Department of Electrical and Computer Engineering

North South University

CSE 498R

3rd Eye: Smart Eyeglass for Blind

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Declaration

This is to declare that no part of this report or the project has been previously submitted elsewhere for the fulfillment of any other degree or program. Proper acknowledgement has been provided for any material that has been taken from previously published sources in the bibliography section of this report.

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Approval

The Project entitled "3rd Eye: Smart Eyeglass for blind" by Porinita Hoque (ID#*1711204642*) is approved in partial fulfillment of the requirement of the Degree of Bachelor of Science in Computer Science and Engineering on May and has been accepted as satisfactory.

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Acknowledgement

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Abstract

Communication is one of the greatest obstacles an outwardly impeded goes through as there's need of interaction due to failure to studied someone’s facial expressions by the dazzle. In this report we display a keen glass particularly built for the dazzle called the “3rd Eye”. Built utilizing Python and OpenCV, the savvy eyeglass is able of identifying facial expressions on a person’s confront. Utilizing Haar Cascades Classifier, this shrewd glass is able to distinguish five sorts of feelings and tell the outwardly impeded individual through a joined headphone to the eyeglass. We have used ESpeak, which may be a discourse synthesizer to change over content to discourse. This extend was done so that the dazzle can get to know almost the feeling of his near ones and can progress interaction.

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Chapter 1

Project Overview

1.1 Introduction

Communication is an act of communicating one's considerations, passing on data from one individual to another. Communication is foremost to make or move forward the relationship between 2 or more individuals. Facial expressions play a vital part in successful communication. Numerous times, human creatures express their feelings through facial expressions instead of words. Amid communication, facial expressions are the preeminent include one notices as faces uncover the genuine feelings. But this could end up a prevention on the off chance that an individual is outwardly impeded. A blind individual cannot see the facial expressions of the individual he is communicating with and so cannot feel and express his possess feelings as much as an ordinary individual will be able to. This influences the mental wellbeing of the debilitated and may lead to misery, stretch and dissatisfaction.[1] Our extend points for the daze individuals by building an eyeglass which can identify the real-time facial feelings of the individual in-front. The 3rd Eye: Shrewd Eyeglass for daze will have a joined camera to the glasses and a button. When the button is clicked, the camera will turn on and in the event that the camera can distinguish a person confront, the facial highlights will be prepared and the feeling on the confront will be indicated. We draw closer this extend through a few steps. To begin with, we conducted inquire about on the extend, looked for past related works. At that point we collected the equipment components required. At that point we begun coding and building up the glasses.

This report talks approximately our arranging, prepare and the conclusion result of our extend. It moreover talks about the challenges confronted by us amid the working of the extend like budget challenges, time impediment etc.

1.2 Project Goals

Innovation has been creating quickly and is being utilized in nearly each area like healthcare, cultivating, trade and instruction. Confront location and facial expression discovery method are being utilized in numerous regions. Our objective was to construct a framework for the outwardly disabled which can identify facial expressions within the surrounding helping the impaired to induce to know the expressions of his/her near ones and know the state of his relative's intellect.

1.2.1 Project Description

The 3rd Eye: Shrewd glass for the daze could be a mechanically progressed eyeglass particularly for the dazzle, which can distinguish facial expressions. Built utilizing Python and OpenCV and Raspberry PI 3 Demonstrate B and a Camera module, it can identify real-time facial expressions by collecting the facial highlights on the identified confront utilizing Haar-Cascade classifier. The writings gotten from the detected feelings are changed over into discourse employing a discourse synthesizer.

1.2.2 Difficulty

The venture is of medium trouble. As none of our individuals are experienced with working on machine learning or profound learning, we had to memorize machine learning and profound learning through instructional exercises from the web. We at that point went through facial expression location instructional exercises. This way, we made utilize of our timeline of 8 months into completing us extend effectively.

1.2.3 Motivation

Innovation has continuously been made accessible for the abled individuals. The crippled endure the push from their incapacities due to need of innovation or due to costly accessible techs. This propelled us into building an eyeglass for the outwardly disabled which is able to identify facial feelings on a recognized confront and change over the writings into voice. The 3rd Eye can offer assistance the daze familiarizes around the passionate state of the individual he is collaboration with. This way, the daze progresses the interaction with his near ones.

1.3 Summary

This chapter indicated the diagram of our venture and extend objectives. This venture was persuaded by the need of innovation accessible for the crippled to assist them make strides communication with his relatives. Point by point data approximately facial expression location are given in Chapter 3.

Chapter 2

Related Works

2.1 Introduction

In this segment, we depict the past works which have persuaded us into building our keen glass for the daze. There are numerous ventures and investigate papers on facial expression location which depicts the strategy of feeling location in detail. In spite of the fact that there are comparative ventures related to eyeglass for the dazzle, these frameworks are moderate in preparing. The 3rd Eye is done utilizing Python and OpenCV which are solid methods for feeling discovery and forms quickly.

2.2 Related works

2.2.1 Sight: For the Blind

The Locate: for the dazzle [2] may be a savvy glass for the daze built on TensorFlow and Android Things. But there are a few restrictions to the Locate. The glasses will not work with ancient Raspberry Pi Adaptations, like Raspberry Pi Zero, as Google Android Things isn't upheld by the ancient Raspberry Pi chip. But the drawback in typically that since Android thing does not back the more current adaptations of Raspberry Pi, this extend will not work with more current adaptations of Raspberry Pi.

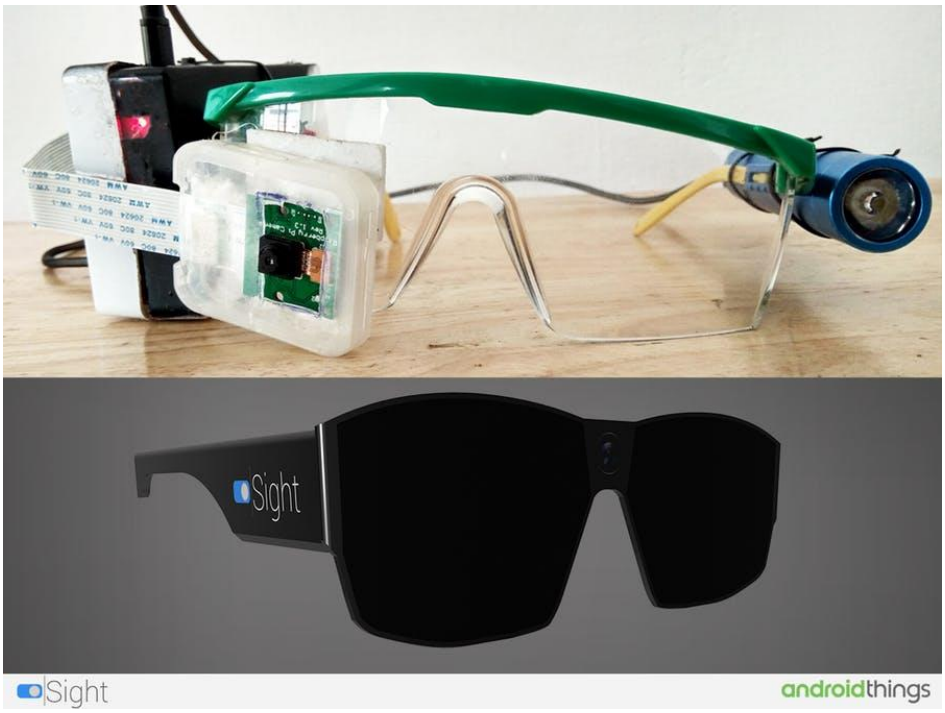

Figure 1: Sight: For the blind

2.2.2 Use of facial emotion recognition in e-learning system

U˘gur Ayvaz, H¨useyin G¨ur¨uler, Mehmet Osman Devrim have composed a commentary on utilize of facial feeling acknowledgment in e-learning framework. [3] The paper talks about almost discovery of feelings in learners and giving criticism to the teachers around the student's moment and weighted passionate states based on facial expressions. Utilizing machine learning and profound learning methods, this framework was built which is able offer assistance the teacher be mindful of the common enthusiastic state of the classroom and based on that, the educator can make strides the educating strategy and make an intuitively environment. A few classification calculations were connected to identify the enthusiastic states and the precision rates were gotten and compared utilizing kNN and SVM algorithms.

2.3 Summary

This area portrayed the past works and papers related to facial expression location. Locate: For the Daze may be a savvy glass built for the outwardly disabled fueled by Android things and TensorFlow. The paper “Use of facial feelings in e-learning system” recognizes facial feelings in learners utilizing machine learning and profound learning approach and gives criticism to the teachers around the student’s moment and weighted enthusiastic states based on facial expressions.

Chapter 3

Theory

3.1 Introduction

In this area, the hypothesis behind facial location are portrayed in detail. Facial expressions are the changes happening on a human confront demonstrating a person's inner passionate states, entomb or societal communications. In genuine time, facial expression location has ended up a noticeable investigate zone because it plays a critical part in Human Computer Interaction.

3.2 Working of facial detection

Confront discovery [4] may be a computer innovation that distinguishes human faces in advanced pictures. Confront discovery can be respected as a particular sort of object location. In question discovery, we ought to discover the areas and sizes of all objects in a picture. Face-detection calculations center on the location of frontal human faces. It is comparative to picture location in which the picture of an individual is coordinated bit by bit.

A dependable face-detection approach based on the hereditary calculation and the eigenface method: To begin with, the conceivable human eye locales are recognized on the confront. At that point, the hereditary calculation is utilized to produce all the conceivable confront districts which incorporate the eyebrows, the iris, the nostril, and the mouth corners. The wellness esteem of each candidate is measured based on its projection on the eigenfaces. After a number of emphases, all the confront candidates with tall wellness esteem are chosen for encouraging confirmation. Here, the confront symmetry is measured and the nearness of the distinctive facial highlights is confirmed for each confronts candidate.

3.3 Working of Facial Expression Detection

After the confront is identified, the diverse facial highlights are extricated just like the wrinkles next to the eyes, grin, narrowing of facial muscles, etc. This information is at that point prepared by distinctive machine learning and profound learning calculations to decide the feelings on the confront. In our extended, 5 distinctive sorts of feelings are identified utilizing the Haar-Cascade classifier: outrage, fear, unbiased, joy, and pity.

3.4 Application of Face Detection

- **Facial recognition**

  Confront location is utilized in biometrics with a facial acknowledgment framework. It is additionally utilized in video observation, human-computer interface, and picture database administration.

- **Photography**

  These days, advanced cameras utilize confront discovery for autofocus. Later cameras moreover utilize grin discovery to require a photo at a fitting time.

- **Marketing**

  Confront discovery is right now the intrigued by marketers. A webcam can be coordinated into tv and distinguish any confront that strolls by. The framework at that point decides the race, sex, and age run of the confront.

- **Lip Reading**

  Mechanized lip perusing has applications to assist computers to decide who is talking which is required when security is critical.

3.6 Summary

Protest location and Facial Discovery has changed our life. Facial Location innovation is being utilized in most of the areas just like the attendance system utilizing facial location alongside facial acknowledgment in instruction, in biometric frameworks, etc. This segment depicts the human confront location procedure and how the facial feelings are identified utilizing the facial highlights from the identified confront.

Chapter 4

HAAR-Cascade classifier

4.1 Introduction

We have recognized the feelings on a confront employing a classifier called the HAAR Cascade classifier. Haar Cascade classifier is executed utilizing an open-source library in Python called the Open Computer Vision Library (OpenCV) are utilized. In this segment, the HAAR Cascade classifier is depicted in detail.

4.2 How does HAAR Cascade work?

Haar feature-based cascade classifiers are proposed by Paul Viola and Michael Jones in their paper, "Rapid Question Location employing a Boosted Cascade of Basic Features" [5] in 2001. It is a compelling machine learning approach that is able to picture processing quickly and at an awfully high exactness rate.

The HAAR cascade highlights as appeared within the figure are applied on each portion of a picture to distinguish faces. Each includes maybe single esteem which is gotten by subtracting the entirety of pixels beneath the white rectangle from the entirety of pixels beneath the dark rectangle.

4.2.1 Equations and Calculations

To calculate the sum of pixels under the black and white rectangle, intermediate representations of the original image are produced like the **integral image representation**.

The integral image is an array containing the sums of the intensity values of the pixels located directly to the left of a pixel and directly above the pixel at location (x, y) inclusive. The simple rectangular features of an image are calculated using the integral image. That is, if A[x,y] is the original image

and AI[x,y] is the integral image, then the integral image is computed as shown in equation 1.

$$AI[x,y] = A(x', y') \text{ where } x' \leq x, y' \leq y \quad \text{(equation 1)}$$

Another intermediate representation called the **rotated integral image or rotated sum auxiliary image** where the features are rotated by forty-five degrees. Introduced by Lienhart and Maydt, the rotated integral image is calculated by finding the sum of the pixels' intensity values that are located at a forty- five degrees angle to the left and above for the x value and below for the y value. That is, if A[x,y] is the original image and AR[x,y] is the rotated integral image then the integral image is computed as shown in equation 2.

$$AR[x,y] = A(x', y') \text{ where } x' \leq x, y' \leq y \quad \text{(equation 2)}$$

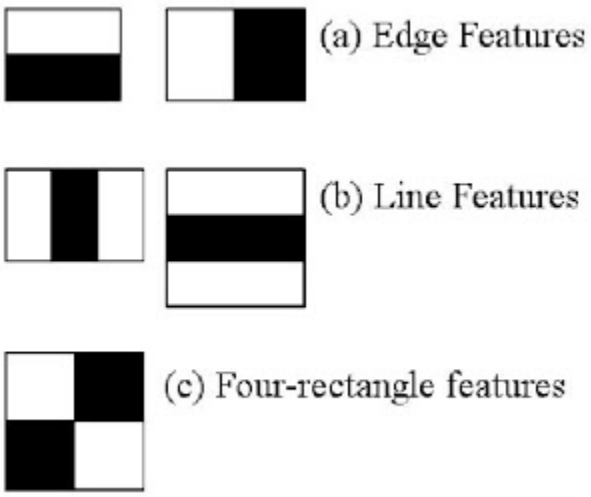

Figure 2: HAAR-Cascade features

Two passes are required to compute both integral image arrays, one for each array. Using the appropriate integral image and taking difference between six to eight array elements forming two or three connected rectangles, a feature of any scale can be computed. Hence, calculating a feature is extremely fast and efficient. Also, calculation of features of various sizes requires the same effort as a feature of only two or three pixels. The detection of various sizes of the same object requires the same amount of effort and time as objects of similar sizes since scaling requires no additional effort.

4.3 Summary

The HAAR Cascade features, its workings and equations are described in this section.

Chapter 5

Structure of the system

5.1 Introduction

The 3rd Eye, a smart eyeglass for the blind is able to detect facial expressions on a human face. The structure of our system is divided into three parts:

1. Face Detection
2. Facial Expression Detection
3. Conversion of text-to-speech

5.2 Structure of our System

The structure of the 3rd Eye is given below:

To begin with, the wearer of the eyeglass presses the thrust button which turns on the camera. The camera begins searching for any human confront. On the off chance that a human confront is detected, then the facial highlights are extricated just like the choking of facial muscles, eye muscles, lip development, etc. Analyzing from the highlights, the feeling is identified. The writings gotten from the identified feeling are put into a discourse synthesizer and the writings are changed over into discourse.

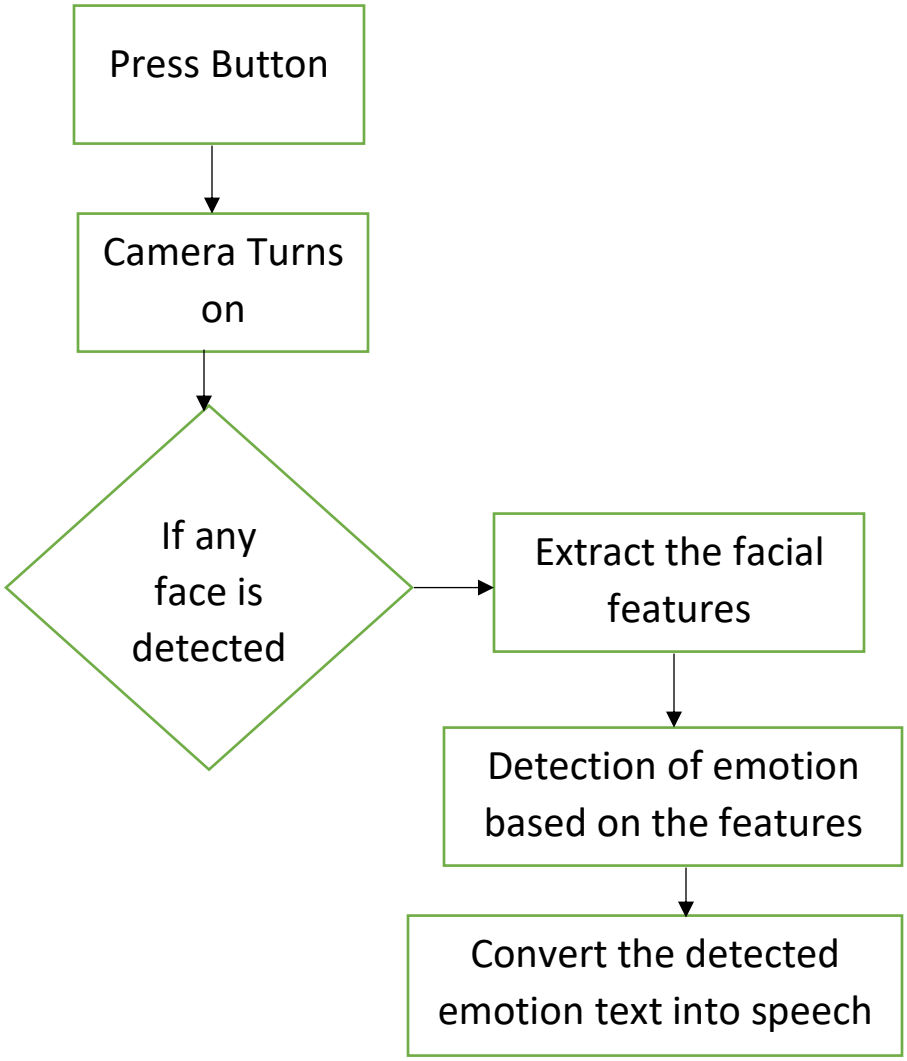

Figure 3: Structure of facial expression detection system by 3rd Eye

5.3 Workflow

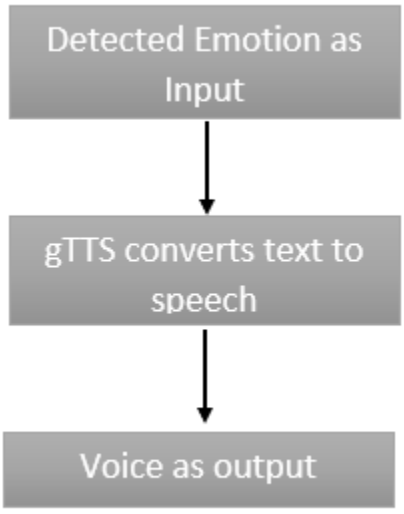

Figure 4: Workflow of 3rd Eye

5.4 Summary

In this area, we have portrayed the structure of our keen glass for the dazzle. 3rd Eye can distinguish a human confront, extricate the information of the facial highlights, and analyze the facial feeling. The writings from recognized feelings are at that point changed over into discourse by discourse synthesizer.

Chapter 6

Components used in the system

6.1 Introduction

In this segment, the components utilized to construct the framework are portrayed in detail. We have utilized Raspberry Pi, which could be a scaled-down computer with a single board. We have too utilized a camera module to capture pictures of the encompassing, a thrust button, and a remote earphone. Raspberry Pi is being utilized broadly presently in a few ventures and is exceptionally common in making smaller than expected ventures, in spite of the fact that it isn't exceptionally broadly utilized commercially.

6.2 Hardware Components

6.2.1 Raspberry Pi

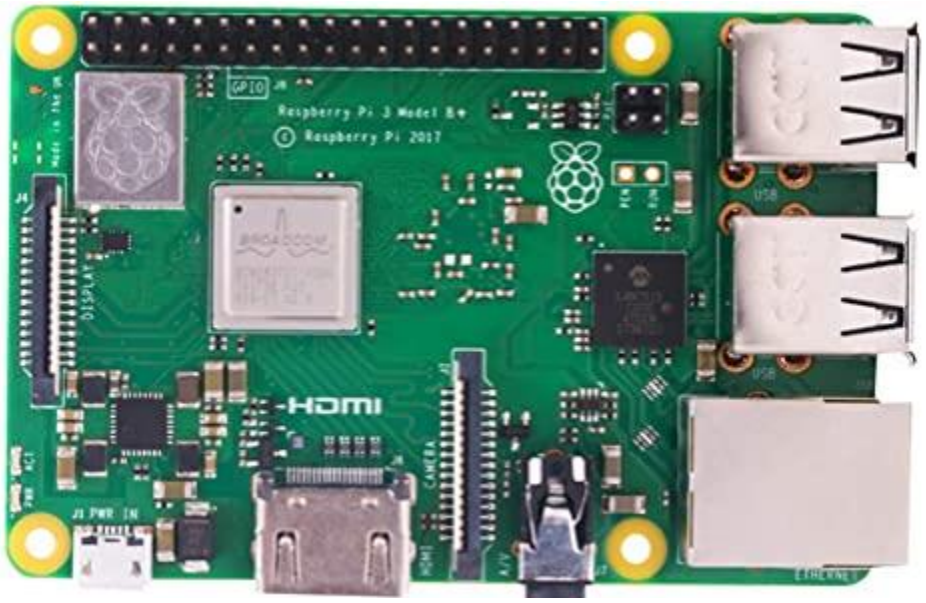

Figure 5: Raspberry Pi

Raspberry Pi 3**[6],[7]** is the processor of our system. It is an ARM based credit card sized SBC (Single Board Computer) created by Raspberry Pi Foundation developed in the United Kingdom. Raspberry Pi runs Debian based GNU/Linux operating system Raspbian and ports of many other OSes exist for this SBC.

There are various benefits of Raspberry Pi:

1. Low cost
2. Huge processing power in a compact board
3. Several modules can be connected such as HDMI, multiple USB, Ethernet, onboard Wi-Fi and Bluetooth etc.
4. Support Linux, Python

There are several versions of Raspberry Pi:

1. The first generation **"Raspberry Pi Model B"** was released in February 2012, followed by the simpler and cheaper Model A.
2. In 2014, the Foundation released a board with an improved design, **"Raspberry Pi Model B+"**. These boards are approximately credit-card sized and represent the standard mainline form-factor.
3. In February 2015, the **"Raspberry Pi 2"** was released featuring a 900 MHz quad-core ARM Cortex-A7 processor and 1 GiB RAM.
4. A smaller size **"Raspberry Pi Zero"** with reduced input/output (I/O) and general-purpose input/output (GPIO) capabilities was released in November 2015 for US$5.

5. In February 2016, **“Raspberry Pi 3 Model B”** was released with a 1.2 GHz 64-bit quad core processor, on-board 802.11n Wi-Fi, Bluetooth and USB boot capabilities.
6. **“Raspberry Pi 4 Model B”** was released in June 2019 with a 1.5 GHz 64-bit quad core ARM Cortex-A72 processor, on-board 802.11ac Wi-Fi, Bluetooth 5, full gigabit Ethernet, two USB 2.0 ports, two USB 3.0 ports, and dual-monitor support via a pair of micro HDMI ports for up to 4K resolution.

6.2.2 Camera Module

The Raspberry Pi Camera Module **[8]** are official products from the Raspberry Pi foundation. The Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. All current models of Raspberry Pi have a port for connecting the Camera Module. The original 5-megapixel model was released in 2013 and an 8-megapixel Camera Module v2 was released in 2016. For both the models, there are visible light and infrared versions. A 12-megapixel high quality camera was released in 2020.

Figure 6: Raspberry Pi Camera Module

6.2.3 Push Buttons

The thrust button acts as a trigger for the camera to press a picture. When the thrust button is squeezed, to begin with, it begins the camera module and squeezed once more, the camera takes a picture.

6.2.4 SD card

The SD card could be a key portion of the Raspberry Pi; it gives the starting capacity for the Working Framework and records. Capacity can be expanded through numerous sorts of USB associated peripherals.

6.2.5 Power Bank/Battery

To power up the Raspberry pi, we use a power bank and connect it via a USB port.

We can also use batteries.

6.2.6 Wireless Headphone

A wireless headphone is attached through which the person will be able to hear the names of the detected objects.

Figure 7: Push Button

6.3 Implementation Methods

6.3.1 Python 3

Python **[9][10]** is an interpreted, high-level, general-purpose programming language. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and largescale projects.

Python was created by Guido van Rossum and first released in 1991. Python's design emphasizes on code readability with its notable use

of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects. Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including structured, object-oriented, and functional programming. Python 3.0 was released in 2008 which was a major revision of the language that is not completely backward-compatible and more features are supported in Python 3 than in Python 2.

6.3.2 OpenCV

We used the OpenCV **[11],[12]** (Open source computer vision) with Python to build our project.
OpenCV is a library of programming functions mainly aimed at real-time computer vision. The library is open source and cross-platform under the BSD license. OpenCV is a highly optimized library with real time applications. OpenCV supports some models from deep learning frameworks like TensorFlow, Torch, Py-Torch.

6.3.3 Dataset

To train our classifier, we have used a dataset consisting of 800-900 images for each emotion. Each feature is applied on all the training images. After a classifier is trained, it can be applied to an input image. The classifier gives an output of “1” if the region is likely to show the object and “0” otherwise. The classifier searches the whole image to detect any object it has been trained with, like a face or car.

6.3.4 gTTS

To convert the texts to voice, we have used a speech synthesizer called gTTS **[13]**. gTTS (*Google Text-to-Speech*) is a Python library and CLI tool to interface with Google Translate's text-to-speech API. Some of the features of gTTS are given below:

- Customizable speech-specific sentence tokenizer that can read unlimited lengths of text, all while keeping proper intonation, abbreviations, decimals and more
- Customizable text pre-processors which can provide pronunciation corrections
- Automatic retrieval of supported languages

6.4 Summary

To implement our system, we have used Raspberry Pi 3, a camera module, SD card, power bank and a push button as hardware components. For coding, we have used Python 3, OpenCV which is a library in Python and gTTS as speech synthesizer to convert texts to speech.

Chapter 7

Results and Discussions

7.1 Introduction

This area examines the arrangements and comes about what we have gotten from our venture. The 3rd eye is able to perform real-time facial expression discovery precisely and indicate the names of the feelings through the headphone. Its execution is exact and quick.

7.2 The Completed System

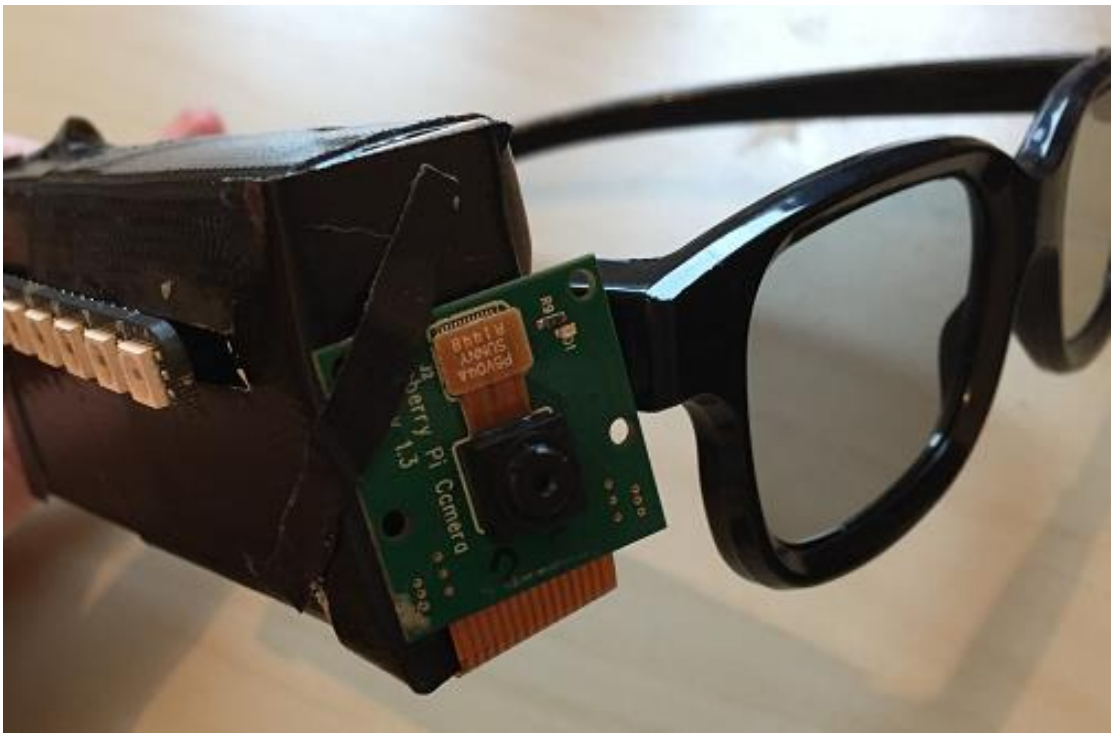

Figure 8: 3rd Eye-Smart glass for the blind

7.3 Results and Findings

The eyeglass can detect 5 emotions which are anger, happiness, sadness, fear and neutral. The facial features related to each emotion are given below:

7.3.1 Facial features related to the emotions

Emotion	Facial Features
Happiness	Lip corners raised diagonally, tightened muscles around the eyes, cheeks raised
Anger	Upper and lower eyelids pulled up, eyebrows pulled down, margin of lips rolled in, tightened lips
Sadness	Loose eyelids, lip corners pulled down, inner corners of eyebrows raised
Fear	Eyebrows pulled up and together, upper eyelids pulled up, mouth stretched
Neutral	Blank Expression

Figure 9: Table showing the different facial features for each emotion

7.3.2 Facial Expression detection

When a confront is recognized by the camera within the encompassing, a rectangle is drawn around the confront utilizing the Haar cascade classifier. Based on the facial highlights of the identified confront, the classifier compares the highlights on the confront with that of the prepared pictures and the emotion that matches the finest is shown on the screen. The coming about feeling content is changed over to voice utilizing the gTTS. The sound is listened through the headphone joined to the glass.

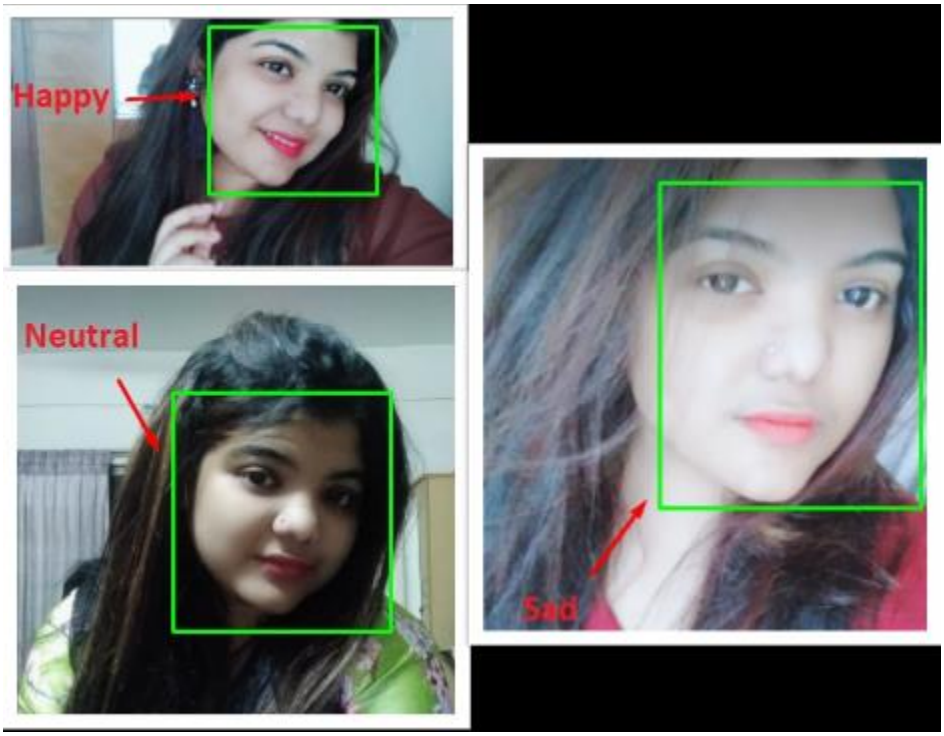

Figure 10: Emotion detection using HAAR cascade classifier

7.4 Summary

The 3rd Eye: Smart glass for the blind can detect 5 facial emotions. The text is converted into audio using gTTS. The voice graph for the neutral emotion is given above.

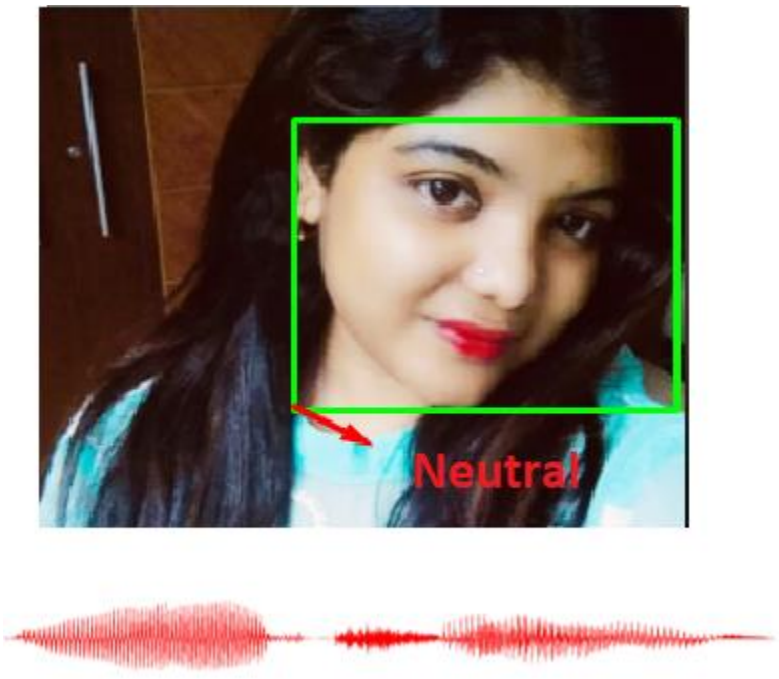

Figure 11: Voice graph for the neutral emotion

Chapter 8

Compliance with standards

8.1 Introduction

There are several international standards a project should meet. Some of the important ones are IEEE **[14]** standard. The compliance of 3rd Eye with these standards are described in this section.

8.2 Compliance with IEEE standard

There are a few distinct guidelines put forward by IEEE Standards affiliation. Our project meets the IEEE standards for Raspberry Pi. Our system is safe, beneficial for the disabled, and uses equipment that do not pose any threat to the environment.

8.3 Summary

In this section, the compliance of our project with the IEEE standard are described.

Chapter 9

Design Impact

9.1 Introduction

The impacts that our extend have on the environment, wellbeing, and economy are depicted in this segment. Moreover, manufacturability and maintainability are portrayed in detail.

9.2 Impact on Economy

There are numerous shrewd glasses accessible within the showcase just like the Google Glasses. But, due to its exceptionally tall cost, numerous are not competent in managing it. So, this eyeglass is financially productive for the industry as this will be accessible at a cheap cost and numerous individuals will be able to but it. These days, individuals are inquisitive about keen gadgets. There are numerous gadgets accessible within the advertisement like shrewd phones, keenly observe, etc. So, the 3rd Eye will be mechanically productive as this may be utilized not as it were by the daze but moreover by typical individuals.

9.3 Impact on Environment

n spite of the fact that our extension does not help within the improvement of the environment, it in no way hurts it. Our extend is free from all sorts of materials and chemicals that will hurt the wildlife or the environment. So, it is secure to say that our extension does not have any negative natural affect.

9.4 Ethical Impact

Our project can be put to a wide run of employments. It can be utilized by the outwardly impeded to help them in collaboration with relatives. It is expecting to form the life of the crippled easier.

Thus, we will say that it is anticipated to have a positive moral impact.

9.5 Political impact

Our project does not have any direct impact on the political aspect.

9.6 Health and safety impact

Our point for the venture was to emphatically affect the wellbeing and security of its client. The 3rd Eye is implied to assist visually impaired live distant better; a much better; a higher; a stronger; an improved">a much better life with the certainty that typical individuals live with. Another point worth specifying is that our venture does not utilize any destructive chemicals or substances, or transmit any harmful radiation that seems adversely influence the producers, clients, or the environment. In this way, we will say that it has a by and large positive wellbeing and safety impact.

9.7 Manufacturability

The 3rd Eye requires components which are widely available at a low price. The mechanical design is simple and has been precisely documented. Thus, it would not be a complex system to manufacture.

9.8 Sustainability

Our keen glass for the dazzle has been made inflexible and all parts are settled unequivocally to each other so there's an exceptionally small chance of the components breaking down, extricating, or falling separated. The plan is

anticipated to be tough and safe to weight or stretch of any kind. The Raspberry PI 3 could be a great show which incorporates an exceptionally tall handling control and has an exceptionally moo chance of damage.
Thus, it is anticipated to support for a long period of time.

9.9 Summary

The diverse angles of this project's effect and its manufacturability and supportability have been discussed in this chapter.

Chapter 10

Conclusion

In this venture, we centered on creating a savvy glass called the 3rd Eye which is competent in identifying facial feelings on a human confront. We completed this extend utilizing Raspberry Pi 3 Demonstrate B, a camera module, and executed it utilizing Python and OpenCV. The 3rd Eye can distinguish feelings such as bliss, pity, outrage, fear, and neutral.

The eyeglass can distinguish feelings utilizing the HAAR-Cascade classifier highlights. The eye-glass may be a user-friendly glass for the impaired, particularly the daze. When an individual pushes the button, the camera tries to identify a human confront. In case a confront is identified, the classifier extricates the highlights and compares those highlights with that of the prepared pictures and decide the feelings. The writings from the identified feelings are converted into discourse utilizing gTTS which may be a discourse synthesizer. The sound can be listened the remote earphone connected to the glasses. We worked hard and attempted making the extend an effective one. Within the future, we are going attempt joining facial acknowledgment highlight to the glasses so that the glasses will be able to distinguish faces of people and tell the title of the individual, in the event that known.

We trust that our keen eyeglass will offer assistance the impaired, particularly the dazzle to live a simpler life and offer assistance them associated unreservedly with their cherished ones. We too trust to that our shrewd eyeglass will have an extraordinary effect on people's lives.

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Appendix

```
//Code for Facial Expression Detection
import cv2
import label_image
from gtts import gTTS
```

```
import os


size = 4

# We load the xml file
classifier = cv2.CascadeClassifier('haarcascade_frontalface_alt.xml')

webcam = cv2.VideoCapture(0)  # Using default WebCam connected to the PC.

while True:
    (rval, im) = webcam.read()
    im = cv2.flip(im, 1, 0)  # Flip to act as a mirror

    # Resize the image to speed up detection
    mini = cv2.resize(im, (int(im.shape[1] / size), int(im.shape[0] / size)))
```

```
    # detect MultiScale / faces
    faces = classifier.detectMultiScale(mini)

    # Draw rectangles around each face
    for f in faces:
        (x, y, w, h) = [v * size for v in f]  # Scale the shapesize backup
        cv2.rectangle(im, (x, y), (x + w, y + h), (0, 255, 0), 4)

        # Save just the rectangle faces in SubRecFaces
        sub_face = im[y:y + h, x:x + w]

        FaceFileName = "test.jpg"  # Saving the current image from the webcam for testing.
        cv2.imwrite(FaceFileName, sub_face)

        text = label_image.main(
            FaceFileName)  # Getting the Result from the label_image file, i.e., Classification Result.
        text = text.title()  # Title Case looks Stunning.
```

```
        print(text)
        font = cv2.FONT_HERSHEY_TRIPLEX
        cv2.putText(im, text, (x + w, y), font, 1, (0, 0, 255),
2)
        # language = "en"
        # output = gTTS(text=text, lang=language,
slow=False)
        #
        # output.save('output.mp3')
        #
        # os.system('start output.mp3')

    # Show the image
    cv2.imshow('Capture', im)
    key = cv2.waitKey(10)
    # if Esc key is press then break out of the loop
    if key == 27:  # The Esc key
        break
```