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# Blind Assistance Using Android Mobile (OCR)

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**ABSTRACT**: Blindness makes life rather difficult for people who suffer from this health problem, but the use of technology can help in someday-to-day tasks. To access information in a text, a person needs to have vision..However those who are deprived of vision can gather information using their hearing capability. In this paper, we reviewed methodologies and techniques to read data from textual parts and navigation to the blind persons.In which method is a camera based assistive text reading to help blind person in reading the text present on the text labels, printed directions or notes converted into speech. These methodologies make us of an Optical character Recognition (OCR) motor on the cloud and utilize neighborhood assets for the Textto-Speech (TTS) transformation. Models are effectively created and tried with good outcomes.

**KEYWORDS**: Optical character Recognition (OCR), Text-to-Speech (TTS), Visual Inability, Smartphone, Text Extraction, Ultrasonic Sensor.

## I. INTRODUCTION

In Existing System investigators have tried to simplicity the load on blind people by proposing numerous methods that converts manuscript to audible sounds. Tyflos is a pair of spectacles that had cameras binded to the side, earphones, and a microphone. Voice inputs can be used to guide the user and direct the platform. Some instructions include "move paper closer," "move paper up," "move newspaper up, right" from the device to the user, and "rewind paragraph," "forward paragraph," and "volume up" from the user to the device. However, the voice user inputs might not function seamlessly in a noisy atmosphere, interpretation it restricted to indoor use. Finger Reader is a wearable band with a camera on the forward-facing. The world of print data such as the media, books, sign boards, and menus remain mostly out of reach to visually impaired persons, in an strength to seek an response to this determined problem, an assistive expertise based solution, referred in this project. We propose Mobile phones are one of the most usually used electronic gadgets today. Here, we propose to develop a integrated and friendly application using cloud based OCR policy and the built in Android TTS for producing an audible result of the text file. According to a global survey report on visual deficiency around the world by WHO in 2010, there were expected over 285 million visually impaired people in the world. Of the 285 million, 13.7% are blind and 86.3% ie. 246 m people have low vision. And on a further note, 21.9% of the world's visually impaired are from India, whereas 26.5% are from China.[1] Given a look at the statistics, it is clear there is a population that can be served to fulfil a need. Most of the impaired are found to be in emerging nations, over a wide range of ages. These individuals are hindered from a normal life and wages. A innovative step towards accessibility and portability would make life easier and, furthermore, a lot more interesting. There have been many aids developed with this goal in mind, like the smart stick[2] with transducers and lasers fitted on a white cane to identify hindrances and obstacles, and there will furthermore be many more developments in the days to come. But here is our take on the problem. This is a solution for improving the mobility of visually impaired persons. Albeit the consequent goal is to improve the lives of the blind, for practical purposes, this system will gratify low vision individuals more than it would for the total blind. This is a system where the visually impaired user can achieve better mobility despite his/her impairment with little to no help from another person. Mobility is described by Emerson Foulke as The ability to travel safely, comfortably, gracefully, and independently, referred to hereafter by the single term mobility, is a factor of

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importance in the life of a blind individual. [3] The term blindness is qualitative, and it describes the clinical condition where the individual has total vision loss: that is no light perception. It could also describe certain individuals who have very low to negligible vision. Moreover, the term visual impairment is also a qualitative term used to describe loss of vision that is a consequence to various diseases that affect parts of the eye at an organ level. Low vision is a description of lesser degree of vision.

## II. RELATED WORK

Hao Jiang, Thomas Gonnot, Won-Jae Yi and Jafar Saniie discuss a system that uses existing technologies such as the Optical Character Recognition (OCR) and Text-to-Speech (TTS) available on an Android smartphone, and use them to automatically identify and recognize texts and signs in the environment and help the users navigate. The proposed system uses a combination of computer vision and Internet connectivity on an Android smartphone not only to recognize signs, but also reconstruct sentences and convert them to speech.[1]

Nagaraja L Nagarjun R. S described Communication in the main way to pass the information through the speech. Blind Peoples gets information through hearing. And mainly to get textual information persons need to have visibility. To read textual part this paper author proposed text reading by using camera. It involves text extraction from the images and converts it into speech. All functionalities are performed by using raspberry pi with battery support.[2]

Nagarathna, Sowjanya V M presented label reading system for blind peoples by using camera. They performed operations on the video. From taken video all splits into frames. These frames are used to extract textual part through text detection methodologies. After recognizing by using Optical Character Reading text is read from images. After reading it is converted into speech [3].

Roberto Netoa, Nuno Fonseca studied camera based data reading for blind peoples. Studied the problems blind people have to face. Presented mobile application based text reading. The main aim was to convert visual part into speech to help to guide visually impaired peoples. To read textual part from images OCR methodologies are used and to Text To Speech for human voice output [4].

Roy Shilkrot Pattie Maes et.al proposed finger reading a wearable device to read text. Introduced methodology to read line text block of skimming text. Interested by a user required study that displays the help in using incessant multimodal feedback for text scanning. It is instigated in a novel tracking-based process that excerpts text from a close-up camera vision and a finger-wearable method [5].

## III. PROCEEDING METHODOLOGY

### 1. The OCR Process:

**Step 1 – Loading the image file:** In order for OCR to be real, it must backing a wide array of file formats, comprising PDF, BMP, TIFF, JPEG, and PNG files. Once the file is loaded, the software can initiate to work. These files can be scanned pamphlets, photos, or even read-only files. Irrespective of the unique format, OCR software will convert these files into effortlessly reachable & editable data.

**Step 2 – Improving image quality and orientation:** Depend on the technique in which the image file was created, there are a number of matters that may rise. More frequently than not, an image file will be slanted or contain “noise” (a/k/a varying illumination or colour). In this stage of OCR, the software will work to de-skew, eliminate any “noise”, and increase the complete quality of the images. This is a serious step – as blurry or skewed images are not understood properly.

**Step 3 – Removing lines:** Lines can prove to be calamitous when understanding characters. In order to continue as accurate as possible – lines are identified and removed. This allows for better acknowledgment excellence when converting tables, underlined words, etc. Much like the importance of image quality, the removal of lines will guarantee that characters are predictable accurately.

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**Step 4 – Analysing the page:** During this stage of Optical Character Recognition, the layout of the original file is noted and handled. This includes the discovery of text positions, white space, and the ordering of important text areas or sections.
**Step 5 – Detecting words and lines of text:** This is the start stage of actual character recognition. The software begins to classify individual words and entire lines of data. This is a serious pre-process for properly identifying characters as it sets the stage for the analysis and correction of fragmented or complex characters.
**Step 6 – Analysing and fixing of "broken" or "merged" characters:** Depending on the quality of the original file, there are often errors in which characters are broken or blurred together. The OCR software must now break down and resolve these errors in order to properly interpret the appropriate characters.
**Step 7 – Recognizing characters:** This is the main function of Optical Character Recognition. Now that the unique file has been processed, cleaned, and fixed – the OCR technology can begin to read and decode characters. Each image of every character is transformed into a character code. If the algorithm is unsure of a character – the software will produce multiple character codes and choose the proper character later on.
**Step 8 – Saving the file:** After the file has been fully understood, it can be saved to your wanted file format. While there is much more to OCR software, these 8 steps make up the primary processes involved in Optical Character Recognition.

2. **Working Principle of an Ultrasonic Sensor:**

The ultrasonic sensor transmits sound waves and receives sound reflected from an object. When ultrasonic waves are incident on an object, diffused reflection of the energy takes place over a wide solid angle which might be as high as 180 degrees. Thus some fraction of the incident energy is reflected back to the transducer in the form of echoes. If the object is very close to the sensor, the sound waves returns quickly, but if the object is far away from the sensor, the sound waves takes longer to return. But if objects are too far away from the sensor, the signal takes so long to come back (or is very weak when it comes back) that the receiver cannot detect it.

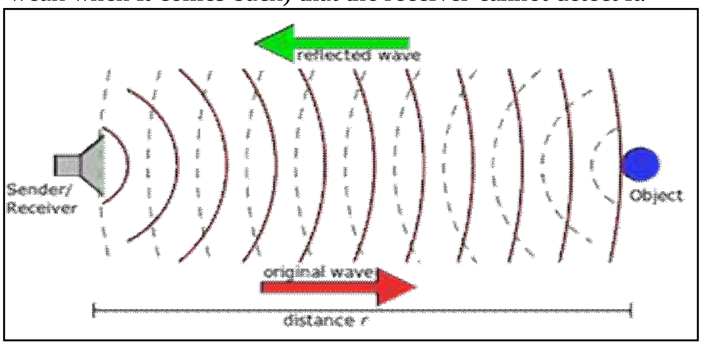


Fig. 1:

The sensor uses the time it takes for the sound to come back from the object in front to determine the distance of an object.

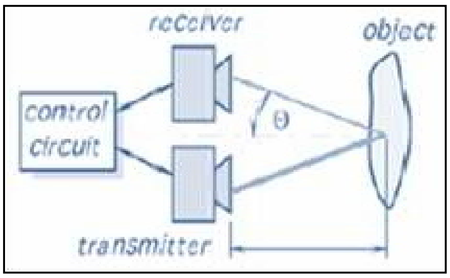


Fig. 2:

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$$L = \frac{v\,t\cos\theta}{2}$$

The distance to the object (L) can then be calculated through the speed of ultrasonic waves (v) in the medium by the relation, where, 't' is the time taken by the wave to reach back to the sensor and 'Θ' is the angle between the horizontal and the path taken as shown in the figure. If the object is in motion, instruments based on Doppler shift are used. The ultrasonic sensor can measure distances in centimetres and inches. It can measure from 0 to 2.5 meters, with a precision of 3 cm.

## IV. EMPLOYED IMPLEMENTATION AND ANALYSIS

### A. *Distance Measurement*

In this study we take the Ultrasonic sensor HCSR-04 controlled by a Raspberry Pi. We keep a flat object in front of the sensor and measure the distance when the code is run. The actual distance is also measured with the help of a scale and both the distances are compared and a graph given below is plotted.

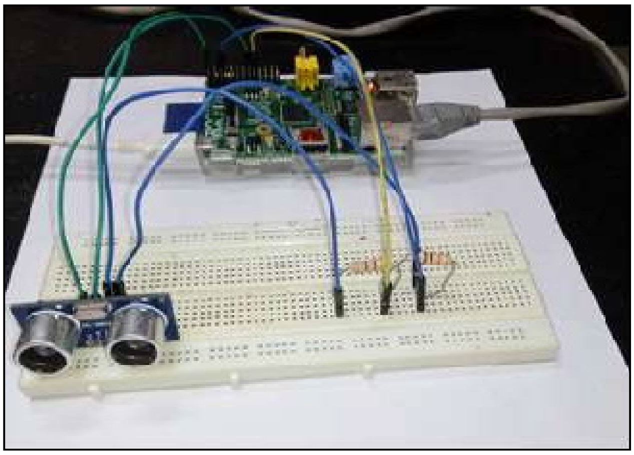

Fig. 3:

Suppose some obstacle is detected in front of the prototype, the ultrasonic sensor will detect a receiving signal and finds the approximate distance of the object from the prototype.

| *Sr. No.* | *Actual Distance (cm)* | *Measured Distance (cm)* | *Percentage error %* |
|---|---|---|---|
| *1* | *5* | *4.94* | *0.012* |
| *2* | *8* | *7.86* | *0.0175* |
| *3* | *10* | *9.98* | *0.002* |
| *4* | *13* | *13.19* | *0.015* |
| *5* | *15* | *14.82* | *0.012* |
| *6* | *18* | *18.2* | *0.011* |
| *7* | *20* | *20.03* | *0.0015* |
| *8* | *23* | *23.17* | *0.007* |
| *9* | *25* | *24.97* | *0.0012* |
| *10* | *28* | *27.87* | *0.0048* |

 

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Table - 1

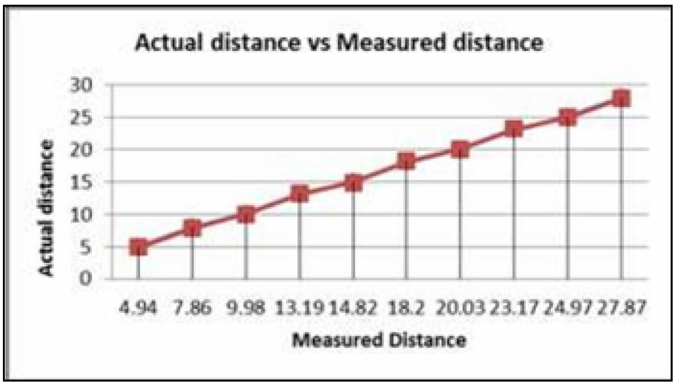


Fig. 4

The experimental results for the distance measurement are shown in Table I. Fig. 4 shows the graph between actual distance and measured distance. We observe that there is considerable error in the measured distance as compared to the actual distance. The
%error column also shows similar results. Since the error is very small, we can easily correct it while programing the code.

*B.* ***Obstacle Detection***

On detection of the obstacle, the braking force to be applied depends upon the distance. It depends on the cases discussed below:

*1) Case 1: The Obstacle is Stationary on the Path*

In this case, the host vehicle detects the obstacle and determines the distance of the obstacle from the host. The speed is then, decreased automatically. If the distance exceeds the critical distance (not safe distance for driving); the braking mechanism is activated and the horn is pressed. If the obstacle is a living creature, it might move out of the path in accordance to the horn. But in case the obstacle is not moving, the speed is kept on decreasing in such a way that the host is brought to a stop at a fixed pre-set value before the obstacle.

*2) Case 2: The Obstacle is Travelling Towards the User*

This case is similar to the first case. But here, the brakes will be pressed harder.

As soon as the obstacle moves away from the path of the host, the sensor will detect it and send a signal to the Raspberry Pi, which will in turn, restart the host/prototype automatically. The speed of the dc motor of the host, will resume to its original speed depending on whether or not any more obstacles lie in its path.

*A.* Experimental Setup

Our service is a web-service. The setup consists of user, admin, and service-provider. We have used AES and used S-box over it to increase the security of the user's personal information. The service provider has to be firstly take permission from the admin to run the services. The service-provider will be provided with the keys by the admin to run the service. The user has to register to the service to the admin. And then the user starts using the service.

*B.* Performance Analysis

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1. Execution Time

Figure represents the average time for execution. The execution time consists of the user using the service from the service provider. The execution time consists of the decryption of the user's information stored on the cloud and then viewing it in plain text on the service-providers device.

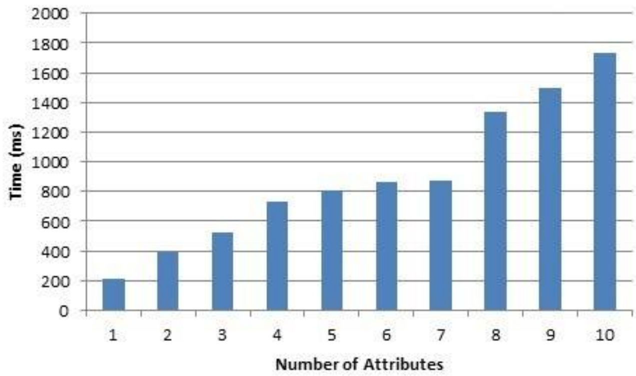


Fig 5: Average execution time.

2. Memory Usage

The figure 2 and 3 describes the memory usage when the encryption and decryption happens.
In encryption less than 11MB of the RAM is being used while in decryption less than 13MB ram is being used. This can be viewed in the graphs shown below.

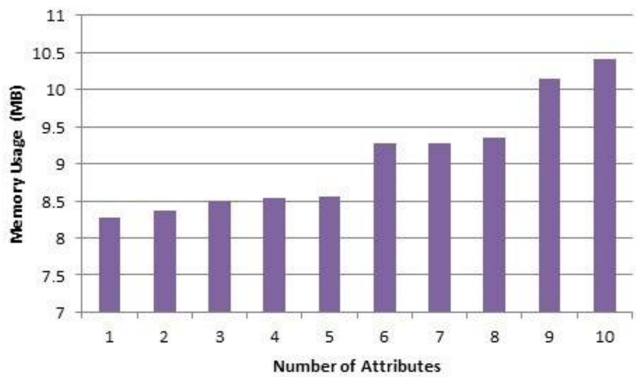


Fig. 6. Average Memory Usage for Encryption

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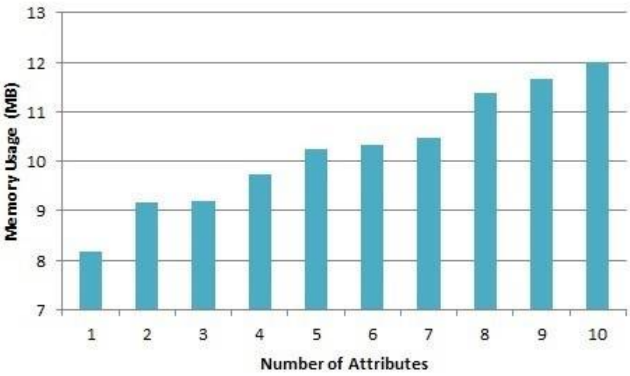


Fig. 7. Average Memory Usage for Decryption

## V. CONCLUSION

We have discussed about the summary and procedure of a methodologies that add to the ability of the visually-impaired peoples to share with us access to printed message. We have studied various methodologies and techniques the is used to read text from the images by using OCR based techniques using android device. With this Text to Speech methodology studied to get voice output of this read data using sound device.

The techniques make use of the cloud as a applied and viable asset for character recognition. Framework is less demanding to consume. However, the correctness of the mobile in the translation efforts is better, mainly due to the high determination camera worked in the gadget. In future promotes this work, we imagine this will improve its accuracy. We expect more work will be sent in this basic terrain of assistive novelty, and undertaking that future multipurpose devices will have simple to use and worked in component as examining helps for the visually impaired, comparative, to the portable based arrangement displayed here

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