APPLICATION FOR VISUALLY IMPAIRED PEOPLE

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ABSTRACT

Visually impaired people are often unaware of dangers in front of them, even in familiar environments. Furthermore, in unfamiliar environments, such people require guidance to reduce the risk of colliding with obstacles.This is an innovative System for visually impaired people . This system is used to help the visually impaired to have access to the most important features of the phone enhancing the quality of the system making use of different custom layouts and using speech to text.This study proposes a simple smartphone-based guiding system for solving the navigation problems for visually impaired people and achieving obstacle avoidance to enable visually impaired people to travel smoothly from a beginning point to a destination with greater awareness of their surroundings. Although mobile devices include accessibility features available for visually impaired users, the user interface of the majority of the mobile apps is designed for sighted people. It is clear that "Design for Usability" differs depending if the final user is a sighted user or a visually impaired user. In this study, a computer image recognition system and smartphone application were integrated to form a simple assisted guiding system. When the system begins to operate, the smartphone captures the scene in front of the user and sends the captured images to the backend server to be processed. we built a mobile app for visually impaired people.Optical character recognition has become one of the most successful applications of technology in the field. The Optical Character Recognition is a mobile application. It uses smart mobile phones of android platform. This paper combines the functionality of Optical Character Recognition and speech synthesizer. The objective is to develop user friendly application. This paper explain the possibility of interaction between visually impaired people and a smartphone especially to replace the sense of sight with help of an android based OCR application.OCR process occurs on a server on the internet to be faster and consume fewer hardware resources.Impaired people do not have luxury to read and write. Hence we are making an application which will enable to read and write emails using speech engine. We are also integrating image to speech conversion so they can read sign boards. Machine replication of human functions, like reading, is an ancient dream. However, over the last five decades, machine reading has grown from a dream to reality. Optical character recognition has become one of the most successful applications of technology in the field. The Optical Character Recognition is a mobile application. This paper combines the functionality of Optical Character Recognition and speech synthesizer. The objective is to develop user friendly application

Keyword : - *OCR,Impaired People,Android App,Text to Speech,Object Detection,Article Reading,Android, TensorFlow.*

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1. INTRODUCTION

The World Health Organization (WHO) estimates that 253 million people live with visual impairment. 217 million of those have moderate to severe vision impairment and 37 million are blind. Traditionally, Tools like stick were used from decades to avoid obstacles. Keeping pet dogs or guide dogs were one of few techniques used by the

visually impaired. Some took help of their family and friends for assistance. However, these techniques and tools had drawbacks. People with trained dogs needed money and time to feed and train the dogs. In today's technologically advanced world the above techniques cannot suffice the needs of the visually impaired people. Smartphone today has become a must-have device. It performs multiple tasks like telling time, messaging, calling, etc. Tasks which visually impaired are in dire need of. Through the help of technology solutions can be created to rectify the problems visually impaired people face in day to day life. It would have a positive impact on their lives and make their day to day life easier.As of today many people suffer from Visual Impairment. It one of the biggest problem's humankind is facing today. Frequent assistance is required for them to be able to perform day to day tasks. Earlier Braille type of paper was used to read. Although it's still in use today it is gradually becoming outdated as it is restricted to only reading and cannot suffice the needs and perform other tasks of the visually impaired. In today's technologically advanced world Computer Vision based solutions and android based solutions are emerging as one of the most promising due to their accessibility and the technology used which enables them to perform a wide range of tasks.Mobile phones have become an inevitable part of our daily lives. It is difficult to think of a day without having our mobile phone by our side. The components that were used for our routine jobs have become obsolete now. For instance, we do not see children playing with pocket video games because the games are now available on smart phones to which they have easy access. Similarly, our to-do list has changed its form from a piece of paper to an application on our smart phone. This paper talks about creating a note manager application. This application is used to create notes that the user who owns the smart phone would like to store in his/her device. A note could be his/her to-do list, important points covered during a meeting, address of a shop etc. Basically it could be any sort of information the user would like to keep with him/her. There are many similar applications available on various mobile application markets [1,2] but a person with no sight may not be able to use applications which were created without keeping in mind the users who are visually impaired. In such applications, the user has to type his/her note using a QWERTY keypad, that is, a set of buttons or keys embedded on the device used for input from the user or an on-screen keyboard, also called a soft keyboard. This would be difficult to use for a person who is not able to see the keys, especially if it is a soft keyboard. Hence, the aim is to design and develop such an application for people with any sort of visually impaired People. Current users use the Services for looking the Phones features So the Motivation is that to implement the android system for Impaired people who can't handle the android phone effectively.Text detection is a wide area of development. Detecting objects using image processing can be used in multiple industrial as well as social application. This project is proposing to use object detection and Article Reading for Impaired people and give them audio/ vocal information about it. The solution aims to create an application for visually impaired in which text and speech commands are accepted from the user and the tasks are performed. The application is created by using JAVA programming language on the open Android Studio platform. We are detecting an object using the mobile camera .User must have to train the system first about the object information. We are then doing feature extraction to search for objects in the camera view. We are taking help of angle where object is placed to give direction about the object There are several Optical Character Recognition (OCR) mobile applications on the market running on mobile devices ,android platforms. The limitations of mobile device processor hinder the possible execution of computationally intensive applications that need less time of process. This paper proposes a framework of Optical Character Recognition (OCR) on mobile device using server-based processing. Comparison methods proposed by this paper by conducting a series of tests using standalone and server-based OCR on mobile devices, and compare the results of the accuracy and time required for the entire OCR processing. Server-based mobile OCR obtains 5% higher character recognition accuracy than the standalone OCR and its format recognition accuracy is 99.8%. The framework tries to overcome the limitation of mobile device capability process, so the devices can do the computationally intensive application more quickly.

1.1 Tensor Flow

Tensor flow is an open source software library for high performance numerical computation. It allows simple deployment of computation across a range of platforms (CPUs, GPUs, TPUs) due to its versatile design also from desktops to clusters of servers to mobile and edge devices. Tensor flow was designed and developed by researchers and engineers from the Google Brain team at intervals Google's AI organization, it comes with robust support for machine learning and deep learning and the versatile numerical computation core is used across several alternative scientific domains. To construct, train and deploy Object Detection Models TensorFlow is used that makes it easy and also it provides a collection of Detection Models pre-trained on the COCO dataset, the Kitti dataset, and the Open Images dataset. One among the numerous Detection Models is that the combination of Single Shot Detector (SSDs) and Mobile Nets architecture that is quick, efficient and doesn't need huge computational capability to accomplish the object Detection.

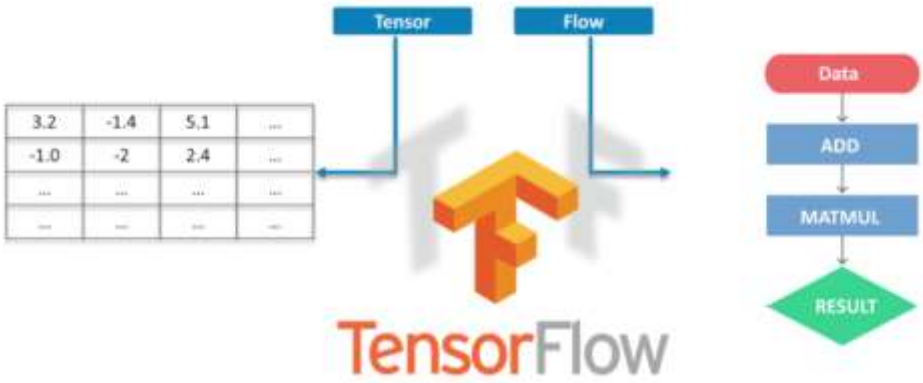

Fig 1: Tensor Flow

1.2 Motivation

Visually impaired people are often unaware of dangers in front of them, even in familiar environments. Furthermore, in unfamiliar environments, such people require guidance to reduce the risk of colliding with obstacles.This is an innovative System for visually impaired people . This system is used to help the visually impaired to have access to the most important features of the phone enhancing the quality of the system making use of different custom layouts and using speech to text.With advances in new technologies, mobile devices have grown in popularity to become one of the most common consumer devices. Cell phones are very important part of modern life. Many of us need to make a call or send a message at anytime from anywhere.For blind and motion-impaired people this issue is more obvious, but other people also often face this problem, e.g., when driving or using a smart-phone under bright sunshine. Sighted users often find them inevitably placed under situations where non-visual interaction is required.The blind people face challenges daily in communicating with the world around them. They have to depend on their sighted colleagues for making a phone call and accessing other mobile functionalities. This system is a voice recognizing application for mobile phones that allow access to most of the functionalities of the phone and will make it possible for visually impaired people to connect with the society. The sighted user's people with limited reading ability can also use this application if they are involved in activities that prevent reading.The application is developed for visually impaired people.

1.3 Problem Statement

To make an efficient use of Android Tehcnology. Provide solution with least hardware requirement. To develop an application that is cost efficient.Easy to use and accurate so that Visually Impaired People can adopt the application quickly.The major challenge with visually impaired people is difficulty in recognizing of objects. There are various issues they have to deal with, while performing various daily tasks. They are unable to recognize objects while performing day-to-day activities, depriving them from normal social life. To Implement application for Visually Impaired People.

2. LITERATURE REVIEW

Many researchers have contributed to this field. Various combinations of existing technologies have been used. Braille systems, screen magnifiers, etc. went through some developments but later faced technical issues.

1. The fusion of several sensors is one of the techniques used for obstacle detection, where combination of visual sensors, sonar and inertial measurement unit are used to detect the presence of an obstacle and give audio as well as tactile feedback to user. Another system was to implement OCR using Raspberry Pi sensor for automatic recognition of the environmental messages and by utilization of TTS [1].
2. Android phone-controlled voice gesture and touchscreen operated wheelchair where voice and gesture is recognized through android ,Developers also created a universal voice control on android which is used to launch android application via voice commands [2].

3. In author implemented an android type mobile messaging application called as Voisee communicator, for communication between two disabled people. The customized voice commands are developed using build-in Java API. It is a user friendly and accurate in delivering messages. It also provides the facility to know the user expectation by analysing the results of the test survey and evaluation form. [3]
4. In authors provided a new system prototype name as Sharojan Bridge to make more effective communication between blind people, which is a wearable device build with Iot devices.[4]
5. In researchers have designed and developed a tool for blind or impaired people using Audio-Supported Reading (ASR) to access text. This tool for integrating multiple pedagogies and teaching the skill sets which are need to gain literacy of blind people. [5]
6. Ayat A. Nada, was proposed, Stick solution use different technologies like infrared, ultrasonic sensor and laser but they still have drawbacks. In the present study we introduce, light pressure, low-cost, adaptable, fast response and low power utilization. Smart stick based infrared technology. A combination of infrared sensors can reveal stair-cases and other obstacle presence in the user path, within a range of two meters. The tentative results carry out good accuracy and the stick is able to identify all of disincentives. [6]
7. S. Innet, N.Ritnoom was proposed that blind people use a white stick as a tool for directing them when they move or walk. In spite of, the white stick is helpful, it cannot give a high assurance that it can assure blind people away from all level of hurdles. Several researchers have been obessed in establishing electronic devices to protect blind people away from obstacles with a higher guarantee. This study introduces an hurdles restraint alternative by using an electronic stick that serves as a tool for blind people in walking. It exploits an infrared sensor for detecting hurdles along the roadway. With all level of hurdles, the infrared stick facilitates to identify all type of earthly available in the course such as concrete, wood, metal, glass, and human being. The outcome also shows that the stick detects obstacles in range of 80 cm which is the same as the length of white stick. The twig is designed to be small and light, so that blind people can carry it comfortably. [8]
8. Ross Girshick , we propose a Fast Region-based Convolutional Network method (Fast R-CNN) for object detection. Fast R-CNN frames on previous work to accurately distribute object proposals using deep convolutional networks. Correlated to previous work, Fast R-CNN uses several innovations to improve training and testing speed while also increasing detection accuracy. Fast R-CNN tracks the very deep VGG16 network 9x faster than R-CNN, is 213x faster at test-time, and achieves a higher mAP on PASCAL VOC 2012. Compared to SPP net, Fast R-CNN trains VGG16 3x faster, tests 10x faster, and is more accurate. Fast R-CNN is implemented in Python and C++.[7]
9. Multiple Distance Sensors Based Smart Stick for Visually Impaired People :Amit Kumar proposed this system. In this system a novel low-cost yet durable and accurate smart stick to assist visually impaired people while they walk in indoor/outdoor unstructured environments. There is a large group of people who have difficulties in their daily routine work due to losing their eyesight. Walking with confidence is one of them which may have different challenges in different environments/countries. We have considered the Indian context where outdoor environments are often clustered and noisy. Keeping these challenges

   in mind, a new smart stick is developed which is capable of detecting obstacles of any height in front or slightly sideways of the person. The stick gives a fair idea about the distance and the location of obstacles through vibration in hand and audio in the ear of the person. The wireless connection has been set up using Bluetooth between theearphone and the stick. Different frequencies of the generated vibration and different tracks of the audio alert the person about the distance of the obstacle. Real-time experiments have been conducted in different environments by different people to observe the accuracy of the stick and results are quite encouraging. [9]

10. Navigational Assistance System For Visually Impaired : In this system, an electronic aid to visually impaired people is designed which helps them to voyage to the destination like normal people. The aiding system is built into a walking stick that shall be carried by a visually impaired person. The aiding system acts like a reproduction vision. Sensors with most accurate outputs are used in this work. The intelligent algorithm is used in the software so that it is more user-friendly. A suitable walking stick is designed with all the stuff built-in. The canopy people will able to budge from one place to another lacking other help. If such a system is developed, it will act as a basic stand for the invention of more such devices for the canopy people in the potential which will be cost-effective. And as far as the localization is anxious it will be able to provide accurate information on the position of the canopy if in case they lost with help from the GPS. It will be a real boon for the blind. The developed prototype gives good results in detecting obstacles paced at distance in front of the user.These works report the designing of the multi-sensor blind stick. This will be useful for visually impaired peoples. The canopy stick consists of tricky features which detect obverse and top part of the obstacles, water stagnated/manholes on the ground. Due to these features it is the best tool for blind and visually impaired people for on foot on the road. It is unforced, cost-effective, configurable and simple to handle smart supervision systems. The system is planned implemented, tested and verified. The results indicate that the structure is expert and inimitable in its impending in specifying the source and space of the obstacles. [10]
11. The Assistance System using RGB-D Sensor with Range Expansion : Navigation assistance for visually impaired (NAVI) refers to systems that can assist or guide people with vision loss, ranging from partially sighted to blind, using sound commands. In this paper, a new system for NAVI is presented based on visual and range information. Instead of using several sensors, we choose one device, a consumer RGB-D camera, and take advantage of both range and visual information. In particular, the main contribution is the combination of depth information with image intensities, resulting in the robust expansion of the range-based floor segmentation. On one hand, depth information, which is reliable but limited to a short-range, is enhanced with the long-range visual information. On the other hand, the difficult and prone-to-error image processing is eased and improved with depth information. The proposed system detects and classifies the main structural elements of the scene providing the user with obstacle-free paths to navigate safely across unknown scenarios. The proposed system has been tested on a wide variety of scenarios and data sets, giving successful results and showing that the system is robust and works in challenging indoor environments[11]
12. Smart Phone Application to Assist Visually Impaired People: Laviniu Tepelea, Loan Gavrilut & Alexandru Gacsadi proposed the assistance system. In the system toassist people with visual impairments, the smartphone proves to be very useful, but it requires sensory modules external to the phone to detect obstacles and find a safe way. The Android application we have made, offers not only a travel guide, but also other daily assistive functions such as reading a poster or article, making phone calls, findingthe date, time, and battery level. The special interface created for the blind has proved its efficiency, and the communication of the relevant information verbally transmitted through the TTS to the earphones to one ear leads to a correct understanding of the message and leaves the user the opportunity to receive other useful information from the environment. External platforms communicate data from sensors to the phone via Bluetooth and Wi-Fi where sensorial data fusion is made, and at the appropriate time, the relevant information is communicated to the user, warning of the existence of an obstacle at a certain level. The accelerator sensor can detect when the person with visual impairment is falling, and a phone call to a favorite number is made, for example, the emergency service, and the light sensor detects the need to move from outdoor guidance to indoor guidance and vice versa. Experimental tests made with the assistive system have proven its usefulness, but they have also revealed that further testing is needed to find the optimum obstacle detection distance, both inside buildings and in the

outdoor environment. In the future, more powerful and cheaper smartphones will be made, which will lead to more effective assistance. Finally, this aiding system for visually impaired, based on a smartphone, but also using other small external sensory modules, proves to be a viable, portable, low-cost, small-scale solution. More important, it does not require many hours of training. [12]

13. Novel Indoor Navigation System: Kabalan Chaccour & Georges Badr proposed this system, In this system a novel design for an indoor navigation system for visually impaired and blind people. The proposed approach has a simple architecture that allows the subject to be fully independent in his home or work. The system provides navigation assistance and obstacle avoidance functionalities in indoor premises algorithms. Unlike other systems in the related work, the subject needs only to hold his smartphone during his displacement and doesn't require any particular skills to be operated. The complexity of the system resides in the computer vision processing algorithm seamlessly to the user. Future development is planned for the system expansion to add more functionality. On the application level, we are working to automatically run the application when motion is sensed from the subject (chair rise, walking, etc.). It can also revert to its sleep mode in static conditions to minimize the battery consumption. Battery level can also be communicated loudly through voice messages to avoid critical situations. The application may also offer gait analysis for elderly and visually impaired subjects and may prevent the subject from a potential fall. On the remote processing system level, enhanced image processing algorithms may be implemented to detect specific objects in the environment. The time between voice messages must be adequately chosen to avoid flooding the ears and disturbance. These issues will be addressed in future research activities. [13]
14. Smart Guiding Glasses : This system presents a smart guiding device for visually impaired users, which can help them move safely and efficiently in a complicated indoor environment. The depth image and the multi-sensor fusion based algorithms solve the problems of small and transparent obstacle avoiding. Three main auditory cues for the blind users were developed and tested in different scenarios, and results show that the beep sound-based guiding instructions are the most efficient and well-adapted. For weak sighted users, visual enhancement based on the AR technique was adopted to integrate the traversable direction into the binocular images and it helps the users to walk more quickly and safely. The computation is fast enough for the detection and display of obstacles. Experimental results show that the proposed smart guiding glasses can improve the traveling experience of the visually impaired people. The sensors used in this system are simple and at low cost, making it possible to be widely used in the consumer market. [14]
15. ZoranZivkovic et.al proposes Improved Adaptive Gaussian Mixture Model for Background Subtraction Background subtraction is a common computer vision task. We analyze the usual pixel-level approach. We develop an efficient adaptive algorithm using Gaussian mixture probability density. Recursive equations are used to constantly update the parameters and but also to simultaneously select the appropriate number of components for each pixel. [15]

3. PROPOSED SYSTEM

The proposed system is to build an customized application for visually impaired people. This application acts as a voice assistant. This application is used to help the visually impaired to access most important features of the phone using text to speech and speech to text. The System will have custom Object Detection feature,Article reading Feature , OCR feature in it. This system will speak out all the actions performed by user. This system in all is a voice assistant for whatever action the user has performed though a custom app. The custom app having these features will allow visually impaired users to do their basic things using electronic device without any other help.

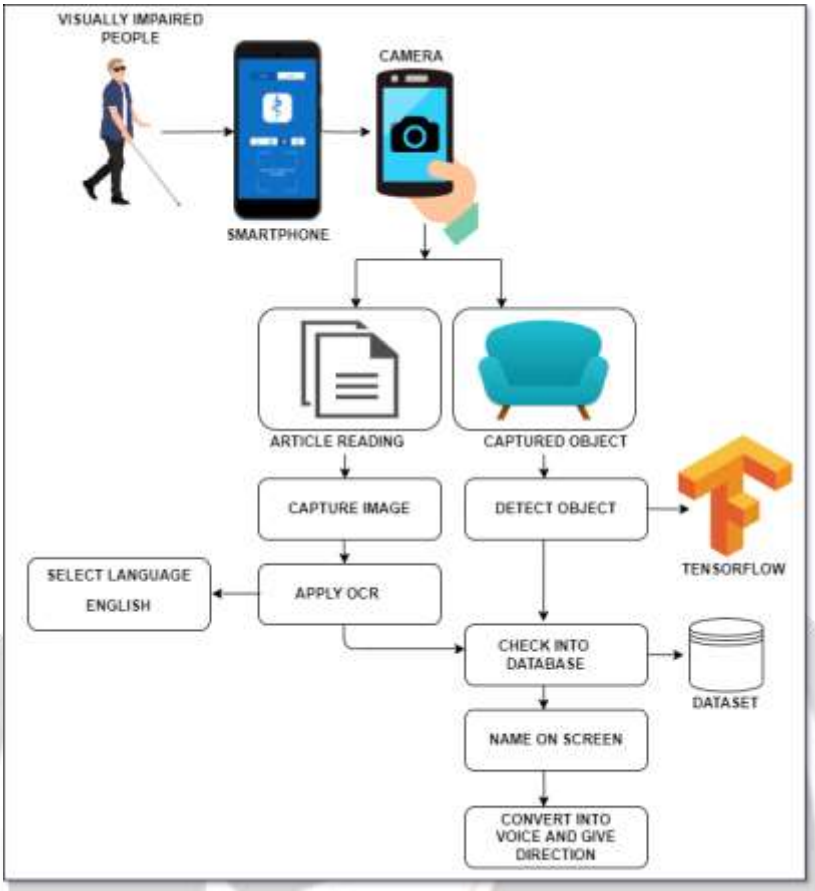

Fig 2: System Architecture

3.1 Block Diagram

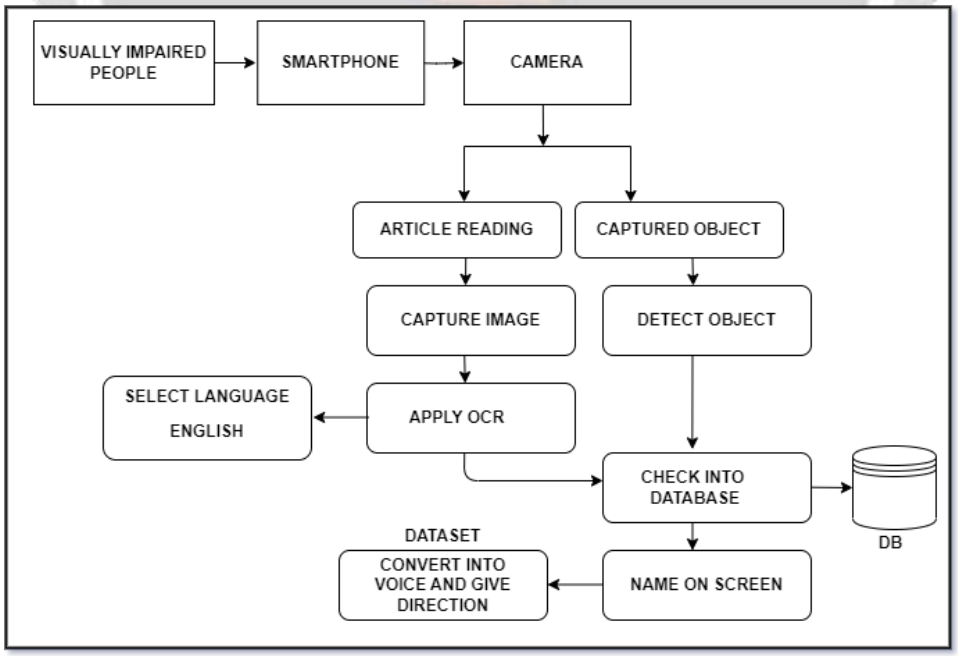

Fig -3: Block Diagram

4. RESULTS

Splash Screen

Main Screen

Object Detection

Article Reading :Image Selection

Article Reading :OCR Output

5. CONCLUSIONS

In this paper, we had proposed a much helpful Application for visually impaired people. This system will be very easy to use. This application will run on Android operating System. This Application is very helpful towards the visually impaired people and makes very easy for them to use electronic gadgets with (text to speech) TTS technology, they will be able to interact more efficiently to the electronic system i.e Mobile Phone, Tablets etc.

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