# Smart Specs

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## Abstract

The World Health Organization estimates that 285 million people globally are partially blind from a total of 7.4 billion. It has been noticed that they're already having difficulty rolling their everyday lives, and it is critical to make the required calculations using new technology to assist them in coping with the current world, regardless of disabilities. A smart spec is provided to read any textual content in audible format with the goal of providing an inventive, efficient, and actual system that produces excellent results without incurring a lot of money. Because reading written materials is difficult for disabled individuals across many settings, it allows them to be self-sufficient. The textual imagery from of the written material is taken with the Pi camera, and the acquired picture is processed with Tesseract-OCR. For the research, data in the formats of jpeg, png, jpg, BMP, and others is used. The picture is then analyzed, and the collected text is transformed into letters using OCR/Tesseract software, which will then be rendered legible using eSpeak software. Scanning, processing, categorization, and recognition are all part of the OCR algorithm. Lastly, the OCR file is converted into spoken requests using the eSpeak command program. A loudspeaker attached to the Raspberry Pi reads the transformed voice audibly. To sense a collapse, a tilt sensor is employed.

**Keywords**— disabilities, scanning, espeak, sensors

## I. INTRODUCTION

40 million of the 215 million visually impaired individuals in the world [1-4] are blind. According to NHIS survey, an approximate 25.2 million adult Americans (almost 8% of the population) are blind or visually impaired in certain affluent countries, such as the United States. Recent advances in computational recognition, camcorders, and laptop devices make it possible to help these people by creating camera-based devices that integrate machine vision expertise with the other commercially available products like OCR systems. For blind and visually impaired people, reading word docs can be difficult in a variety of contexts, including written passages out and about and viewing text in much less

surroundings. The objective is to encourage blind individuals to contact written texts and updated at least voice output. The use of two methods that are crucial to these systems, namely ocr for TIE [5-12] and TTTS to transform this text to speech, is considered for the success of these processes.

A TTS synthesiser is a machine device that must be capable of reading any reading text if an user enters it straightforwardly into the machine [13-23]. Text Data Retrieval is the most significant feature of any helpful scanning technology, and it's also an essential part of OCR since it dictates the quality of the produced speech [24-32]. TtS output quality, and also expanding our opportunity to produce creative, feelings artificial voice. To divide video chunks into textual and non-text regions, intelligent video surveillance text detection and retrieval were used. It's feasible thanks to recent advances in machine learning, camcorders, and processors, which have supports the creation of camera-based goods that combine computer vision technology with other useful products like OCR systems. Text recognition is done using OCR. It is capable of correctly recognizing main character, text, and phrases. OCR, which is also the digital translation of images obtained of typewritten, has a significant increase of identification [33-36].

## II. LITERATURE SURVEY

As per the WHO, roughly 285 million individuals are believed to be legally blind out of a demographic of 7.4 billion. It has been noticed that they continue to struggle with the day tasks, but it is essential to take the required steps using developing technology to assist people in living in the contemporary world despite existing disabilities. With the intention of assisting them, the authors in [1] have developed a perfect spec for blind people that can identify text and then produce a vocal output. This can assist visually handicapped people in reading any printed material aloud.

Routing is challenging for such blind users because they mostly lack sufficient knowledge to avoid impediments and dangers. Electronic Travel Aids (ETAs) are sensor-based gadgets that facilitate and enhance the movement of blind people in terms of reliability and efficiency [2]. Contemporary ETAs do not have straight and unambiguous location data. To assist blind people with guidance, this research in [2] presents an approach for calculating range that used a stereo matching algorithm. The system established in this paper comprises of a portable computer, video camera, and audio headphones all moulded into a headgear. To compute dense disparity pictures, an enhanced location stereo matching is done over the altered images.

SR technologies were tested in a variety of school settings to help students turn oral instructions into writing electronically. In situ culture and human sciences teaching classes using standard classroom technology, basically two approaches of (SR-MLA), RTC and PLT were investigated. Both techniques were evaluated in terms of class application technical feasibility and dependability, instructor perspectives, sight word correctness, and school school grades. During classroom, RTC offered pupils with a close representation of the instructor's voice.

The research presented in [3-4] advances to current progress in the area of increased succeeding TTS technology. The increase of vocal richness and synthesis adaptability are two of the most popular areas of study in this field. In this respect, this work introduces a new TTS approach for synthesising across genres dubbed multidomain TTS (MD-TTS). Even though the simulation and model - based theory is widely used in spoken speech patterns, there has been little study into applying it to TTS. Many ideas are presented in this study to do this. First, in the standard TTS design, a text classifier (TC) is incorporated to automatically identify the most relevant domain for synthesizing the text information among crowded backdrops or other nearby items.

Portable computer sight is frequently promoted as a viable approach for assisting blind individuals with daily tasks. Nevertheless, there's really currently so little knowledge with blind individuals operating remote sight devices. This work in [4-5] is an experimental investigation of a key indicator wayfinding system that identifies particular color markers using a digicam smartphone. The findings reported in the literature could be utilized to help build equipment that allows people to explore their surroundings without using their eyes.

## III. METHODOLGY

The suggested program's idea is to build a word reading system for visually impaired individuals using a specs reader. This structure is divided into three modules: OCR Module, Camera Module, and Text-To-Speech Module. This clarifies the textual scanning approach for visually disabled people who don't want be dependent on anyone.

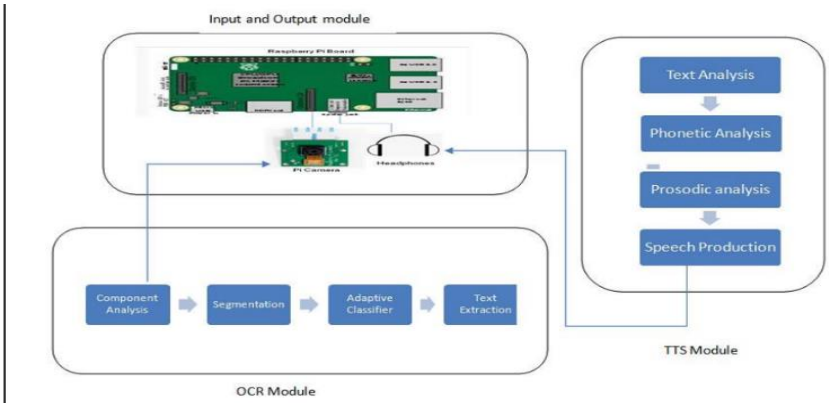


Fig.1. Various components together used in this work

a. Working Principle:

The structure is predicated on a Raspberry Pi board with Raspbian OS and Python/OpenCV modules installed. Again for study, words inside the formats (jpeg, png, jpg, BMP, etc.) are used. For identifying related text, the picture acquired out from Pi camera is divided in the three signs, as explained below. The picture is then analyzed, and the collected text is transformed into characters using OCR/Tesseract software, which can then be made legible using eSpeak software. To identify impediments and identify falls, we'll utilise an ultrasonic sensor and a tilt sensor. The collapse recognition is provided as an IoT notice to the individual affected.

The suggested program's aim was to create a textual process enhancements for visually challenged people using a specifications reader.

A. Camera Module

Everyone of OpenCV's catch techniques (record, capturing ongoing, seize series) must be weighed in terms of their utility and capabilities. The capturing series technique was selected for this study since it is by far the quickest. Our Raspberry Pi camera can capture images at a rate of 20 frames per second at a resolution of 640x480 using the capture series approach.

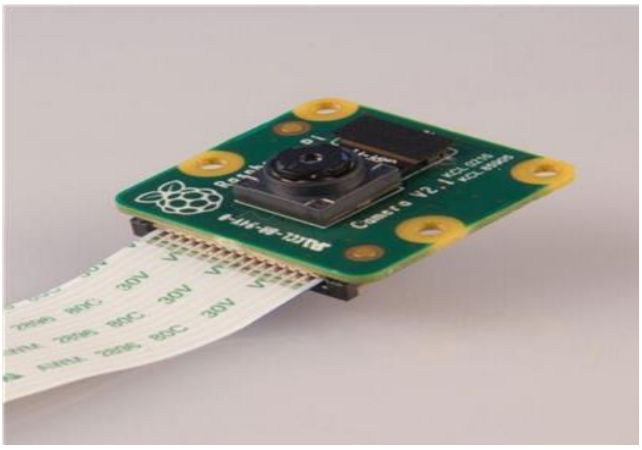

Fig.2. Camera Module

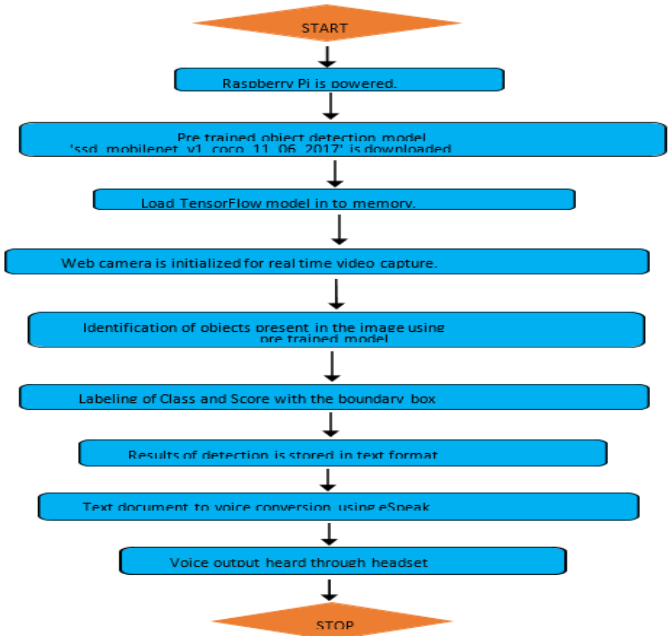


Fig.3. Flowchart of the work

B. OCR Module

TOCR is selected for the work to precisely put the message inside a sentence. TOCR outperformed the majority of commercial OCR systems. It requires a standard stage process workflow for decoding. The analysis is done in the initial stage, and the constituent shapes are saved. This stage is extremely computationally costly, but it provides various benefits, including the ability to read flipped letters and the ability to recognise black writing on a white background. The contours and areas are then evaluated as blobs after such phase. The technique embedded in the OCR breaks the line segments to letter squares for alignment. The evaluation plan is then separated into two sections: adaptive and template classifiers.

C. eSpeak is a small free software voice converter for Linux and Windows that employs a "consonance synthesis" process to prepare English and other languages. This enables a large number of languages to be supplied in a little space. The biggest benefit of adopting eSpeak is the clarity of the voice, which can be used at fast rates.

D. Hardware tools

- Raspberry pi
- Pi camera
- ESP 8266 Wifi Module
- Speakers
- Ultrasonic Sensor ADXl Tilt Sensor
- Software Tools:
- Raspbian OS
- Python

- OpenCV
- eSpeak
- OCR Tessearact

## IV. RESULTS

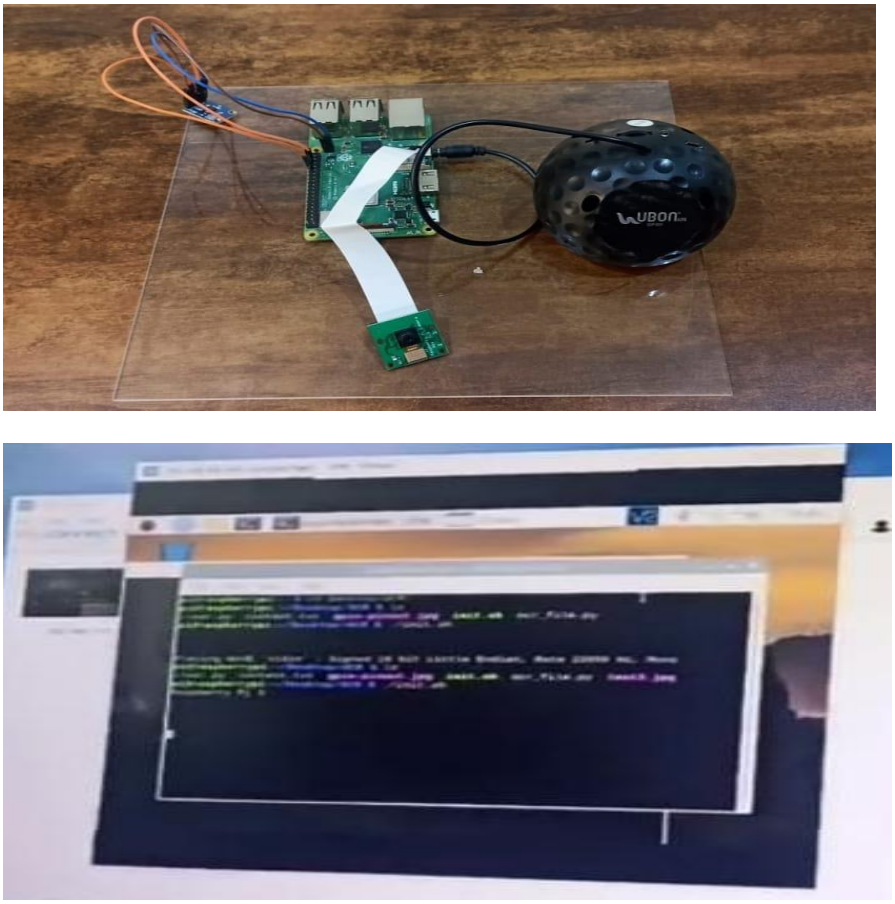

Fig.4. Result of this work

The Fig.4 shows the experimental result. The objectives if the project is met and can be seen in the Fig.4.

## V. CONCLUSION

The system uses a basic architecture to convert visual data taken with a camera into spoken data using a Raspberry Pi. Unlike most other systems available, the user merely gets to wear the hat to run it, and no special abilities are required. The suggested fix is both affordable and adaptable. It should not need any fixed skills from the person who uses it. Any blind or visually impaired individual may use because all they have to do is turn it on. The technology aids in direction prediction and identification of the surroundings. The device is a real-time monitoring system that gives acoustic information about the area, making navigation safer and more secure.

Blind persons will benefit greatly from the pilot system in terms of navigation. The amount of artefacts can be counted using image classification. The COCO model is utilised to train the SSD mobile net in this paper, that can only detect 90 object classes. We can expand the set of items by building the classifier independently. Recognition system can also be included so that the blind person can recognise his or her family and friends.

We tested our algorithm on a variety of photos and discovered that it converts them correctly. The gadget is small and useful to society.

To address this challenge, this research study has proposed a pilot system solution that can be utilized by the visually impaired for normal activities, especially during disaster situations. This Pilot system device provides real-time navigation and a narrative system. The device is cost-effective (about NZD 200), which makes it affordable and accessible

for the wider community who suffer from this problem. We hope that this proposed pilot system can be a step toward providing the visually-impaired people with the missing support and services they so desperately need during and after disaster situations. This research work is only a proof of work; in our future work, we hope to make a completely standalone version with additional assistive functionalities for the blind.

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