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# Audio Assisted Smart Glasses for the Visually Impaired using Deep Learning

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**ABSTRACT:** The recent development of deep learning has promoted object detection to make rapid progress. In recent years, smart wearable technology is rapidly becoming part of everyday life, including watches, glasses and many other wearable items have been enriched with technology. A smart glasses application system is proposed for visually impaired people based on deep learning. The system can use voice response to visually impaired people about the objects in front of them by uploading the photos to our backend object detection system and perform deep learning algorithm YOLO v3 using darknet53 architecture, through the camera function of smart glasses, and then download the text descriptions of the result and then use the text-to-speech function. The system can also detect text characters from images captured via camera by using OCR module. The system will also be able to detect and measure the distance between the user and the obstacle and inform the user via audio output. This application system can assist visually impaired people to understand the surrounding environment and interact more closely with the people around them to improve the quality of life for them.

**KEYWORDS:** Deep Learning, Object Detection, YOLO v3, Darknet53 architecture

## I. INTRODUCTION

There are many people who are suffering from different diseases or are impaired. The increasing number of people with disabilities in world attracts the concern of researchers to invent various technologies, hoping that these technologies can assist the disabled people in carrying out their tasks in everyday life like normal people.

The main goal of “Smart Glasses” is to assist them while walking alone in new environments by taking input through a stereo camera and providing feedback to the person through headphones. This smart glass can also assist blind people and people who have vision difficulties by introducing a new technology that makes them able to read the typed text. These glasses are provided with technology to scan any written text and convert it into audio text.

The goal of “Smart Glasses” is helping those people in different life aspects. For example, these glasses effectively helpful in the education field. Blind people and people with vision difficulties can be able to read, study and learn everything from any printed text images. “Smart Glasses” encourage blind people or people with vision difficulties to learn and succeed in many different fields.

We want to make something for them that would help them become independent. So, people blind can be trained to visualize objects using sensory substitution devices programmed. Evidently their displays move with the user’s head, which leads to the users seeing the display independently of his or her position and orientation. Therefore, smart glasses or lenses are the only devices which can alter or enhance the wearer’s vision no matter where he/she is physically located and where he/she looks

## II. SIGNIFICANCE OF STUDY

Most blind people are smart people and can study if they have the chance to be able to study in normal schools instead of special schools. Most people think blind people and people with vision difficulties cannot live alone and they need help all the times. In fact, they do not need help all the times, they can depend on them self in most of the times and they have the chance to live like a normal person in this life.

The main reason for implementing “Smart Glasses” for blind people is to prove all the people that blind people and people with vision difficulties have the chance to live a normal life with normal people and study in any school or university without the need for help all the times. By “Smart Glasses”, the percentage of educated people will increase. Most Schools will be able to accept people with vision difficulties instead of open special schools. The smart glasses will enhance the quality of their lives and give assurance to them to live on their own.

### III. RELATED WORK

**Guillen-PeñarretaJhonny, Vizñay-Aguilar Carlos, Serpa-Andrade Luis1, Pinos-Velez duardo (2017)** conducted a study on special glasses for obstacle detection with location system in case of emergency and aid for recognition of dollar bills for visually impaired persons. In their study they found out that there is GPS/GSM application which is of great utility and complied with the intended purpose, as the visually impaired people often get lost and will implement the emergency button. In addition, the implementation not only possesses for people with this type of disability but also for disabilities as a deaf person or with physical disabilities.

**Ramisha Rani K (2017)** conducted a study on an audio aided smart vision system for visually impaired. In their study they found the utility, that can robotically become aware of, analyze and recognize textual content in a photograph around the visually impaired and provides corresponding voice hints by means of bluetooth headphones.

**Arjun Pardasani, Prithviraj N Indi, Sashwata Banerjee, Aditya Kamal, Vaibhav Garg (2019)** conducted a study on smart assistive navigation devices for visually impaired people. In their study they found out a technology that directly converts text to braille and gives the visually impaired user an option to read in braille along with the audio message.

**Feng Lan, GuangtaoZhai and Wei Lin (2015)** conducted a study on a smart glass system that will help visually impaired people gain increased independence and freedom in city life. They have implemented an application of public signs recognition on the smart glass system. This application can detect and recognize the public signs in cities and give corresponding voice hints to the blindness.

### IV. METHODOLOGY

The visually impaired people use smart glasses to take pictures of the scene, and the photos are immediately sent to the servers. The deep learning model will perform object detection, and then output the text format of the result that can be read by TTS. TTS then outputs the detection result in a voice manner, so that the visually impaired people can clearly know the objects in front of them and their position.

- The camera will capture the image of the obstacle or the text and will store it in the SD Card.
- The image will be uploaded from the SD card to the servers via RaspberryPi for the processing.
- If the image is of an obstacle, then the Tensorflow and Keras versions will be applied on the image for classification and identification.
- If the image is of a text, OCR (optical character recognitions) will be applied to compare the words and recognize it using NLU and threshold values.
- The results of the processing will be downloaded back to RaspberryPi from the servers in the form of texts.
- This text result will be converted to audio using TTS.
- The converted audio will be given as the final output to the users via bluetooth headphones.

### V. DATASET

COCO data set was used for the study. COCO is a large-scale object detection, segmentation, and captioning dataset. COCO has several features:

- Object segmentation
- Recognition in context
- Super-pixel stuff segmentation
- 330K images (>200K labeled)
- 1.5 million object instances
- 80 object categories
- 91 stuff categories
- 5 captions per image
- 250,000 people with key points



## VI. TECHNIQUES USED

- **Distance Calculation**
- The distance between the obstacle and the user will be measured using ultrasonic sensors and will be given as output via headphones.
- **Object Identification**
- You only look once, or YOLO, is one of the faster object detection algorithms out there. Though it is no longer the most accurate object detection algorithm, it is a very good choice when we need real-time detection, without loss of too much accuracy. YOLO v3 uses a variant of Darknet, which originally has 53-layer network trained on Imagenet. For the task of detection, 53 more layers are stacked onto it, giving us a 106 layer fully convolutional underlying architecture for YOLO v3.
- **Text Recognition**
- Optical character recognition (OCR) algorithm using LSTM network will be used for text identification.
- **Text to speech**
- TTS algorithm along with RASA will be used to translate the received text results to audio outputs.

## VII. CONCLUSION AND FUTURE WORK

The smart glasses gives the result from the position of the glasses. So, this system provides overall support for the blind society in guiding. The broad beam angle ultrasonic sensors help in wide range obstacle detection. The main aim of this system is to act as a secure guard and helps the visually impaired to be aware of their surroundings. Future work includes addition of GPS system along with designing an application and face recognition to find out the people before them. Addition of GPS system helps in locating the exact position of the visually aided person which helps their guardians to find them and provides a great guide. It is necessary that visually impaired people get access to an efficient and comfortable object in order to live their daily life comfortably. In a developing country like India, there is a need for a cost-effective solution so that most of the people can have an effective product as proposed in this paper. The project "Audio assisted Smart Glasses for the Visually Impaired using Deep Learning" is designed to create a system using Ultrasonic sensors, GPS module and providing voice command through headphone to the visually impaired. It would help a visually impaired person navigate through a public place independently.

## REFERENCES

1. Indo – Taiwan 2nd International Conference on Computing, Analytics and Networks (Indo-Taiwan ICAN2020) held at National Chung Cheng University, Taiwan (February 7-8, 2020) and Chitkara University, India (February 14-15, 2020)
2. Feng Lan, GuangtaoZhai, Wei Lin "Lightweight smart glass system with audio aid for visually impaired people",TENCON,IEEE,Region 10 Conference, 2015.
3. Jafri, R., Ali, S.A.: Exploring the potential of eyewear-based wearable display devices for use by the visually impaired. In: International Conference on User Science and Engineering, Shah Alam, 2–5 September 2014.<https://developers.google.com/machine-learning/practica/image-classification>
4. <https://circuitdigest.com/microcontroller-projects/arduino-based-text-to-speech-converter>
5. Rosebrock, A. (2018). Install OpenCV 4 on your Raspberry Pi – image Search. Available at: <https://www.pyimagesearch.com/2018/09/26/install-opencv-4-on-your-raspberry-pi/>
6. Tabbara, K. F., & Ross-Degnan, D. (1986, June 27). Blindness in Saudi Arabia. Retrieved a. from <https://www.ncbi.nlm.nih.gov/pubmed/3712697>
7. Raspberry Pi Rfid Reader- How to Integrate Rfid With Raspberry Pi  
a. <https://www.deviceplus.com/connect/integrate-rfid-module-raspberry-pi/>  
b. Hc-sr04 Ultrasonic Range Sensor on the Raspberry Pi
8. ModMyPi LTD - <https://www.modmypi.com/blog/hc-sr04-ultrasonic-range-sensor-on-the-raspberry-pi>



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