

# Smart Glass for Blind People

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## ABSTRACT

Eyes are the blessings given by God to humans to live their life beautifully. The world population is about 7.8 billion, but everyone having the right vision means it is questionable. People with visual impairments use Braille Codes for reading and writing, walking sticks to detect and identify obstacles in their paths. People who are experiencing these kinds of impairments may face various problems, some of them are teased without their knowledge, some may make fun of them. This stressful environment is not good for Blind People. The main objective of our project is to make sure that blind people are aware of the person whom they are interacting with and notifying them with audio of the person's name. With the help of our proposed system, blind people can survive without depending on others or any external assistive systems. This system makes use of deep learning techniques to identify a person and provide their name as an audio output through earphones. The modern tools are just available to alert them in case of any objects present in front of them and these devices have low accuracy and cost is also high in which Blind people cannot afford to buy those gadgets. Our project provides good accuracy, best performance results for Blind people.

**Keywords-** Haar Cascade, Numpy array, Tensorflow, Opencv-Python, Face recognition.

## I. INTRODUCTION

Blindness as well as low vision, are conditions where people have a decreased ability to see and visualize the outside world. This reduces their mobility and productivity in completing their daily tasks. Blind people usually depend upon experience, smart sticks or some other people to help them in walking and avoiding obstacles. They do not have a sense of sight which makes highly dependent on their memory. Also, they cannot be aware of sudden changes in the surroundings which makes it almost impossible to react to an instantaneous situation. Understanding any of the visual aspects like colour, orientation and depth of an object is not easy. However, in the recent past, technology has made many advancements for the Visually impaired human beings. Hands free devices work completely on the audio input of the users. However, these devices are not enough to make the personal life and professional life of sight impaired people easy. They only take audio input and when users want to understand the image of their surroundings or texts. These are not helpful for Blind people. In order to increase their level of assistance, their innovation will be more helpful to Blind people. This makes visually challenged smartly survive in an environment as like normal people.

## II. LITERATURE REVIEW

[1]A system with people tracking and re-identification using RGB-D camera was developed by Kenji Koide is all about to identify the person in an office and track their paths. It is a face recognition-based people tracking system and re-identifying them using RGB-D camera networks. This system utilizes OpenPTrack, an RGB-D image-based people tracking framework and re-identify the people by face recognition based on OpenFace, which is a deep convolutional neural network-based face representation. Here, they have proposed a Bayesian interference-based face classification method for reliable re-identification of the system. Here, face visibility is hard.

[2]Jawaid Nasreen invented an application for object detection and narration for the visually challenged. This is a system which can be used to assist the visually impaired people in the understanding environment by narrating the objects in the surrounding. This developed system is based on using a website which on loading takes the image from the back camera of the phone and pass that image to the server. On server side, a trained machine learning model called YOLO (You Only Look Once) is deployed to detect the objects in that image. The result of detection is passed to the client browser where a browser-based voice library

narrates the results to the visually impaired people. Hence, the image gets recognized and the output is passed through voice output. The phone quality is essential, so it can run effectively on phones like iPhones and Samsung.

[3] Another object recognition techniques using portable camera is proposed by Vikky Mohane. In this they developed a system uses SIFT algorithm which use a lone to capture images of the view in front of the user. Different features are then extracted from those images and objects in the scene are recognized by comparing these features with those of known database objects. Before applying SIFT algorithm to the image, preprocessing of image takes place. In image acquisition, the camera captures scenes which contains region of interest in the form of images. After preprocessing and foreground and background separation SIFT algorithm is performed and key-point of the input image is drawn and that is matched with the features of database image after successful matching image recognition takes place. This method only identifies the object that we use in our day-to-day life.

[4] The smart eyeglass for visually impaired using Raspberry pi was proposed by Esra Ali Hassan. This entire system is primarily controlled by Raspberry pi. This is a Linux based ARM processor that accepts a microSD card and allow the programmer to code the program and complete various tasks. Raspberry pi camera module is used to capture the input images. The Raspberry pi GPIO port was set as if they obtained their images from push buttons. The general principle of the operation of such glasses is given by instructions via switches and give a audio output through earphones. For text recognition mode, the glasses will first detect and confirm its text position and then recognize the text. It will ask the user for text orientation. The captured images are sent to an Optical Character Recognition software and the output which is identified is given as an audio output through audio port of Raspberry pi.

[5] Heethika Gada proposed a paper, that explains about the object recognition using Haar Cascaded algorithm. They have used Raspberry pi with camera module in order to recognize the objects.

[6] The mobility assistance robot is a electronic walker which helps the disability people for navigation. This is controlled by electromyography and it is worked on android mobile phones. [7] A machine-to-machine based intelligent assistance

walker works to provide location and help the visually impaired to protect from adverse events in the time of danger or emergency. [8] Some studies states the access of museums to visually impaired visitors and import many technologies in a single museum for improved access. [9] A stereo view image processing method and a sonification process to support visually impaired people for navigation. [10] This system states the solution of wearable devices for people who have visual impairments in an eco-friendly environment.

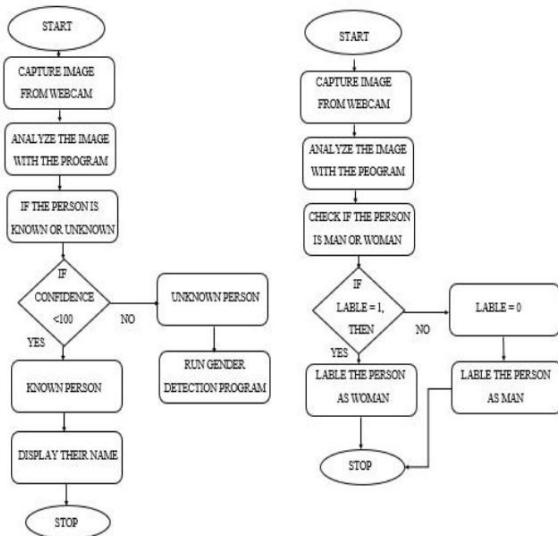
Here with reference to all these papers we have come across with an idea, which is identification of known and unknown person for blind people. This can be done in the eye glass that every blind people wear to hide their disabilities. According to the statistics, about more than 285 million people are visually impaired, with these statistics about 95 million people are blind people and about 246 million people who are aged and above 50 years have low vision. Blind people usually don't have vision to see anything and experience this aesthetic world. The people who are aged, whom experiencing lower vision can't able to spend time with their loved ones. In order to provide a solution and to give blind people a supportive vision our paper will pave a way to fade out their impairments.

### III. METHODOLOGY

Our project is to identify the known person and unknown person of a blind people in order to alert them to be concise of whom they are interacting. After identifying the known and unknown person, we will go for two conditions which is, is the identified person is a known person then we need to recognize their name from the known database of blind people. The people may have up to 10 to 15 people known or may be consider them as their beloved person of the blind's life. If the identified person is an unknown person, then we need to classify them according to their gender (man or woman). For the implementation of this paper, we use Artificial Intelligence techniques for making our paper even smarter. We implement this idea on an eye glass with a webcam affixed on top of the eye wear. The webcam that we have utilized is Logitech C270 HD webcam which is normally manufactured with an USB cable. Hence, we can connect it with the personal computer easily. To alert the blind people with the names of the known person and gender of the unknown person, we are using earphones that are connected to the audio

port of the laptop. Here we have concluded the requirements of the equipment that are used in the paper. The below flowchart illustrates the idea at its best.

The flowchart explains how we analyze the person in front of the camera and also how we classify them accordingly to the conditions. Firstly, we take the real time computer vision of the person in front of blind people. Then we'll compare it with the available database that we have collected. By comparing all these images in the database our paper will provide the name of the known person and gender classification for unknown person.



**Figure : Flowchart of face recognition for known and unknown person.**

Here, we are using two techniques for effective implementation of our idea. One is Haar cascaded classifier for identification of known person and the other is deep Convolved neural networks for gender classification. The Haar cascaded classifier will be extracting the facial features of the database and compare it with the real time image to give the output. Here the name of the known person is labelled on the top of the face. The labelling is done by defining the dimensions of the height and width of the label box. The deep Convolved neural networks is used for increasing the accuracy of the identification. This algorithm will divide the image in different frames of different pixel. According to the weights of the pixel the result will be shown. Let's see the detailed description of the identification of known and unknown person.

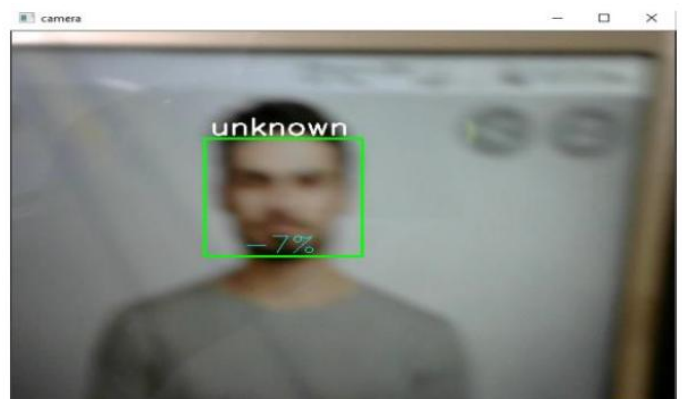
**A. Identification of known person:**

The algorithm used for the identification is Haar cascaded classifier. First we need to collect the database of the known person. For that we have

developed a program with OpenCV python. By running this program we can able to collect the images of the known person. The images will kept captured until it takes 30 snaps of the person. The captured image is then converted into grayscale in order to eliminate the possible difficulties in color extraction. If the image is colored then it will be difficult for ideal classification. The collected database is then trained concisely along with their names. For example if id=1, if the person name is Ram, then the images will be trained for the name Ram. After successful completion of training the database, we'll run the program for face recognition. If the person is known then it will display the names of the respective person and give the audio output of the name. The audio output is provided by integrating the text to speech recognition that is used for python programming. If the recognized person is unknown, then the further classification is explained in section B. The result that we have obtained is shown below.



**Figure: Results for the face recognition of known person.**

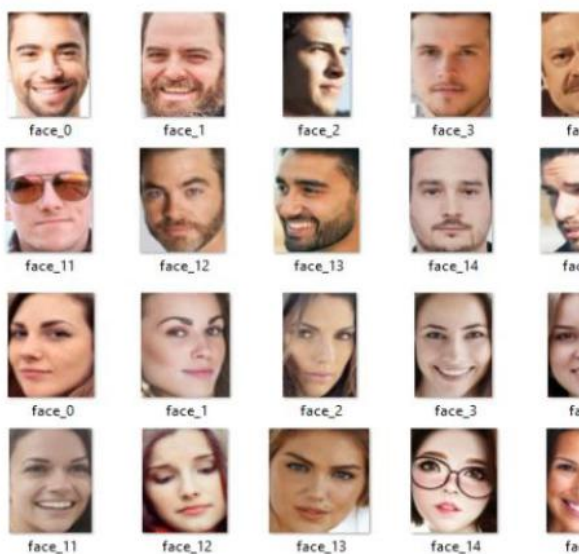


**Figure: Results for the face recognition of known person that results unknown**

**B. Identification of unknown person**

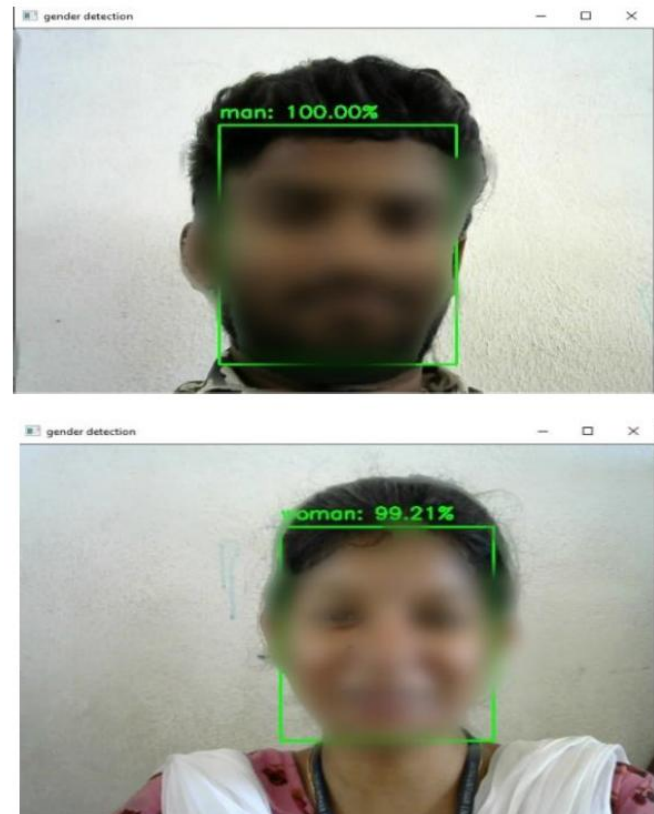
The section is utilized when identified person is

unknown as per the conditions used in section A. In order to provide the gender of then unknown, we have collected various images of man and woman. We have trained those images carefully and the accuracy level is also measured when the database is being trained for gender classification. Here the program for classifying the gender depends on the conditions that is confidence of the image that have been captured by the webcam. If the confidence for unknown is 1, then it will label the person as woman. If the confidence is 0, then it will mark the person as man. In this section also the audio output is included with text to speech recognition of python. The dataset we have collected is given few pictures in below.



**Figure: Collected database for unknown person that contains pictures of random man and woman.**

The results of our paper will be given below. It gives great accuracy and blind people will be able to hear the output through earphones.



**Figure: Results that are obtained for face recognition of unknown person.**

#### IV. CONCLUSION

This paper presents a new concept of smart glass designed for Visually impaired people using low-cost design of smart glass and cameras. For the demonstration purpose, the glass is designed to perform image recognition. The system capability, however can be easily extended to multiple tasks by adding models to the program. The system design, working mechanism and principle were discussed along with some experiment results. This new concept is expected to improve the visually impaired people lives despite their economic situations. Our immediate future work includes assessing the user-friendly and optimizing the computing unit. Technology plays a very important role in our life. We use it almost everywhere and every time. The distinct and quick development that we discover each day proof for us that there is no point to give up and struggle with our obstacles in life. Technology offers us a lot of significant solutions to our problems. Our role is to use it properly to reach the success level that benefits individual society and whole country as well.

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