

SMART GLASSES FOR VISUALLY IMPAIRED PEOPLE

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Abstract— Human communication today is mainly via speech and text. 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. The proposed method is a camera based assistive text reading to help blind person and the travellers in reading the text present on the text labels, printed notes and products in their own respective languages. It combines the concept of Easy Optical Character Recognition (OCR), Google Text to Speech Synthesizer (gTTS) and translator in Raspberry pi. Easy Optical character recognition (OCR) is the identification of printed characters using photoelectric devices and computer software. It converts images of typed, handwritten or printed text into machine encoded text from scanned document or from subtitle text superimposed on an image. Text-to-Speech conversion is a method that scans and reads any language letters and numbers that are in the image using OCR technique and then translates it into any desired language and at last it gives audio output of the translated text. The audio output is heard through the raspberry pi's audio jack using speakers or earphones. Even a object detector is implemented using open cv that would detect the objects that we come across in our day to day lives. Human detection/ identification is done using the Face Recognition Process with the camera present in the eyewear.

Keywords— *Optical Character Recognition (OCR), Google Text To Speech (gTTS) , Raspberry Pi, Face Recognition, Open CV.*

I. INTRODUCTION

In today's world, technology is growing at an alarming rate. It has found its way in every field of our life. But this technology is of no use if it couldn't provide itself to the aid of the disabled people. The aspect considered most important in human life is education. It is the education that we receive today shapes our tomorrow. 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. Visually impaired people report numerous difficulties with accessing printed text using existing technology, including problems with alignment, focus, accuracy, mobility and efficiency. We present a smart device that assists the visually impaired and travellers which

effectively and efficiently reads paper-printed text. The proposed project uses the methodology of a camera based assistive device that can be used by people to read Text document. The framework is on implementing image capturing technique in an embedded system based on Raspberry Pi board. The design is motivated by preliminary studies with visually impaired people, and it is small-scale and mobile, which enables a more manageable operation with little setup. In this project we have proposed a text read out system for the travellers and visually challenged. The proposed fully integrated system has a camera as an input device to feed the printed text document for digitization. Speech is probably the most efficient medium for communication between humans. To extract the text from image we use optical character recognition technique (Easy OCR). Optical character recognition has become one of the most successful applications of technology in the field of pattern recognition and artificial intelligence. This work aims to assist the visually impaired people for reading a text material and detect objects in their surroundings in local language. The input is taken in the form of an image captured from the raspberry pi camera module. This image is then processed either for the purpose of text reading or for object detection based on user choice. The Raspberry Pi acts as the micro controller for processing of the entire process. The text reading is supported by software named Easy OCR. The read text is changed into an audio output using the gTTS Synthesis. The audio is given out in a local language (as of now kannada).

II. LITERATURE SURVEY

A. Priya Bhardwaj and Ritesh Kumar Sharma: "Image Text Reader for Visually Impaired in Desired Language"(IEEE JUNE 2020): The problems faced by visually impaired individuals; we aim to propose a viable, workable method for conversion of image Text to Speech in the user required languages. The proposed prototype enables the users to hear out the content, present in the image, out loud in the desired language. There are 3 major steps: a) extraction of text present in image, then saving it in a separate text file b) converting the text to speech output in English language c) translating the speech in the

language that the user desires. This model will also be a really helpful device for traveller who can make use of this tool to hear the content in English in their own required language.

B. M. Murali , Shreya Sharma and Neel Nagansure: “Reader and Object Detection for Blind”

(International conference on Communication and Signal July 29-30 2020 - India): This work aims to assist the visually impaired people for reading a text material and detect objects in their surroundings. The input is taken in the form of an image captured from the web camera. This image is then processed either for the purpose of text reading or for object detection based on user choice. The Raspberry Pi acts as the micro controller for processing of the entire process. The text reading is supported by software named OCR. The read text is changed into an audio output using the TTS Synthesis. Other dependencies required for the process include Tesseract Library. The Object Detection is another aspect of the project which is implemented using a Tensor Flow Object Detection API. It is able to detect various objects in its surroundings and provide an audio feedback about the same. The data set can be trained on various different situations depending on the user needs.

C. Google’s AI - Powered Smart Glasses Help The Blind to See:

Google Glass to create a set of AI-powered spectacles that help blind and visually impaired people to see. The glasses extract visual information from images of people, belongings, and public transport, and then speaks about them out loud. It can read text from books, name friends by analyzing their faces, and describe surroundings such as train signs and street hazards. The wearer could use the glasses to read a recipe from a cookery book, get to the grocery store, find ingredients on the shelves, and then return home to prepare the dish. Pre - Orders for the smart glasses began today, at a reduced starting price of \$1,699. They will retail for \$2,099 once shipping begins in August 2020..

D. Ajman University Develops Smart Glasses for People Who are Blind and Partially Sighted:

The whole system is composed of a pair of smart glasses and a smartphone that are interlinked with a processing unit. All of the smart glasses features are accessible through the smart phone device. The user basically chooses what programme they want to use — for example reading — and can access it with their smart phone. The user also does not need an internet connection for this to work,” If the person wants to use the reading feature, the smart glasses are able to read and identify the words on the piece of paper or a signboard in real time with an accuracy of 95 per cent, and so it basically works like an audio book transmitting the words to the person.

E. Jawaid Nasreen ,Warsi Arif , Asad Ali Shaikh , Yahya Muhammad , Monaisha Abdullah: “Object Detection and Narrator for Visually Impaired People” (2019

IEEE 6th International Conference on Engineering Technologies and Applied Sciences (ICETAS)):

Machine Learning has gained attention since the introduction of high computing machines and the availability of huge amount of data also known as big data. Today, machine learning is used in many types of industries from medical image processing to autonomous car. Detecting objects in images has also become one of the important research areas and now computers are able to not only detect objects but also able to draw bounding boxes on it. This is also known as computer vision. In this paper, we proposed the implementation of computer vision machine learning algorithms to detect object and use it to aid visually impaired and blind persons. This paper explain how convolution neural network are trained on ImageNet dataset that can detect objects and narrate detected objects information to the visually impairs person. This implementation can be used with any device using a camera that includes computers, tablets and mobile phones.

III. LIMITATION OF CURRENT WORK

- a) No device can detect both text and object in one single model.
- b) Expensive.

IV. PROBLEM STATEMENT

- ✧ The Object detector can identify only those objects for which the data set has been trained.

V. OBJECTIVES

- ✧ This work aims to assist the visually impaired people for reading a text material and detect objects in their surroundings in a local language.
- ✧ As the main intension of the project is to help the blind by assisting them in reading text and detect objects in the surrounding.
- ✧ User friendly and portable.

VI. METHODOLOGY

The procedure of the proposed system is shown in figure. If the text needs to be read, raspberry camera module clicks a photo of the printed text and fed into raspberry pi which converts it into audio output which is in the local language using libraries such as EasyOCR and gTTS. If objects are to be detected, raspberry camera module with Open CV displays the name of the object around the rectangle that

surrounds the object and that text is converted into audio output. This is achieved using EasyOCR, gTTS, Pillow, Open CV libraries.

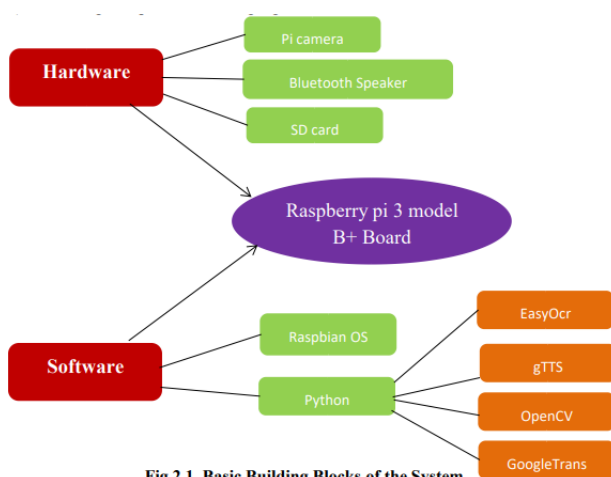
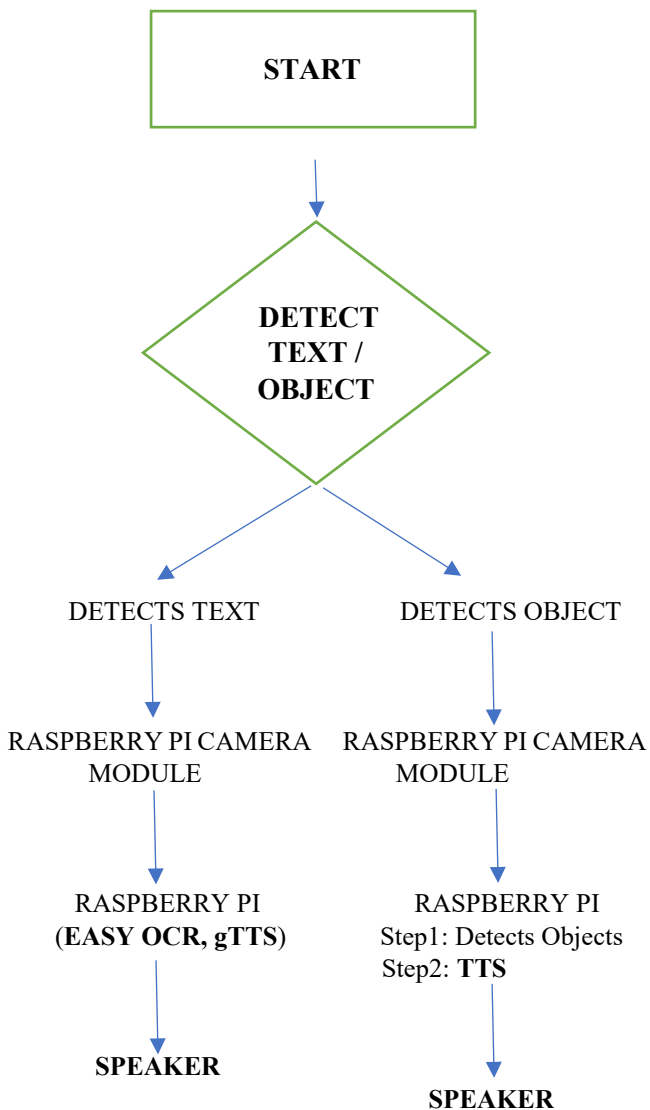
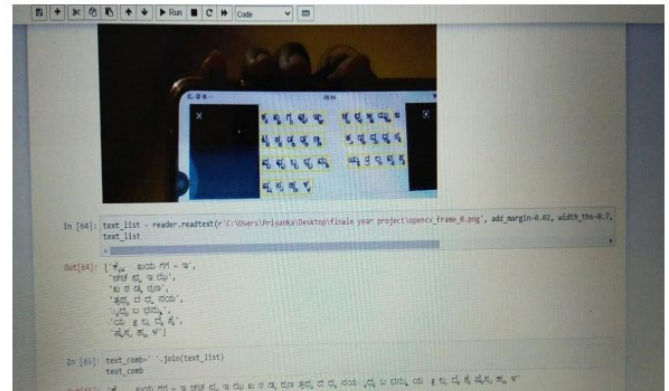
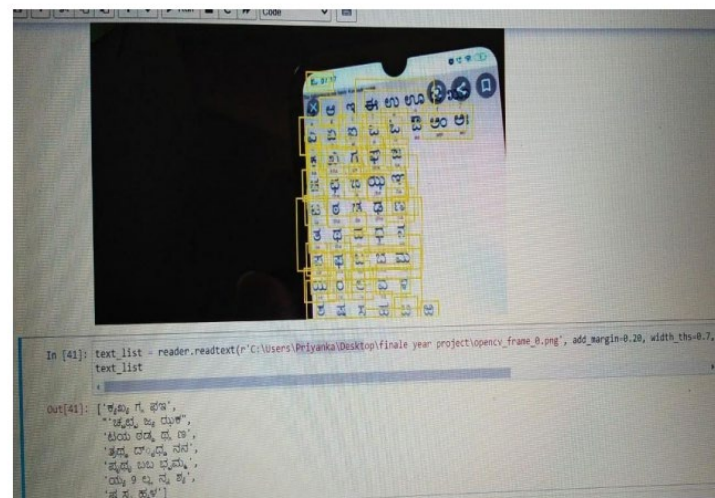


Fig.2.1. Basic Building Blocks of the System

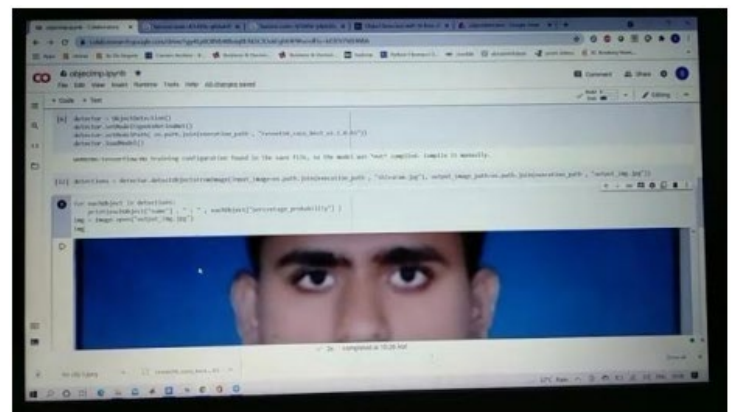
VII. RESULTS



OUTPUT OF THE IMAGE CAPTURD BY CAMERA



OUTPUT OF THE IMAGE CAPTURED AND TEXT EXTRACTED



OUTPUT FOR OBJECT DETECTION

VIII. CONCLUSION

The system enables the visually impaired to not feel at a disadvantage when it comes to reading text not written in braille in another language also (particularly Kannada). We have implemented an image to speech conversion technique

using raspberry pi. The feature of Object Detection can be used to help the blind people know more about their surroundings without having to move around the place. This is an economical as well as efficient device for the visually impaired and traveller. We have applied our algorithm on some images and found that it successfully does its conversion and the same is shown above.

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IX. FUTURE SCOPE

With further work and implementation we can show the output for various local languages and not just kannada. The data set can be trained with more models so that the object detector can recognize maximum objects nearby.

REFERENCES

- [1] Roberto Neto, Nuno Fonseca Camera Reading For Blind People. Procedia Technology 16 (2014) 1200 – 1209
- [2] D. Velmurugan , M.S. Sonam , S. Umamaheswari , S.Parthasarathy , K.R. Arun A Smart Reader for Visually Impaired People Using Raspberry PI DOI 10.4010/2016.699 ISSN 2321 3361 © 2016 IJESC.
- [3] Jamal S. Zraqou, Wissam M. Alkhadour and Mohammad Z. Siam RealTime Objects Recognition Approach for Assisting Blind People. International Journal of Current Engineering and Technology E-ISSN 2277 – 4106, P-ISSN 2347 – 5161
- [4].D. B. K. Kamesh, S. Nazma, J. K. R. Sastry , S. Venkateswarlu , “Camera based Text to Speech Conversion, Obstacle and Currency Detection for Blind Persons” Indian Journal of Science and Technology, Vol 9(30), DOI: 10.17485/ijst/2016/v9i30/98716, August 2016
- [5].S. Rishi Kumar, G. Madhavan, M. Naveen, S. Subash, U. Selvamalar Beulah Ponrani, “Image Processing based Multilingual Translator for Travellers using Raspberry pi”, International Journal of Advanced Research in Computer and Communication Engineering ISO 3297:2007 Certified Vol. 6, Issue 3, March 2017
- [6]. Asha G. Hagargund. Sharsha Vanria Thota. Mitadru Bera. Eram Fatima Shaik “Image to Speech Conversion for Visually Impaired”, International Journal of Latest Research in Engineering and Technology (IJLRET) ISSN: 2454-5031, Volume 03 - Issue 06, June 2017, PP. 09-15.
- [7].Aaron James S, Sanjana S, Monisha M , “OCR based automatic book reader for the visually impaired using Raspberry PI”, International Journal of Innovative Research