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Virtual Vision for Blinds

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Abstract:- *As we know in this world in our daily life we see certain people with disability, among them one of the major issue is of loss of sight or blindness. By using the recent technologies we are trying to make a project which is affordable to the common people having loss of sight, to help them in their daily life by offering them a virtual vision to have a better real life experience. It will also help the people who are illiterate or unaware of place(tourists), who can't understand the texts, written in front of them. Along with them, it can be helpful for auditory learners like students, for memorizing notes in creative way. The objective of our project is to assist them in multiple daily tasks using the advantage of wearable design format in the form of glasses. As a proof of concept this project presents many example applications like text recognition technology that can help reading from hard copy materials which will then be converted to speech which will be audible to the user with the help of ear buds attached to the glass.*

1. INTRODUCTION

1.1 PROBLEM SUMMARY

As we know in this world in our daily life we see certain people with disability, among them one of the major issue is of loss of sight or blindness, by using the most recent technologies we are trying to make a project which is affordable to the common people having loss of sight to help them in their daily life by offering them a virtual vision to have a better life experience.

1.2 AIM AND OBJECTIVES

The objective of our project is to assist them in multiple daily tasks using the advantage of wearable design format in the form of glasses. As a proof of concept this project presents many example applications like text recognition technology that can help with reading from hard copy materials which will then be converted to speech which will be audible to the user with the help of ear buds attached to the glasses. The user will also be guided on how to click the perfect picture of the desired document or any hard copy to be read, the user will also be made aware about the surroundings, including human

1.3 PROBLEM SPECIFICATION

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

- Reading the sign. Boards and books
- Difficult for blind students for learning and understanding the text in the book
- For audio learners, learning the context from the book
- Crossing the roads for the blind people
- Understand the voice communications of foreign countries for travelers
- Understand the instructions, written in regional language for tourists
- Difficulties in reading texts written around them, for uneducated/illiterate people

1.4 Material/Tools Required

- Raspberry Pi
- Camera (input)
- Push Buttons
- Bread-board
- Portable Battery
- Earphone (output)
- Cables
- Sliding Button
- Wearing Glasses
- Internet connectivity module
- Casing for Pi

- Technical Specification for Rasberry pi :

The Raspberry Pi is a low cost, **credit-card sized computer** that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. What's more, the Raspberry Pi has the ability to interact with the outside world and has been used in a wide array of digital maker projects, from music machines and parent

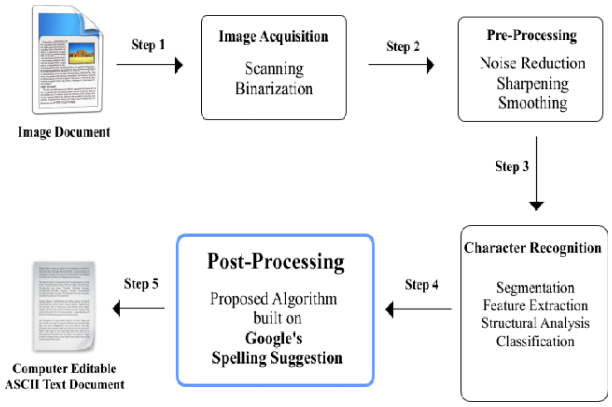
detectors to weather stations and tweeting birdhouses with infra-red cameras We are using raspberry pi 2 model b in our project; the specs of that board are listed below:

- Broad-com BCM2837 Arm7 Quad Core Processor powered Single Board Computer running at 900MHz
- 1GB RAM
- 40pin extended GPIO
- 4 x USB 2 ports
- 4 pole Stereo output and Composite video port
- Full size HDMI
- CSI camera port for connecting the Raspberry Pi camera
- DSI display port for connecting the Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data
- Micro USB power source

- **Software Requirement**

a) Optical Character Recognition:

Optical character recognition (also optical character reader, OCR) is the mechanical or electronic conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image. It is a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as cognitive computing, machine translation, (extracted) text-to-speech, key data and text mining. OCR is a field of research in pattern recognition, artificial intelligence and computer vision.



b) OpenCV

OpenCV (*Open Source Computer Vision*) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel. The library is cross-platform and free for use. OpenCV has a modular structure, which means that the package includes several shared or static libraries. The following modules are available:

Core functionality - a compact module defining basic data structures, including the dense dimensional array Mat and basic functions used by all other modules.

Image processing - an image processing module that includes linear and non-linear image filtering, geometrical image transformations, color space conversion, histograms, and so on.

Video - a video analysis module that includes motion estimation, background subtraction, and object tracking algorithm.

Video I/O - an easy-to-use interface to video capturing and video codecs.

c) Text To Speech:

Google Text-to-Speech is a screen reader application developed by Google. It powers applications to read aloud (speak) the text on the screen which support many languages. Speech synthesis is the artificial production of human speech. A computer system used for this purpose is called a speech computer or speech synthesizer and can be implemented in software or hardware products. A text-to-speech (TTS) system converts normal language text into speech. The quality of a speech synthesizer is judged by its similarity to the human voice and by its ability to be understood clearly. An intelligible text-to-speech program allows people with visual impairments or reading disabilities to listen to written words on a home computer.

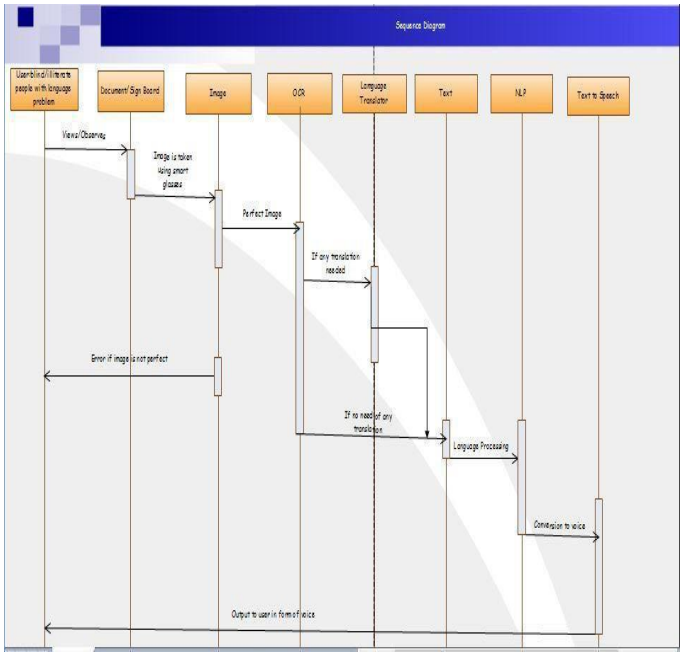
d) Google Trans:

Google Translate is a free multilingual machine translation service developed by Google, to translate text. It offers an API that helps developers build software applications. Google Translate supports over 100 languages at various levels. Rather than translating languages directly, it first translates text to English and then to the target language. During a translation, it looks for patterns in millions of documents to help decide on the best translation. Its accuracy has been

criticized and ridiculed on several occasions. Google Translate would switch to a neural machine translation engine - Google Neural Machine Translation (GNMT) - which translates "whole sentences at a time, rather than just piece by piece. It uses this broader context to help it figure out the most relevant translation, which it then rearranges and adjusts to be more like a human speaking with proper grammar".

e) **Google Assistant:** To help the users with their day to day activities (for example knowing the time, getting to know about their train schedule, location, news. Weather, etc).

2. Design and Modelling



2.1 Sequence Diagram

Sequence diagrams are sometimes called event diagrams or event scenarios. A sequence diagram shows, as parallel vertical lines (lifelines), different processes or objects that live simultaneously, and, as horizontal arrows, the messages exchanged between them, in the order in which they occur.

2.2.3 Flow Diagram

A graphical representation of a computer program in relation to its sequence of functions (as distinct from the data it processes).

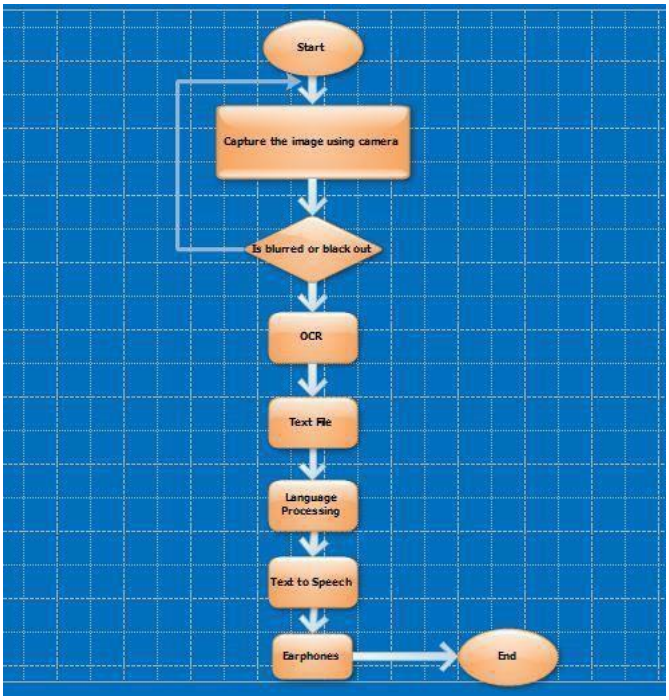


Fig.2.7 Flow Diagram

3. Conclusion

3.1 Summary of Work

After reviewing all possible literature s, studying existing system and gathering possible, feasible changes we started with creating our system. The project work is started with the designing of the product (i.e. Smart glasses). Using the project planning, we divided the tasks among four of us. We have studied many research papers and prior art search related to our domain. We listed out all possible features that we can add up to our system. In the initial stage we found out the easiest and efficient way to implement it by using python language, after that we started to research various libraries that will be useful in our project.

After studying about various hardware's required in our project we started assembling it. Gradually initiating with the OCR implementation followed by image capturing, text to speech, language translation. We added all the possible features as we stated. We have interfaced hardware and software portions with the use of buttons to make our model more user friendly. We have encapsulated all this things into working prototype.

3.2 Scope of Future Works

We have already tried to add features on the existing system. But many more features can be added up, a voice command to click picture, play/pause the voice and for other functionalities. Glasses should be able to sense the surrounding environment and according to that, using Artificial Intelligence it will explain the whole scenario

into the ears of the blind. It will be very helpful for visually impaired people to experience such things. We are using a developer board, which is not only bigger in size, but also has many components which remains unused for us, as we are utilizing only around 30-35% of overall components, that we are present on the board. In future work, we can design a smaller and light weight circuit chip which contains the components that we actually needed, which can also result in low power consumption (from which we can reduce size of battery to be attached) as well as overall cost 40% lesser. We are also working on the design to make it universal for every eyewear, by making it attachable and detachable easily, so that anyone can attach it with their personal eyewear too.

3.3 Unique Features

Our system's unique features are:

- Easy to carry and use.
- Optical character recognition
- Text to Speech
- Language translation
- User Friendly
- Efficient
- Cost effective

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