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Facial Recognition Smart Glasses for Visually Challenged People

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Abstract: *There are millions of disabled people worldwide who constantly require assistance. Individuals with visual hindrance face many difficulties in their day to day life as present day assistive gadgets frequently don't meet shopper prerequisites in wording of cost and level of help. Here is a brand-new design of smart glasses for those with vision impairments.. The project of Blind assistance aims to raise awareness of a broad problem in computer vision, such as the blind's daily recognition of people in their surroundings. In order to perform the required recognition, a dataset of people gathered from everyday scenes is created. Designing and implementing blind glass-based real-time object recognition is the project's main goal.*

Keywords: Raspberry Pi, OpenCV, the Haar cascade algorithm, a database, a camera, and an acoustic feedback device.

I. INTRODUCTION

People with visual impairments face a variety of difficulties as a result of the fact that modern assistive gadgets typically fall short of customer expectations in terms of cost and amount of help. This project presents a revolutionary design for helpful smart glasses for those with vision impairments. The idea is to leverage the wearable design format to facilitate a range of daily activities. The initiative for Blind Assistance seeks to increase understanding of a variety of computer vision issues, such as the routine practise of blind persons identifying people in their environment. The camera is attached to the glasses of a blind person. In order to perform the necessary recognition, a dataset of people gathered from everyday scenes is created. Any person can be detected by the camera. The suggested method for the blind focuses on giving persons who have vision loss the opportunity to achieve their full potential. The main goal of the project is to create and put into practise blind glass-based real- time object identification.

In Saudi Arabia, 1.5% of the population is blind, and another 7.8% have vision problems, according to NCBI (1986). To improve and simplify their lives, these individuals require assistance. By introducing a cutting-edge and novel technology that enables users to locate an object, this aims to aid blind and visually impaired individuals. This project presents a revolutionary design for helpful smart glasses for those with vision impairments. The objective is to utilise the benefits of the wearable style format in a range of daily chores. The sensors are capable of detecting any person or thing.. The proposed blind method aims to make it easier for people with vision loss to reach their full potential. The project's primary objective is to develop and implement blind glass-based real-time object recognition.

II. OVERVIEW OF THE SYSTEM

There are four components in the proposed design. 1) Raspberry Pi 3, 2) USB camera, 3) earphones, and 4) Smart Glasses, which operate in conjunction with the camera. A video camera with real-time feeds or streams is the USB camera. The Espeak module notifies the user whenever the person approaches the glasses. The camera module will use to detect the person's face A potent item recognition method uses the face dataset envelope with Haar include based overflow classifiers. It is an Al-based strategy where a large number of both good and negative images are used to prepare an outpouring capability. It is then used to locate items in other images. Here, we concentrate on facial recognition. The classifier must initially be trained using a large number of positive images (pictures with faces) and

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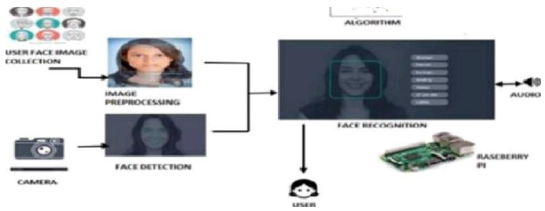
negative images (pictures lacking faces). The next step is to take features out of it. The Haar feature was used for feature extraction. We utilized a few libraries including Open cv, operating system, espeak

The history of prosthetics started with Egyptians who sees the exciting future of the technology. German mercenary Gotzvon Berlichingen got iron hand with advance technological benefit after losing his hand in the battle in 1508. Some of the historians also found the proof of prosthetic hands that are capable of generating feelings, but they were never confirmed. Earlier researches of Prosthetic hand go back to 1960's during the time people with amputation used some sort of plastic or wooden arms. There was no automation or movement at all. From then to now the basic operation of an ideal prosthetic hand remained the same. Although with the advancement of technology it became more reliable and more advance. There had been some researches around the robotic arms that can be operated from distance that was near to the real prosthetics. A prosthetic hand is an artificial device or a replacement of missing body part. A prosthetic arm is a fake arm for those who amputated their arm. Earlier arm reissued prosthesis mainly in battle to hold sword and shield. Modern prosthetic principles evolved after II world war. In 1949 first myoelectric switch was developed. Earlier body powered prosthesis components have not much changed because most of the research has focused one externally powered prosthesis and high cost of manufacturing also a prime issue.

The first microprocessor-controlled prosthetic knees became available in the early1990s. The Intelligent Prosthesis was first commercially available microprocessor controlled prosthetic knee. Batch ford & Sons, Ltd., of Great Britain, in 1993 made walking with the prosthesis feel and looks more. natural. An improved version was released in 1995 by the name Intelligent Prosthesis Plus. Batch for released prosthesis, the Adaptive Prosthesis, in1998[1]. The Adaptive Prosthesis utilized hydraulic controls, pneumatic controls, and a microprocessor to provide control action.

III. BLOCK DIAGRAM



Raspberry Pi

It is a single-board computer that takes low-cost input from the GPIO pins and is attached to LEDs, switches, and other devices. It is small. It requires a 5V power source to function, and a Micro Memory SD card that serves as its permanent memory must be inserted into it. A Raspberry Pi 3 Model B serves as the basis of our design. The Model B Raspberry Pi 3 is the third iteration of the Raspberry P. The Raspberry Pi 3 Model B offers you a more potent processor that is 10 times speedier than the Raspberry Pi 1 while preserving the well-liked board structure. Numerous applications may be employed with this powerful single board computer that is the size of a credit card. It is perfect for strong linked designs since it also offers Bluetooth and wireless LAN connection.

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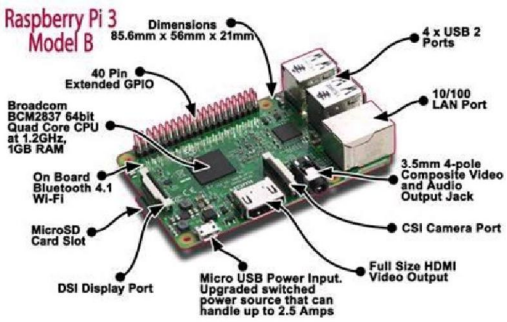

Camera Module

A variant with 5 megapixels came out in 2013, and an 8 megapixel model was out in 2016. The Raspberry Pi camera module is typically used to capture both still images and high- definition video. It connects to the Raspberry Pi's CSI port via a 15 cm lace connection. It is often used in facial recognition systems.5 pictures for preparing and 10 pictures for acknowledgment are caught utilizing pi camera

Push Button

Push Buttons are tactile switches that are usually open. Press buttons permit us to control the circuit or make a specific association just when we press the button. Simply put, pressing it connects the circuit and disengages it. The gate terminal also triggers the SCR with a push button.

Ear Phones

The main need for clients to receive sound messages is this. It is intended to alert the visually impaired individual about impediments nearby by displaying the direction and distance from the obstacle. It is better than a buzzer because it gives more accurate findings and has better perception, which makes it simpler for the person to reply.

Power Supply

Although a power bank that can be linked to a raspberry pi using a battery, travel charger, micro USB, or rectifier as the input power source allows the raspberry pi to operate without the main connection, this system needs a 5V power supply.

IV. FACE RECOGNITION

Face recognition is a biometric technology that uses computer algorithms to identify and verify the identity of individuals based on their facial features. It works by analyzing and comparing the unique characteristics of a person's face with a database of previously stored images. The process typically involves capturing an image or video of a person's face using a camera, and then using computer vision algorithms to extract and analyze features such as the distance between the eyes, the shape of the nose, and the contours of the face. This information is then compared to a database of images to identify a match. Face recognition technology has many applications, including security and

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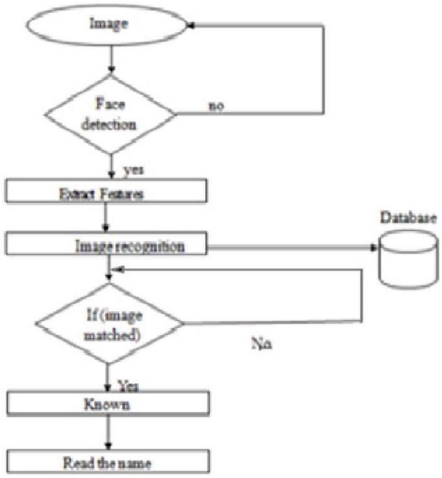
surveillance, identity verification for access control, and personalization of devices and services. However, it also raises concerns about privacy and the potential for misuse. Therefore, it is important to use face recognition technology ethically and responsibly.

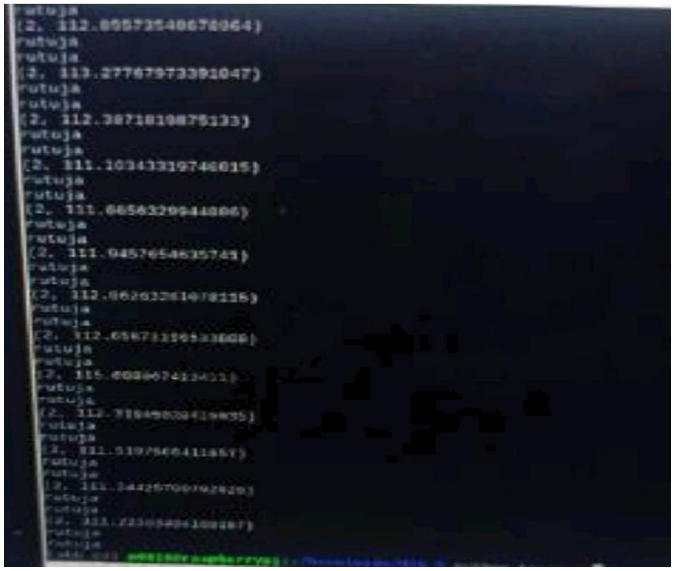
V. WORKING

We used a Raspberry Pi 3B, one USB camera, and one earphone for this project. What's more, we supplant this headphone with bluetooth headphone. The system will start up when we turn it on, and we will use Python to run the code in our system. Once the code is run, the camera window will open, and the faces in the window will be detected. The blind person will be able to hear their name over Bluetooth. This recognition is done with the help of Python and machine learning, so the blind person will be able to easily recognize the person by hearing their name



VI. RESULT

The Project "Facial Recognition Smart Glasses for Visually Challenged People" has been tested and designed satisfactorily. This "smart glasses" are built into wearable devices that can recognize faces from a database and add faces from the unknown to the database. It is the most cost-effective, portable, and effective option for visually impaired individuals.



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The live demo of the camera module's screenshot is displayed. The camera module, or Pi camera, takes a picture of the wearer when they approach the smart glasses. It then runs an analysis on the Face Dataset folder to see if there are any matches, and if there are, the person's name is spoken into earphones connected to facial recognition.

VII. CONCLUSION

Using a Raspberry Pi camera, Smart Glasses for visually impaired individuals were designed and simulated. Outside of India, smart glasses for visually impaired people are already a technology. The idea of creating portable or wearable assistive technology for people with visual impairments emerged as a result of the incorporation of computer vision algorithms and hardware. The gadget has been created by us for a minimal price of assembling, accompanies sound result, and is helpful to use for everyday exercises. While previous iterations of these systems relied on simple image processing and computer vision techniques, more current iterations of these systems are clever enough to provide a safe path for human movement.

This project's system is affordable to consumers and can be worn like a glass. Utilizing face acknowledgment, and pi-camera, we have proposed a high level framework giving the distance estimation, voice results and face acknowledgment. Since the choice of stacking and preparing the face acknowledgment module we can store and handle N number of recognizable appearances. And would enable a person to lead a life without difficulty and without the assistance of others.

VIII. FUTURE SCOPE

The system's capabilities can be easily extended to include a variety of tasks by incorporating additional models into the core program, but this is constrained by the raspberry pi SD card's capacity. Each model focuses on a specific mode or task. The ideal assignment may be conducted independently from other tasks by the customer. The design, operation, and concepts of the system were described along with some of the experiment's findings. This innovative initiative is expected to make a difference in the lives of visually impaired pupils, regardless of their financial situation.The computing unit's power management and user friendliness will be the focus of immediate future work.

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