International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

Survey on Assistive Aid for Visually Impaired

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Abstract: ***The assistive technology is one of the most basic and important system that helps a persons with a disability to work around his challenges. Various latest developments in assistive technology for visually impaired is explain in this paper. The latest existing technology enables its users to detect and differentiate between objects, navigate, recognize text and provide vibrational and audio feedback to the user. Various techniques are used, such as text-to-speech and speech-to-text translation, natural language processing, image and video processing and recognition, binaural image mapping and various sensors to make a use of technologies. The blind and visually impaired people needs assistance in their day-today life, for navigation, detecting objects, text recognition etc., Computer vision based assistive device for the blind is promising and efficient technology but still, the area is still a developing one. Various assistive device exist today to assist the blind most of which are still in prototypical stages. Purpose of this paper is to apprise the research and scientific community about the progress of computer vision based assistive technology for blind.***

Keywords: Assistive technology, blind, visually impaired, image processing, computer vision, mobile applications, machine learning.

1. Introduction

According to WHO, from the last few years the data shows so as toreadily accessible has been growth in preventing and curing visual harm in a lot offoreign countries. But the people aged above 50, about 65% of people who are visually impaired, while above 50 age group comprises about 20% of the world's population. With an increasing bigger population in many countries, Visual impairment due to chronic eye diseases and ageing processesmore people will be at risk. In the society assistive technologies are gaining rapidly. Assistive technologies will help the visually impaired to take part in some of their social activities. So they require understanding, so as to circulate in the society and be independent for their routine activities. Therefore visually impaired people need an assistive device that will allow user to navigate freely and this requirement has become critical. Most of the visually impaired people dependson other persons, white stick or guide puppies to travel easily. Presently, there arenumerous visual information that helps visually impaired people to transfer in a correct way but they all limit the liberty of the customer. Walking securely and readily with no human help within urban environment is an undertaking for visually impaired and blind individuals.

2. Types of Assistive Technology

For the day to day life certainmainlysignificant aspects for the visually impaired are the solutions of thesupportstrategy. Here presented some classifications of the assistive technologies of supportstrategy.For inside/outsidedirection-finding in dynamically changing environmentis an extramajorfeature for the visually impaired persons. The technicaldevelopment made possible the making of different electronic equipment's to help out visually impaired/ disabled folks in their navigation, such as different navigation systems, barrierprevention, item/barrier localization, and directionsupport systems, support for compensationeven as shopping, in order to extend or modify the basic hold up of supervisionpuppies and the white bond.

2.1 Assistive technology for Currency Recognition

Worldwide, there are many currency recognition systems and devices accessible. In this some of which support multiple currencies while others are currency dependent [5]. Currency Recognition systems are built behind the extraction of sufficient, stable, and distinctive monetary features.Momentous for correctness and robustness from the respective currency using various recognition algorithm [1]. This uniqueeconomic characteristics extraction varies from one currency to the other making this type of devices usually complex and very expensive. System like adaptive Neuro Fuzzy inference system and Digital Image processing (DIP) are planned for detecting fake banknotes. The effected system was cheaper and more precise however it was only designed to detect fake banknotes only [7]. System with powerful algorithm such as the Feed forward Neural Network (FNN) has been planned to extract economic structures like color and texture. This algorithm analyses data from a currency image and categorizes them positively [9]. Yoshida et. al. [10] designed a grid scanner to achievement a unique feature of Bangladeshi currency having microprints on them. They scan the note for this microprints to recognize there denomination and detect if they are counterfeit notes.

This system is built around PIC-16F648A or ATMega88 (AVR) microcontroller to process the scanned microprint image and classify them. The average processing time is a record 250 millisecond with 100% Captured image [10] Kauret. al. presented a system based on image processing and Fuzzy assumption for counterfeit currency detection. The planned system works for Indian wealth however not all. The system is believed to be adaptable to foreign currencies by replacing the extracted features. R Bhavani et. al. [6] proposed a system for Indian currency recognition. In this work, banknotes are recognized using a novel feature extraction technique called speeded up robust features (SURF) which is a combination of both interest point detector and descriptor. They are used to remove the local image features from an image. The SURF features extracted are both scale and rotation invariant which makes it robust

against various image transformations [6]. The interest points are detected from the test and the template images followed by SURF feature extraction. Then the distance between the SURF descriptors for corresponding matched interest points are calculated and the average distance is taken to find the category of the banknote.

2.2Assistive Technology for Color detection

Edge recognition of a colorpicture algorithm is used using entrancesystem. Plannedprocess for recursive finding of ends in color picture based on Green's role approach in the color vector space field. A technique is reported for color detection using hierarchical neural networks in RGB space. A method for color image edge detection using fast vectorial total disparity minimization model is reported in [10]. For object color detection, color recognition system was established by finger interaction method.

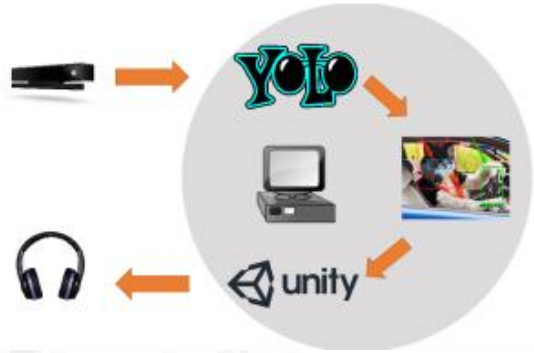
A traffic light recognition system wasestablishedusing image processing techniques for color blind vehicle driver. Vishesh Goelet. al.proposed a methods for the detection of color in images are conversion of three dimensional RGB image into gray scale image and then subtracting the two images to get two dimensional black and white image, using median filter to filter out noisy pixels, using connected components labeling to detect connected regions in binary digital images and use of bounding box and its properties for calculating the metrics of each labeled region. Further the color of the pixels is recognized by analyzing the RGB values for each pixel present in the image

2.3 Assistive Technology for Navigation

In unknown environments barrier detection and warning can improve the mobility as well as the security of visually impaired folks. For this, using dissimilar modalities such while voice, tactile, vibration etc.obstacles is detected and restricted and then the information of the obstacles will be sent to the visually impaired people. Smart walking stick for visually impaired [1] incorporates artificial vision and object detection integrated with GPS to enable the user to know about the environment for efficient navigation. Although it is an advanced technology, lack of voice recognition to input the destination is a disadvantage to this system. Dissimilar technologies such as WiFi, RFID, laser, ultrasound, or else camera have been used for aiding unsightedfolks avoiding obstacles in the environment. In [2], pixels are confidential into setting or substance based on neural network technique in camera captures grayscaleimages formerly, the pixels belonging to barrier are improved and the surroundings pixels are separate. If it is detected, to the blindbeing, information of obstacles must be conveyed.In overall,through auditory and tactile sense the user could be informed. Audio commentin [14], by text-to-speech machine and the loudspeakerthe obstacle information is sent to the user. For the blind one to hear through a stereo headphonethe voice system translates live images into sounds. The brightness is represented by the loudnesswhile position of visual pattern corresponds to the high pitch. Through the headphones, the segmented image is separated into left and right parts, converted to (stereo) sound so that it is sent to the user. On different parts of the bodythe acoustic feedback is informing the visually impaired users about the potential obstacles in that way tactile pointera differentmove towards is to change obstacle in turn into a vibrotactile or electro concrete stimulations. Visually impaired users are then trained to understand the information. Vibrator motors was created byJohnson and Higgins, to detect localbarrier search motor is assigned. The value of the closest object in each region is transformed to vibration applied on the coat of abdomen. In [8], to electrical pulses that inspire the tension in the coat via electrodes in the data handbag, barrierin sequence is distorted.

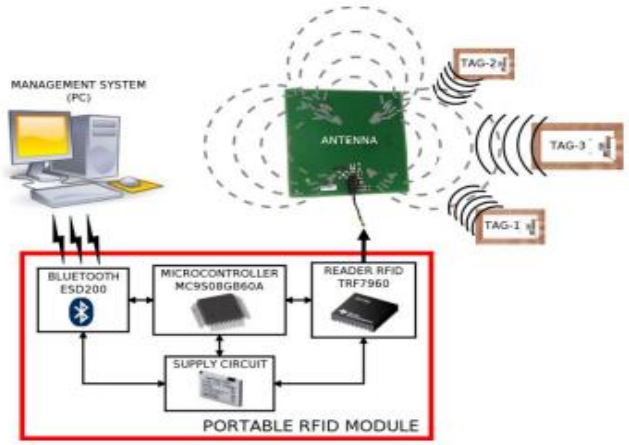
3. Current Research and Developments

The modernflash in improvement of assistive technology for the visually impaired taking place off with the technology living being able to notice and see objects for the user, hard work have been made to give help the blind discover their mode in covered environments. single such try is The Stanford based project called 'Let Blind People See' was clever to convert detected substanceabout it into 3D binaural noise to help out blind personsrecognizesite and nearness of substanceabout them by the You justseem Once replica[15].



YOLO Model

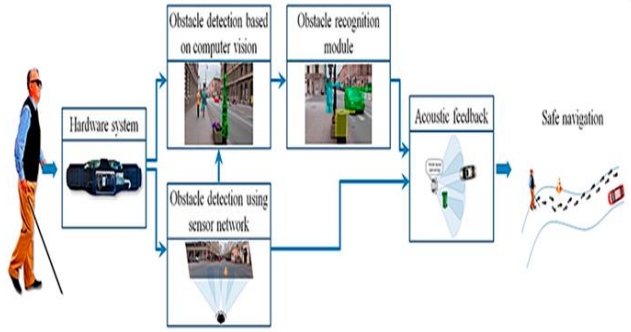
RFID (radio frequency identification) is a wireless arrangementtouse radio rays to recognize and pathwaytag. In the pitch of wearable knowledge, RFID solutions have much profit. Inside 'Wearable Object Detection System for the Blind' [16], an RFID tool is calculated to help out the blind in identifying substance; in particular, it has been urbanized to achieve tasks such as pointed for medicines in a cupboard. The tags can store in order which is useful for this exactingexercise. The person who reads can contact this in order and recognize the purpose that contains the tag. The RSSI (Received Strength Signal Indicator) price, that is the controlin attendance in the external radio signas of the tag, is used to calculate the reservein the middle of the person who reads and the thing



Schematic of wearable device

An additional audio based steeringscheme is '3D CMOS sensor based acoustic object discovery and steeringscheme for unsighted people' optional by researchers as of the Polytechnic University of Valencia. This system presents us with the prototype of an Electronic Travel Aid for unsightedpersons. The scheme gains in rankregarding its environmentbyacollection of 1×64 CMOS Time-of-Flight sensors. The in order is transformedkeen on binaural signals production to the unsighted users via the wearable help. Tests explainwith the aim of it was capable to labour with accuracy in the series of 15m and 64 degrees in azimuth that is a major improvement in excess of the alive Electronic Travel Aids [17].

A different wearable machine [18] chainssteering and mobility of visually-impaired persons in an indefinitesurroundingsby vision sensors, machine learning and computer vision techniques. Input data is inward from numerous ultrasonic sensors and a mobile phone camera. Each onemeting out is finished on the smartphone. It is outstanding that the tool was clever to identifysubstance in togetherinside and outside environments incessantly and gave audio advice to the consumer. The two machinery of the processor idea scheme were barrier discovery and thing acknowledgment. The obstacles detected in the outlook were recognized and the consumer was knowledgeable during audio comment about the location and space of the thing compared to the user's location.



Wearable Device

4. Conclusion

The thought of this document forusuallyreasonabletool such as the smartphone or else camera to help the visually impaired is strictlynoteworthy and cost successful. Visually impaired persons or unsightedfolks are those folks who are deficient in in their opticalawareness, and they are not capable to observe the item. Except they have the investigationpotential, and this potential makes them hear as of the surroundings. So somesay based scheme will help out them successfully.

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