

IMPLEMENTATION OF VOICE BASED E-MAIL SYSTEM FOR VISUALLY CHALLENGED

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Abstract—The advancement of technology and its infinite possibilities have made it unavoidable for current generations to fully utilise Internet technology. Email, as one of the most extensively used features of the Internet, serves as a basic requirement. Despite the availability of various screen readers, visually impaired users face challenges when using the internet. The research intends to provide them with voice assistance. The goal of Voice Based Email for the Visually Impaired is to provide easy and efficient access to emails. Anyone can use this application, which is based on the usage of speech and text recognition modules, to manage their email accounts and conduct useful functions like reading and sending using only their voice. The device's output voice commands to the user, and the user will respond. Speech and text recognition technologies are thus used in this work. The Speech Recognizer, also known as Automatic Speech Recognition, transforms audible words into text, making email composition simpler. The system reads out the message's received with subject and body of the mail through the Text recognizer.

Keywords— Speech recognizer, Text recognizer.

I. INTRODUCTION

Communication in the modern world has become exceedingly straightforward because to the internet's integration with communication technology. In the modern world, the internet is regarded as a significant repository of knowledge. It is now even one of the accepted forms of communication.

Many fields have seen a significant change since the advent of the internet. People today can access any information they desire while sitting at home thanks to the internet, which has made life incredibly simple. Communication is one of the key areas that the Internet has transformed[1]. When online communication comes into discussion, email is the first thing that springs to mind. For delivering or receiving critical information over the Internet, email is thought to be the most dependable mode of communication. However, there is a special prerequisite for using the Internet as a person, and that prerequisite is vision. You must be wondering what kind of standard this is since everyone with sight can see it. However, there are also persons with specific needs in our society who lack your talents. Unable to see anything, including the computer screen or keyboard, are certain blind or visually impaired people.

More than 295 million visually impaired persons live in the world, according to a poll. In other word, 295 million people lack basic Internet and email literacy. A visually

impaired person can only send emails by dictating the message's whole to a third party who is not blind or visually impaired, who will then write the message and send it on the disabled person's behalf. However, this is not the proper course of action in this situation[2],[3]. A visually impaired person finding assistance frequently is quite unlikely. Although our society criticises those with exceptional needs for these reasons. In order to enhance society and give such differently abled persons an equal footing, this project idea comes into play by enabling the user to create emails utilising voice instructions without the need for a keyboard or any other visible objects.

In apps for the disabled, Text to Speech and Speech to Text translation are both frequently utilised. Additionally, they can be utilised for a variety of purposes, such as: Using text-to-speech and voice recognition technology from Nuance Communications, Siri, an in-built intelligent automated assistant, enables users to interact with tools and engage with local and/or remote services more successfully.

In order to reduce time when writing emails at work, this paper examines the use of text-to-speech and speech recognition libraries in email assistants[4]. Employees with disabilities or ordinary employees whose main method of communication is email are the target audience for the technology platform. Voice typing is not supported by the email system, which is mostly focused on manual input. With the help of artificial intelligence, the email system has started to recognise the mail context and offer predictions based on it, although it still has its limitations.

When email is the main form of communication in a workplace, the idea of typing an email Communication takes a little longer, but with an audio control bot, it is simple to structure the email from beginning to end using voice commands, and in less time, one may send mail to everyone or any group on the sender's list. In an online environment, email is one of the most reliable methods of communication and correspondence[5][6]. In place of using hardware like mouse, keyboards, controllers, etc., voice collaboration with programmes is a popular and accepted practise. Speech is a hands-free, yet precise method of communicating with purposes that permits users to be productive and informed in situations where other interfaces cannot. Speech recognition is a topic that is useful in a variety of applications and situations in our daily lives. Another aspect of Voice Recognition recognition is to motivate people who have a functional

incapacities or other types of inabilities. Voice control could be useful in making their daily schedule more efficient.

II. LITERATURE SURVEY

Dikshita Patel, Minakshi Kudalkar, Shashank Gupta, Renuka Pawa [20] used Convolutional structures in place of the conventional 3-tiered recurrent neural network architecture in the real-time speech translation system, which increased the system's overall accuracy and delivered an accuracy of 99.27 percent.

Harsh D Shah, Amit Sundas Shabnam Sharma A system was developed in which the sender[24] would enter into their own email account and, using voice commands and speech, would be able to send emails to specific recipients on their contact list. This work concentrated on Speech recognition System with a broad vocabulary that can support continuous speech in various languages and speaker-independent activity.

K.G Maheswari, R.Meenakshi, G NaliniPriya, Anandasayanam K, Hariram B, Maheswara Pandian G [22] developed a voice-based email assistant powered by AI. The voice assistant receives voice input from the user, translates it to text, and then emails the text to the intended recipient. To begin, enter the user's email address and Gmail password. Simple Mail Transfer Protocol, or SMTP, is the most popular and widely used email protocol. It is utilised to send email via the internet from one account to another.

Suresh Malodia, Puneet Kaur, Nazrul Islam, Amandeep Dhir [18], looked at different consumption metrics related to voice assistant. Utilised a mixed-methods approach built on a theoretical foundation based on the principle of consumption values, which comprises cross-sectional research with active voice assistant users ($n = 371$) as well as expert ($n = 5$) and consumer ($n = 30$) interviews. The study considers five buying patterns, including social identity, convenience, embodiment, subjective standards, and perceived playfulness, as well as two ways to use voice assistants, information search, and task function.

With the aid of text and speech recognition algorithms, Pof. S. S. Khatal, Shilpa Sasikumar, Lakshmi Rahim, Prapti Lasunte, and Sindooja Gajam created a Voice Based Mailbox[16], System for Blind Using Face Recognition Technique to make it simpler for people with visual impairments to access email services. The system allows the user to identify themselves by face. When a user first logs in to a system, their face is collected by the application, and LBP features are extracted from the face. The Support Vector Classification technique is used to analyse the LBP face features.

Woo Young Park, Sang Hyun Kim, Duy-Son Vu, Chang Han Song, Hee Soo Jung, Hyeon Jo, used SMTP reply codes linked to email loss to do traceback and verify the sender of emails. [23]. The system creates a verification request session and communicates with the email server

and DNS of the sender upon receiving an email. The suggested framework determines the sender's authenticity based on information returned by the email server of the sender.

Tae-Kook Kim, proposed a voice command system that uses a user's voice commands to operate modules[21] such as a relay module. By utilising Raspberry Pi, modules, and free software, the system was created affordably. Through the useful speech recognition interface and many modules, this system enables users to construct their own system. This paper describes the design of a voice control system that makes use of embedded devices and open API AIs.

Georgios Germanos, Dimitris Kavallieros, Nicholas Kolokotronis, and Nikolaos Georgiou, After researching privacy concerns in environments that use voice assistants[19], gave a typical audio assistant system, together with the current EU regulation on the processing of personal data and its privacy elements. The functionality of the vocal assistants Alexa from Amazon, Assistant from Google, and Cortana from Microsoft was stimulated on a custom testbed..

III. IMPLEMENTATION

1. Block Diagram of Voice based E-Mail service for visually challenged:

The development of this web application will be entirely based on "voice" or "speech." The system will be able to receive commands from the client, which it will then carry out. The main benefit of this programme is that it won't require any keyboard input. The user will only need to into the gadget. The dilemma of where on the screen the user should tap next and how a blind person will find the target point now emerges. Because a visually impaired person cannot see any particular place, the system allows the user to tap anywhere on the screen and voice out his inputs [7],[8],[9]. At any given moment, only one input field will be active. As a result, regardless of where the user taps on the screen, the input will be fed into the proper input area.

By enabling users to communicate with one another via voice assistant, the newly developed technology outperforms the current system. The sender is not limited to selecting a single recipient; additional recipients in the nearby code area may be added.

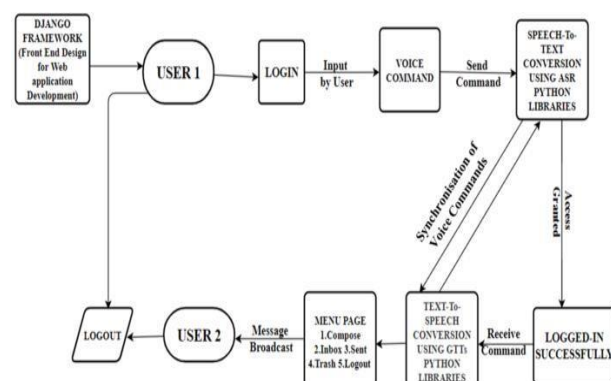


Figure 1 : Block Diagram of Voice based E-mail for visually Challenged

The Django Framework is used to first establish a user interface that directs users to web pages made with front-end design tools including HTML, CSS, and Javascript as shown in fig 1. When a user visits the website, he or she must log in using an email address as their username and password to access their account which will be obtained in speech format and converted to text. The system will then use this text to determine whether or not the user is legitimate. The system will move that user to the following GUI if they are an authorised user. After a successful login, the application navigates to the menu screen, where users may execute operations including compose, inbox, sent mail, trash, and logout.

2. Creating a Django Project by setting up an virtual Environment and installing text and speech Recognition Module

Framework for Python Django focuses on backend and API/middleware development primarily. The objective is to construct a Web application that has an administration panel that allows users to add and edit information. The CRUD capability is provided by the entire programme[34].

2.1 Steps to Create a Virtual Environment

Is as Python-related dependencies that install all of the necessary Python-related packages and versions for a specific project.

1. Make a new directory called "project-Homepage" by using the Desktop's "mkdir" command. Using the 'cd' command, change the directory to "project-Homepage". Python's "python -m venv env" command creates the virtual environment, displayed by the "ls" command. The 'source' command can be used to activate the virtual environment when the folder 'Scripts' needs to be installed[35].
2. In the event that the virtual environment is successfully activated, the 'env' will be displayed in parentheses. To install Django in a given Virtual Environment, use the command "pip install django" to install the necessary package.

2.2 Making a Django Project

1. The first step is to run "django-admin startproject project name," where "project name" is "django homepage." Furthermore, our brand-new project will generate a large number of files. Change the directory to the newly formed project with the cd command, then inspect the created file with the ls command[35].

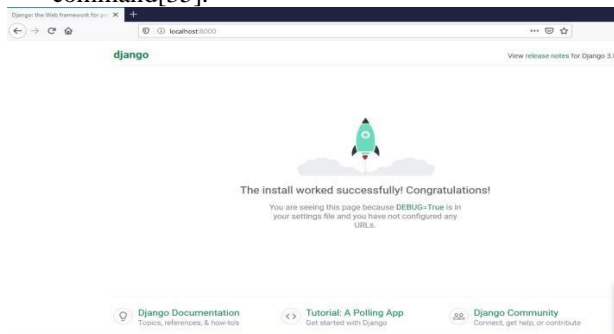


Figure 2.2 :Django Project Successful Installation

2. Using "python manage.py runserver" to run the project. One can see the project in their preferred browser. As seen below, one can enter the URL in the browser by typing "localhost:8000" or "127.0.0.1:8000".

And also HTML and CSS languages are used to make the webpage look amazing and Interactive.

3. The following command is entered into the command prompt terminal to install the gTTS module:—

pip install gTTS

4. Once the installation is complete, use this module to turn the text typed into speech[28]. This module turns the text typed into speech. Let's examine the program -

```
from gtts import gTTS
text = Welcome to the Home Page.
tts=gTTS(text)
tts.save("Menupage.mp3")
```

5. Importing the speech translation tool's library, or gTTS, from the gtts module. The user's input is saved as a string in the text variable. Another possibility is to have the user enter each time the programme is run with their own intended input using the input statement[28]. The procedure is as follows:

```
text = input("Enter your text: ")
tts=gTTS(text)
tts.save("user_input.mp3")
```

6. The user's input is translated using Google's text-to-speech service using the tts variable. The tts variable contains the output of the converted text as speech. The converted speech can be saved using the tts.save function in a playable format and store it in the.mp3 format in a file called mysite.
7. Once saving the file successfully. This file can be run in 3 different ways. —Launching the stored file directly from the folder. Making use of the OS module: Thus creation of Django framework by setting up an virtual Environment, creating urls and templates and finally get a login page for the user to access the application further by adding more options[28].

```
import os
os.system("speak.mp3")
```

Making use of the playsound module.:

```
pip install playsound
from playsound import playsound
os.system("user_input.mp3")
```

8. Google's speech recognition API is one of the several APIs that Speech Recognition API supports[29]. The process of translating speech into text is helpful. Using a Python library to install:

pip install Speech Recognition

2.3 Creating text from an audio file:

1. Install a voice recognition library. Setting up the recognizer class and utilising Google Speech Recognition to recognise the speech.
2. Speech recognition software supports the audio files wav, AIFF, AIFF-C, and FLAC.
3. Use an audio clip as an example. By default, Google's voice recognition software reads English. Other languages are supported[29].

3. Various Types of E-Mail Operations Performed

3.1 Composing of an E-Mail

The user can configure the mail they want to send in this module as shown in fig 3. As to how it operates:

- Next, the programme will ask for the recipient's names, the message's subject, and the body.
- The user will provide this information orally, and the application will convert it to text.
- The application will then read the recipient's name, the message's subject, and its body before requesting confirmation.
- Following affirmation, the appropriate recipient or recipients will receive a letter.

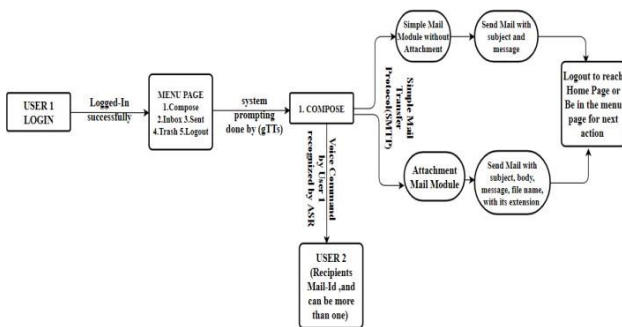


Figure 3 : Data Flow Diagram for Composing an E-Mail

3.1.1 Send Emails in Python with Gmail:

In a few lines of code, setting up an app password in the Google account. SMTPlib must be imported by the user. The usage of SMTP, enables software to send emails over the internet. The servers of SMTP employ the Transmission Control Protocol (TCP) on port numbers 587 and 25 (SMTP).

1. Setting up a Google Account:

- Configure an app password for a third-party programme, in how to send emails using a Gmail account, such as a Python script.
- The standard Gmail password can only be used for web login for security reasons.
- Additionally, starting in 2022, even with the "Less Secure App Access" being disabled for the google account, with the default password a Python script cannot access Gmail account.
- The first step is to enable 2-Step Verification by doing the following actions: Select 2-Step Verification under Google Account > Security > Signing in to Google, then follow the on-screen directions [30], [33].

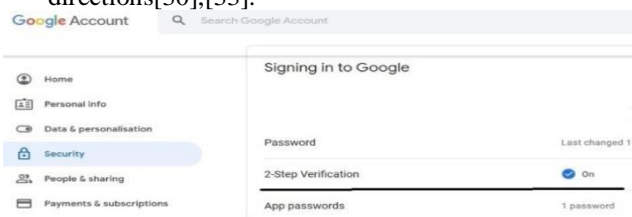


Figure 3.1.1: Enable 2-Step Verification [30]

- Make an app password next. Simply choose "App passwords" under "2-Step Verification," and a popup similar to the one below will appear. In the dropdown for "Select app," choose "Other."

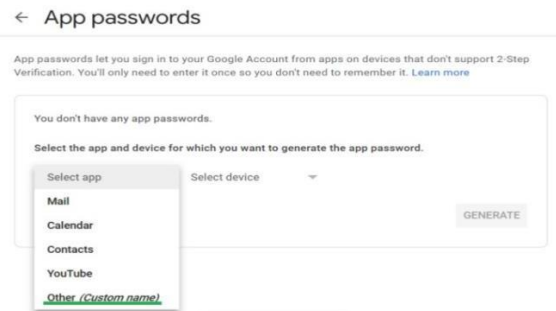


Figure 3.1.2: App password/Step 1 [30]

- Input a name, like Python, and then click "GENERATE." This name is completely unrelated to the Python script and might be anything as shown in fig 3.1.3.

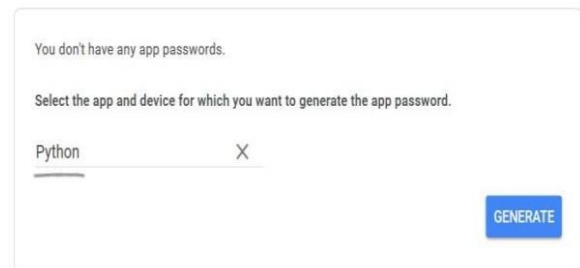


Figure 3.1.3 : App password/Step 2 [30]

- An entirely new app password is issued to the user [33]. The 16-character password should not contain a space. Copy and save it, for example, xnbwjmgvjeeevlgc, as shown in fig. 3.1.4.



Figure 3.1.4 : App password/Step 3 [30]

- For Composing an E-Mail:
 - First, import the smtplib and standard email packages and define the variables that will be used like Gmail username and password for the app, Gmail host and port, To, Subject, Body composition and Attachment.
 - Secondly, using the data above, create an object for email messages. To allow for the addition of attachments, the message is defined as a MIME (Multipurpose Internet Mail Extensions) Multipart [32], with each part being a MIMEText object that also allows binary files.

- Invoking the smtplib to log in and transmit the message is the final step. Emails can be sent using the Python standard library without the need to install any additional libraries as shown in fig 3.1.5.

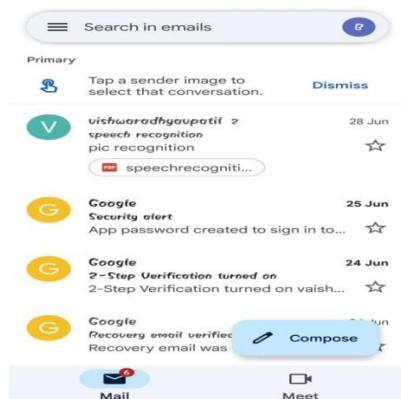


Figure 3.1.5 : E-Mail Composed

3.2 Fetching E-Mails from the Inbox Folder

This choice enables a user to view all emails that have been delivered to his or her account as shown in fig 3.2. When this option is selected, the most recent emails are loaded. The recipient's name and the subject of each message will then be invoked by the programme; if the user wants to listen to the mail, they must carry out the action stated by the invocation[31]. He/she must use the proper voice command to go on to the next emails.

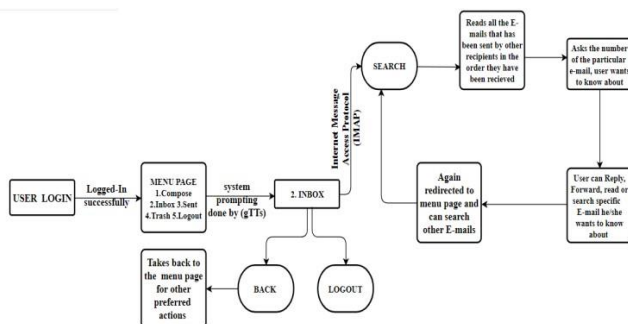


Figure 3.2: Data Flow Diagram of Fetching Mails from the Inbox

3.3 Searching of Sent E-Mails from the sent Folder

The user's emails are tracked by this alternative. The user must carry with the instructions supplied by the invocation to move between emails in order to access the sent mails as shown in fig 3.3. This will make it easier for the user to quickly get and forward the needed mail.

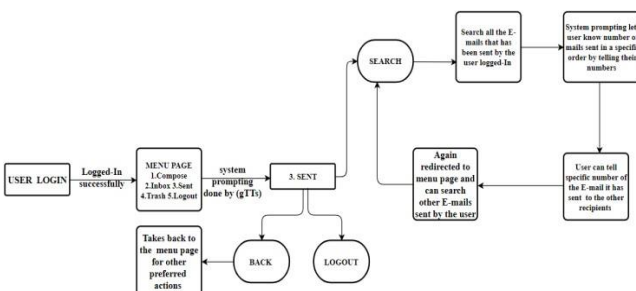


Figure 3.3: Data Flow Diagram of Searching Mail

3.4 Deleting E-Mails from the Trash Folder

The user can delete E-Mails from the trash folder with the aid of this folder. The user must carry out the commands specified by the invocation to access the mails and move among them as shown in fig 3.4. This will enable the user to delete unnecessary mail efficiently.

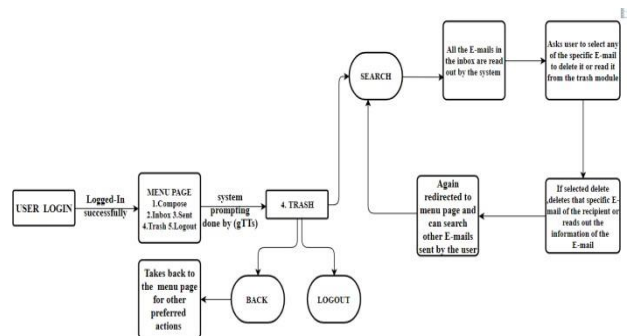


Figure 3.4: Data Flow Diagram of Deleting Mails from the Trash Folder

3.5 Flow chart of the working of Voice Based E-Mail for Visually Challenged.

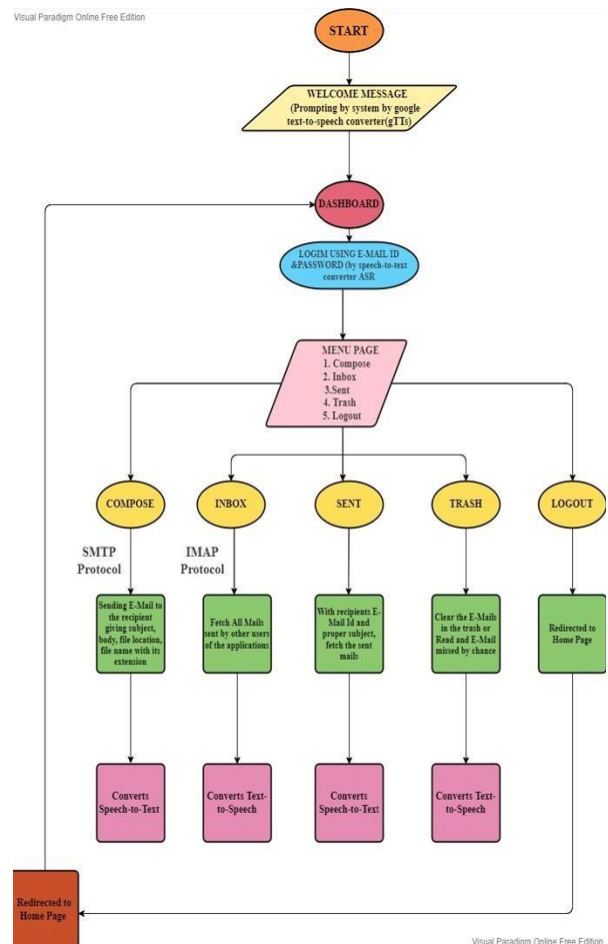


Figure 3.5: Flow on the working of voice based E-Mail system for visually challenged

The user can log in by entering their username and password on the login page when they first launch the application. The menu screen will open after logging in,

and the user will be prompted to enter the instructions Compose, Inbox, Sent, Trash, and Logout as shown in fig 3.5. User must speak one of the orders, and then the voice commands will direct the user as necessary. The user will be redirected to the compose page and when touching anywhere on the screen at random, they will be asked to enter the email's subject, recipient ID, and message. Successful delivery of the mail to the recipient's ID gets done. Next User can use select another option Inbox to read the E-mails being received in the inbox

The user can then choose which mails they wish to read first, second, or third, etc. The system prompting assists the user in performing both actions when the user wants to reply or forward the emails. The system will prompt the user to specify all of the emails they have sent by selecting the Sent option. Emails that are no longer needed are removed and placed in the trash. And Logout option assists the user to get logged out of the system.

IV RESULTS AND DISCUSSION

The implementation of project helps us to produce the desired results as follows and are Implemented Application Screenshots:

Before Logging into the Application, the user logging into the system with his/her E-Mail Id and Password, should set create an app password in the Google account used for the application.

1. Login to the application with normal E-Mail Id and Password through voice commanding as shown in fig 4.1,

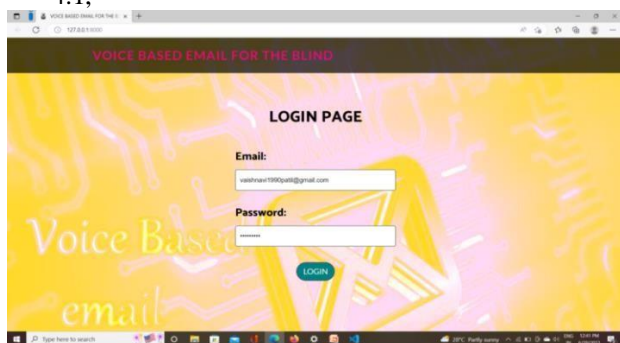


Figure 4.1: Login Page for the user to login into G-Mail account using his/her E-Mail ID and Password through voice commands

2. The user will be directed to the menu page after successfully logging in. as shown in fig 4.2,

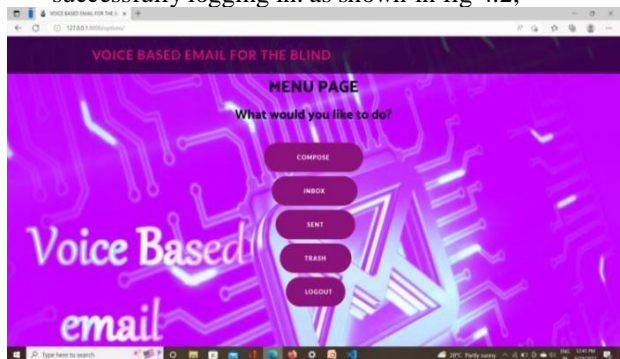


Figure 4.2: Menu Page with E-mail Options-Compose, Inbox, Sent, Trash, Logout

with actions to be performed are - Compose, Inbox, Send, Trash and Logout, according to the users requirement.

3. If the user selects the compose option to compose an E-Mail, the programme will ask for the recipient(s) names the message's subject, and the body. The user provides this information orally, and the application will convert it to text. The application will then read the recipient's name, the message's subject, and its body before requesting confirmation. Following affirmation, the appropriate recipient or recipients will receive a the information sent by the user which may be a Msg or any file attachment. Here the file attachment sent was a pdf file named "speechrecognition", as shown in the fig.4.3,

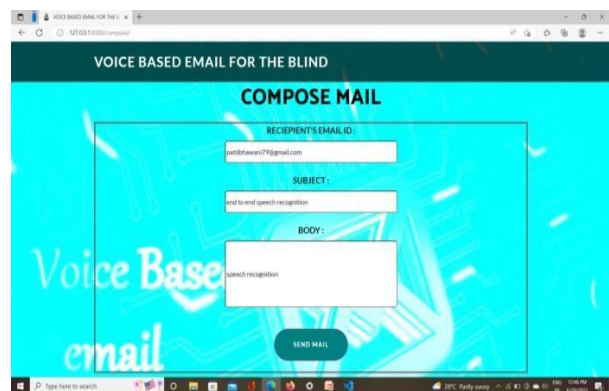


Figure 4.3 : Compose Folder with options - Recipients E-mail Id, subject and body of the E-mail, Attachments with voice recording or by telling the file name with extension

4. If the user selects the Inbox option to know the E-Mails from the Inbox, then the options available are Unread, Search, Back, Logout as shown in fig 4.4. Unread option helps the user in knowing the unread E-Mails it has in the G-Mail account. Search helps the user in getting a specific E-Mail from the sender and also provides the option of replying and forwarding the sent Mail to other recipients.

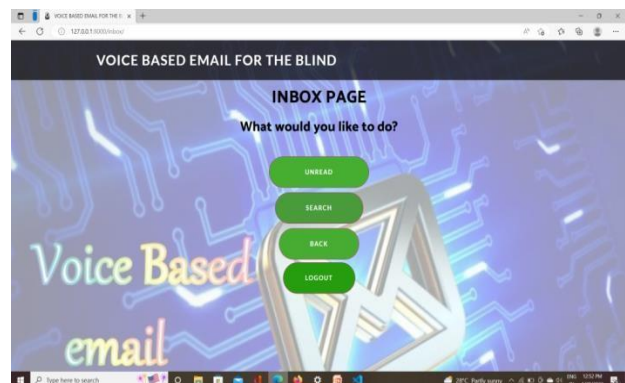


Figure 4.4 : Inbox Folder options for reading Unread E-mails.

5. If the user selects the Sent option to know the E-Mails that have been sent by the specific G-Mail account of the user, then the options available are Search, Back, Logout as shown in fig 4.5.

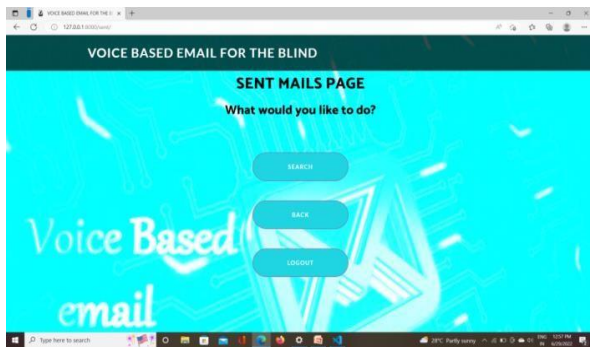


Figure 4.5 : Sent Folder options, to check the mails sent by the user that has logged in

Through search user can easily find out the sent E-Mails by him/her to the other recipients

6. If the user selects the Trash option to delete E-Mails that have been sent or received by the user by other recipients, then the options available are Search, Back, Logout as shown in fig 4.6.

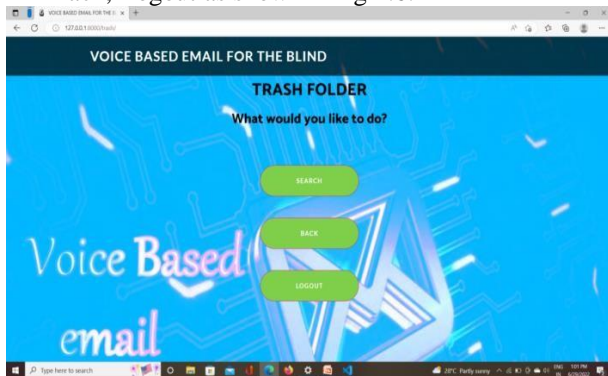


Figure 4.6 : Trash Folder Options ,searching and Deleting Mails from the Trash Folder

V CONCLUSION

A voice-based email system is suggested to assist the blind in accessing, composing, and retrieving emails with attachments. The system fully forgoes the usage of a mouse or keyboard and is voice-based only. The simplicity, security, and effectiveness of this work make it valuable to users who are not visually impaired despite the fact that helping the visually impaired is its major goal (including illiterates). By employing voice commands, this proposed system can help average people compose and retrieve mails with attachments. Some of the shortcomings of earlier research, such as incorporating attachment with mail and constructing the framework entirely based on voice, were effectively overcome in the implementation.

V FUTURE SCOPE

The confidence of blind and visually impaired persons will increase as a result of technological advancements like voice-based email with attachment. Future plans for the implementation include the addition of other regional languages, the addition of other mail features (such as spam filtering and sent mail tracking), voice control of typefaces and formatting, and the addition of cc and bcc fields in mail. Additionally, the visually impaired individual seated in front of the system can be made to

log in using face recognition, which will make it simpler than using voice commands.

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