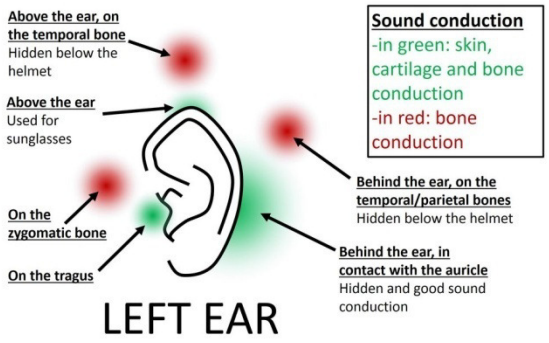

Fig.5 Spots for the signal conduction

VI. ELECTRET MICROPHONE

An **Electret microphone** is classified under the electrostatic capacitor-based microphone. In this we don't need polarizing power supply by a permanently charged material. Electret is a kind of stable dielectric material with a permanently attached static electric dipole moment (which is due to the higher resistance and the material is chemically stable and it will not decay for hundreds of years).Drawing structure to the formation of the magnet by alignment of magnetic behaviour in a piece of iron. Suitable dielectric materials are first melted to make an Electret. The materials are like wax and plastic. Then in a powerful electrostatic field, the material is allowed to resolidify. In the direction of electrostatic field, the molecules of the dielectric align themselves and produce a permanent electrostatic bias

Fig.6 Electret Microphone

There are three major types of electret microphones, differing in the way the electret material is used.

Foil-type or diaphragm-type:-

In the diaphragm, a film of electret material is used. This type is very common and it is of very low quality. The electret material do not make good diaphragm.

Back electret:-

The uncharged material is used in the diaphragm and the back plate is made of the electret film. This is more suitable for the transducer design.

Front electret:-

In this sort of electret, the rear plate isn't enclosed within the style, and also the electrical device is made by the diaphragm and also the within surface of the capsule. The electret film is adhered to the within front cowl and also the metalized diaphragm is connected to the input of the field-effect transistor. It's comparable to the rear electret there in any conductive film is also used for the diaphragm. Our system

conducts the sound to the ear canal and the user can able to navigate them using the text to speech conversion.

VII. GPS

TheGlobal Positioning System (GPS), have some
receivers squaremeasure usually employedin smartphones, fleet management system, military etc. for following or finding location GlobalPositioning System (GPS) may be a satellite-based system that uses satellites and ground stations to live and cipher its position on Earth. GPS is additionally referred to as Navigation System with Time and travel (NAVSTAR) GPS. GPS receiver has to receive knowledge from a minimum of four satellites for accuracy purpose. GPS receiver doesn't transmit any info to the satellites. This GPS receiver is employed in several applications like smartphones, etc..

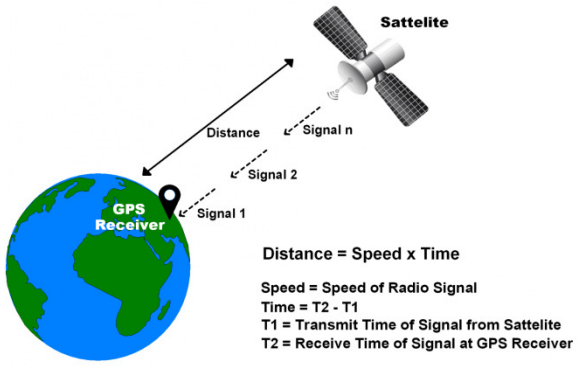

Fig.7 Working of GPS

VIII. WORKING AND DISCUSSION

The machine vision camera feeds the information to the processing unit and generates the signals based on the vision. The earphone receives signals in the form of user input voice signals. The GPS module searches for the location of the person and the interpreter converts the output of GPS (text) to speaker output (speech). By this way the person can navigate themselves without the help of anyone.

Output:

User	Give me the way to reach SRIT
System	[responding and searching the best route]
System	Go straight for 40 meters and turn right. Walk for 20 meters and take left. Go straight….. you have reached SRIT

Fig.8 Output

IX. CONCLUSION

The idea of machine vision has been implemented in a great manner in our project. It not only helps the blind but also to gives them belief to come out and find their way even in hard situations. This initiates corrective actions for the enhancement of their development. This system is very cost effective than the prevailing system which is not even advanced like our project. The future advancement may lead to a huge change in the development of the mankind and humanity.

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