

E-VISION GLASSES FOR VISUALLY IMPAIRED

MOHIT GAJBHIYE¹, VRUSHABH VAIDYA², MOHD GAUSS QURESHI³, ABHISHESH SAMATKAR⁴, DIPEEKA RADKE⁵

COMPUTER SCIENCE AND ENGINEERING, PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
COMPUTER SCIENCE AND ENGINEERING, PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
COMPUTER SCIENCE AND ENGINEERING, PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
COMPUTER SCIENCE AND ENGINEERING, PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
COMPUTER SCIENCE AND ENGINEERING, PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR

Abstract -Around the world there are many problems which arises every day and gets resolved but there are some major problems like loss of sight or blindness which needs some assistance from others. By making the use of recent technologies we are presenting here a paper which gives a new design of assistive smart glasses for visually impaired people in an affordable price to the common people having loss of sight to assist them in their lifestyle by offering a virtual vision to have a far better real life experience. This paper aims in making a wearable design format of a glasses to help the people with disability for reading from hard copy materials which will be converted to speech that will be audible to the user with the help of ear buds attached to the glasses.

Key Words: smart glasses, virtual vision, ear buds

1. INTRODUCTION

1.1 PROBLEM SUMMARY:-

Around the world there are many problems which arises every day and gets resolved but there are some major problems like loss of sight or blindness which needs some assistance from others. By making the use of recent technologies we are presenting here a paper which gives a new design of assistive smart glasses for visually impaired people in an affordable price to the common people having loss of sight to assist them in their lifestyle by offering a virtual vision to have a far better real life experience.

1.2 AIM AND OBJECTIVES:-

The objective of our project is to make a wearable design format of a glasses to help the people with disability for reading from hard copy materials which will be converted to speech that will be audible to the user with the help of ear buds attached to the glasses and can rediscover hobbies like visual art and travelling independently.

1.3 PROBLEM SPECIFICATION:-

For the users like visually impaired persons, Audio learners, travelers and illiterate masses the following problems are given below:

- Reading the text in the books
- Crossing the roads for the blind people
- Difficulties in reading the texts written around them, for illiterate people
- Understand the surroundings objects
- Understanding the foreign languages

1.4 MATERIALS/TOOLS REQUIRED:-

- Raspberry Pi 3 B
- Raspberry Pi Camera Module (input)
- Bread-Board
- Push Button
- Portable Battery
- Earphone (output)
- Connecting Wires
- Wearing Glasses
- Casing for Raspberry Pi

2. LITERATURE SURVEY

The paper by Peter B.L.Meijer et al, 1992 says about the arrival of fast and cheap digital electronics and sensory devices opens new pathways to the event of sophisticated equipment to overcome limitations of the human senses. This paper addresses the technical feasibility of replacing human vision by human hearing through equipment that translates images into sounds, which could at some point become relevant for the visually impaired.

The paper by F.Hongand, A.Chekima, (2001) says regarding the goal of Blind Aid project to develop guidance help technology for the blind or visually impaired. Specifically, it seeks to develop a transportable Electronic Travel Aid (ETA) for visually impaired users, in conjunction with accompanying frequency identification (RFID) localization infrastructure used to equip buildings.

The paper by G. Balakrishnan et al, (2007) describes about the visually impaired to find their navigation as they often lack the needed information for by passing obstacles and hazards. Electronic Travel Aids (ETAs) are devices that use sensor technology to help and improve the blind user's mobility in terms of safety and speed.

In various fields, there is necessity to detect the target object and also track them effectively while handling conclusions and other included complexities. Many researchers (Almeida and Guting 2004, Haiso-Ping Tsai 2011, Nicolas Papadakis and Aure lie Bugeau 2010) attempted for various approaches in object tracking. The nature of the technique largely depends on the application domain. Some of the research works which made the evolution to proposed work in field of object tracking are depicted.

3. METHODOLOGY

The hardware system comprises of three distinct components namely, Raspberry Pi B, Raspberry Pi Camera Module, Earphones. The Raspberry Pi Camera (input) and earphone (output) are mounted and controlled by Raspberry Pi which is powered by portable battery.

COMPONENTS REQUIRED

I.Raspberry Pi:-

The Raspberry Pi being a low cost, credit-card sized computer that plugs into a computer monitor or TV and uses a typical keyboard and mouse. It is a capable little device that lets or permits people of all ages to explore computing, and to find out the way to in languages like Scratch and Python. We are using Raspberry Pi 3 Model B in our project.

II. Raspberry Pi 3 B:-

It's capable of doing everything you'd expect a personal computer to try to do, from browsing the web and playing high-definition video, to creating spreadsheets, word-processing, and playing games. What's more, the Raspberry Pi has the power to interact with the surface world and has been utilized in a good array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras.



Fig:-Raspberry Pi 3 B

III.Raspberry Pi Camera Module:-

The Raspberry Pi camera module are often used to take high-definition video and also stills photographs. It's easy to use for beginners, but has plenty to supply advanced users if you're looking to expand your knowledge. There are variety of online examples of individuals using it for time-lapse, slow-motion and other video cleverness. You will also use the libraries we bundle with the camera to create effects.

If you're curious about the nitty-gritty, you'll want to understand that the module features a five megapixel fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes, also as stills capture. It attaches via a 15cm ribbon cable to the CSI port on the Raspberry Pi. It are often accessed through the MMAL and V4L APIs, and there are numerous third-party libraries built for it, including the Pi camera Python library. The camera module is very widespread in home security applications, and in life camera traps. you will even be wont to take snapshots.



Fig:-Raspberry Pi Camera Module

IV.Earphone:-

Headphones let one user hear an audio source privately, in contrast to a loudspeaker, which emits sound into the outdoors for anyone nearby to listen to.



Fig:-Earphone

4. DESIGN AND IMPLEMENTATION

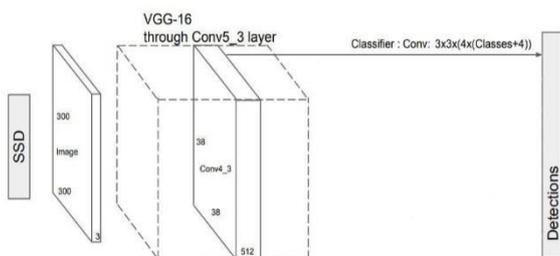
E-vision glasses does have three main parts, a raspberry pi 3, camera and a button. When the person press the button on the glass, The camera will take a picture and analyze the image using tensor flow and detect what is that picture is about, then using a speaker or earphone, the Sight for blind will assist the person about that picture in the form of voice.

YOLO works by taking an image and split it into an SxS grid, within each of the grid we take m bounding boxes. For every of the bounding box, the network gives an output a categorical probability and offset values for the bounding box. The bounding boxes have the categorial probability above a threshold value is chosen and used to locate the object or things within the image.

SSD is meant for object detection in period of time.Faster R-CNN uses a region proposal network to make boundary boxes and utilizes those boxes to classify objects. While it's considered the start-of-the-art in accuracy, the entire process runs at 7 frames per second.

The SSD object detection composes of two parts:

1. Extract feature maps, and
2. Apply convolution filters to detect objects.

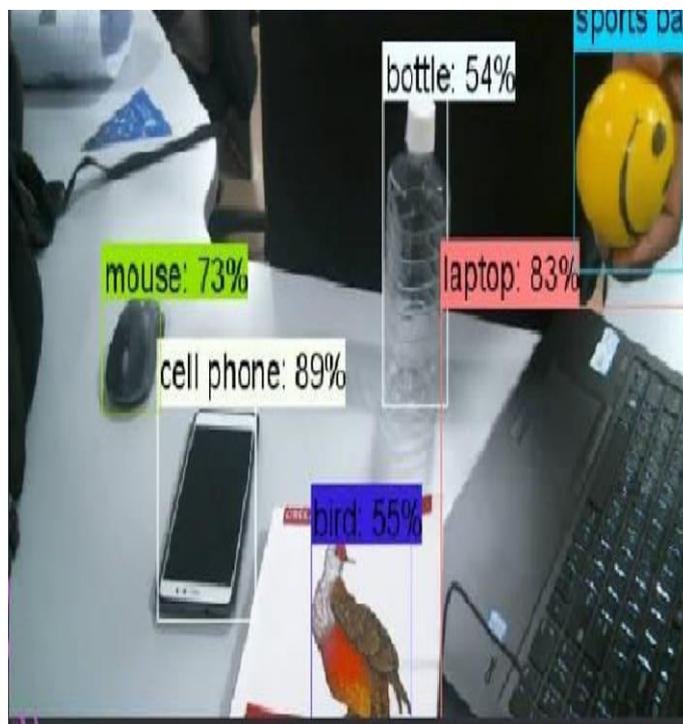


OCR systems are made from a fusion of hardware and software that is used to convert physical documents into electronic text.

- ❑ Image Acquisition:- Acquire images of paper documents with the assistance of optical scanners.
- ❑ Preprocessing:- :- The goal of preprocessing is to form raw data usable by computers.
- ❑ Segmentation:- The segmentation is aimed towards grouping characters into meaningful chunks.
- ❑ Feature Extraction:- Splitting the input data into a set of features, that is, to seek out essential characteristics that make one or another pattern recognizable.
- ❑ Training a Neural Network:- In any case features are extracted, it are often fetched to a neural network to train it to recognize characters.
- ❑ Post-Processing:-The process of refinement as an OCR model.

5.RESULT

In this research paper we have mentioned that our system is designed consisting the following components such as Raspberry Pi, Camera module and earphone. System objective is to make a wearable design format of a glasses to help the people with disability for reading from hard copy materials which will be converted to speech that will be audible to the user with the help of ear buds attached to the glasses.



6. CONCLUSIONS

In this paper E-Vision Glasses was designed and implemented using Raspberry Pi, Camera Module, Tensor Flow and OCR. This system is able to detect an object from image and also able to read text from image. Using this results we are able to detect object more precisely in the picture in x, y axis.

REFERENCES

- [1] Tao Hong, Jonathan J. Hull, OCR technique and appliance using image equivalents, U.S.Patent 5 764 799A, 1995, Comp.
- [2] Willis J. Luther, Graphics interface for controlling text-to-speech conversion, U.S. Patent 5 500 919A, 1996-03-19.
- [3] Henry C. A. Hyde-Thomson, Roger Liron, electronic communication system with automatic language identification for text-to-speech conversion U.S. Patent 6 487 533B2, 1997-07-03.
- [4] AI & Deep Learning with the use of Tensor Flow - https://youtu.be/wh7_etX91ls
- [5] Demonstrates to put in and use tesseract-ocr engine for character recognition in Python-
<https://youtu.be/jWh0FaRRZC4>
- [6] <https://www.irjet.net/archives/V6/i4/IRJET-V6I4651>
- [7] <https://www.irjet.net/archives/V5/i3/IRJET-V5I3109>
- [8] You Only Look Once - https://youtu.be/4eIBisqx9_g