
EMAIL INTERFACE FOR BLIND PEOPLE USING PYTHON AND AI

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ABSTRACT

With the advent of computer technologies, many technological solutions have been implemented for the visually impaired so that they can utilize them and benefit from them. Considering it a key idea we have built a desktop interface that will help blind people to send, read, search, and find spam emails as ordinary people do. In this research paper, we describe the VMAIL system architecture for the Python platform that can be used by a Blind Person to access e-mails easily. The interface uses a text-to-speech, voice recognizer to facilitate sending and reading, and emails using a computer. The Internet has become one of the basic amenities for day-to-day living. Every human being is widely accessing knowledge and information through the internet. However, blind people face difficulties in accessing these text materials, also in using any service provided through the internet. Audio feedback-based virtual environments like screen readers have helped Blind people access internet applications immensely. We describe the Voicemail system architecture that can be used by a Blind person to access e-mails easily and efficiently.

Keywords: Speech Recognition, Text To Speech, Speech To Text, Email, Translator.

I. INTRODUCTION

It is approximately stated that there are more than 4.5 billion email accounts. There are approx. around 2.586 B email users overall along with both business and purchaser clients. One of the major disadvantages that set in is that accessing emails or any page on the internet requires a person to have visual capabilities. This means that a visually challenged person cannot acquire the facilities provided by the internet thus contributing to the technology of no use. The existing technologies like screen readers, automatic speech recognizers, speech-to-text, and text-to-speech which came into the picture, made it easier for the visually impaired, though not completely. The person using this project is not required to keep in mind all the key locations. Every action will be based on command interactions. Additionally, the blind person should not worry about which mouse clicks should be performed to use a particular service as the system will accept and consider the commands through voice itself.

This project proposes a Python-based project which is designed especially for visually impaired people. This project manages a voice-based emailing service where they can read and send emails on their own. Here, the users can use certain keywords that will perform certain actions e.g. Read, Send, latest, search Mail, etc.

The Voice mail system can be used by a visually impaired person to account for mail services efficiently and frequently. Therefore, to access mail, the visually impaired person need not take any help through third-party applications as they aren't safe. This application uses speech-to-text and text-to-speech modules so that every person will be able to control their accounts through voice inputs only.

This system will always cause the user to perform necessary functions based on their corresponding commands. The main reason behind developing this 4project is that the use of the keyboard is partially removed and mouse operations are not frequently used, many operations will be based on voice only.

II. LITERATURE REVIEW

Ingle, et al. (2016), used three types of technologies to create the application namely STT (speech-to-text) where the speech is converted to text, TTS (text-to-speech) to convert the text to speech, and thirdly IVR (interactive voice response) which describes the interaction between the user and the technology in many ways like keyboard or voice message. It also allows the user to interact with the mail system. The main disadvantage includes the usage of highly sensitive mics which are mostly not available to all the users.[16]

A voice-based system for the visually blind with a multi-lingual facility, the system provides a good GUI for all types of users. The user will be able to send, receive, read, and delete the mail from the mail system. However, the main disadvantage includes the usage of mouse clicks, which is necessary in some places of the proposed application.[18]

A voice-based email system that visually impaired people can use to easily access email. The advancements in text-to-voice email delivery for people who are blind or visually impaired are the main topic of this study. This study offers a text-to-voice and voice-to-text email access method for those who are blind. [21]

A system with TTS and STT to read and record symbolic linguistic representations like phonetic transcriptions. The architecture of the system includes two modules namely interface selection and mailing option, the first module selects the type of users that is blind user or sighted user. The second module includes simple mailing options to perform all tasks.[20]

A system with Audio feedback-based virtual environments like screen readers has helped Blind people access internet applications immensely. We describe the Voicemail system architecture that can be used by a Blind person to access E-Mails easily and efficiently. The contribution made by this research has enabled Blind people to send and receive voice-based emails. We found that our proposed architecture performs much better than that of the existing GUIs.[21]

A system presents an email system working on the voice-controlling principle for people with visual impairment to deliver simple and easy access to the email system. This framework will also be helpful for individuals with other weaknesses alongside visually impaired individuals.[22]

A system uses an extra speech recognition technology along with all other converters and IVR to develop the application. The proposed system provides more features than the existing GUI. Java was the core programming language used. The application can be used by all types of handicapped people and illiterate people. [16-21]

The mail services that are available today are of no benefit to people with visual disabilities. That's because these systems are difficult to use in any way as they cannot provide audio feedback to read the content for them. Since they are not enough to imagine the things that are present on the screen, they find it difficult to carry out operations such as executing mouse clicks specifically. Even though there are screen readers available, they impose some kind of difficulty on them. Screen readers read the text on the screen for them, and they have to use a keyboard to answer it. As a result, the user needs to know the location of the keys on the keyboard to achieve this. Therefore, someone who has never used a computer will never be able to use a computer.

III. PROPOSED SYSTEM

Current technology implies visual perception, it is extremely difficult for people with low vision to use it. To access the Internet, the user needs to know what is written on the desktop/monitor, which is not possible by the blind person. This proposed system, focuses primarily on different types of Speech-Text Technologies (STT) this module collects the user's given speech. converts to text, text-to-speech (TTS) converts the answer giving the system to speech, and finally, mail communication module to send and receive e-mails. (Fig. 1,2 & 3) The System has the following modules:

A. Send Mail: In the Send Mail module, the system requests the sender's email ID, subject line, and body. After every step, a TTS module then called Senders Email ID, Subject and Body mail to be read out loud by the system and to be confirmed by the user much the same. The system then transmits the text to the email module and the email is appropriately formatted. After Sending Mail, the System will ask the user whether to forward the mail using Carbon Copy (CC). (fig.1,2)

B. Search Mail: In Search Mail, using the subject the user can search mail. Users have to speak about the subject. The System will search. If found, using the text-to-speech module system will read the mail. Otherwise, the System will directly say mail is not found. (fig.1)

C. Latest Mail: In the Latest Mail, the user requests the system to find the latest mail and read out loud the latest mail from the mailbox. The system asks the user to reply, mark the mail as important, and delete the latest mail. (fig.1)

D. Spam Mail: In Spam Mail, the user requests the system to count the spam mail and it reads out loud the spam latest mail and the user can mark important the spam mail and also delete the spam mail. (fig.1)

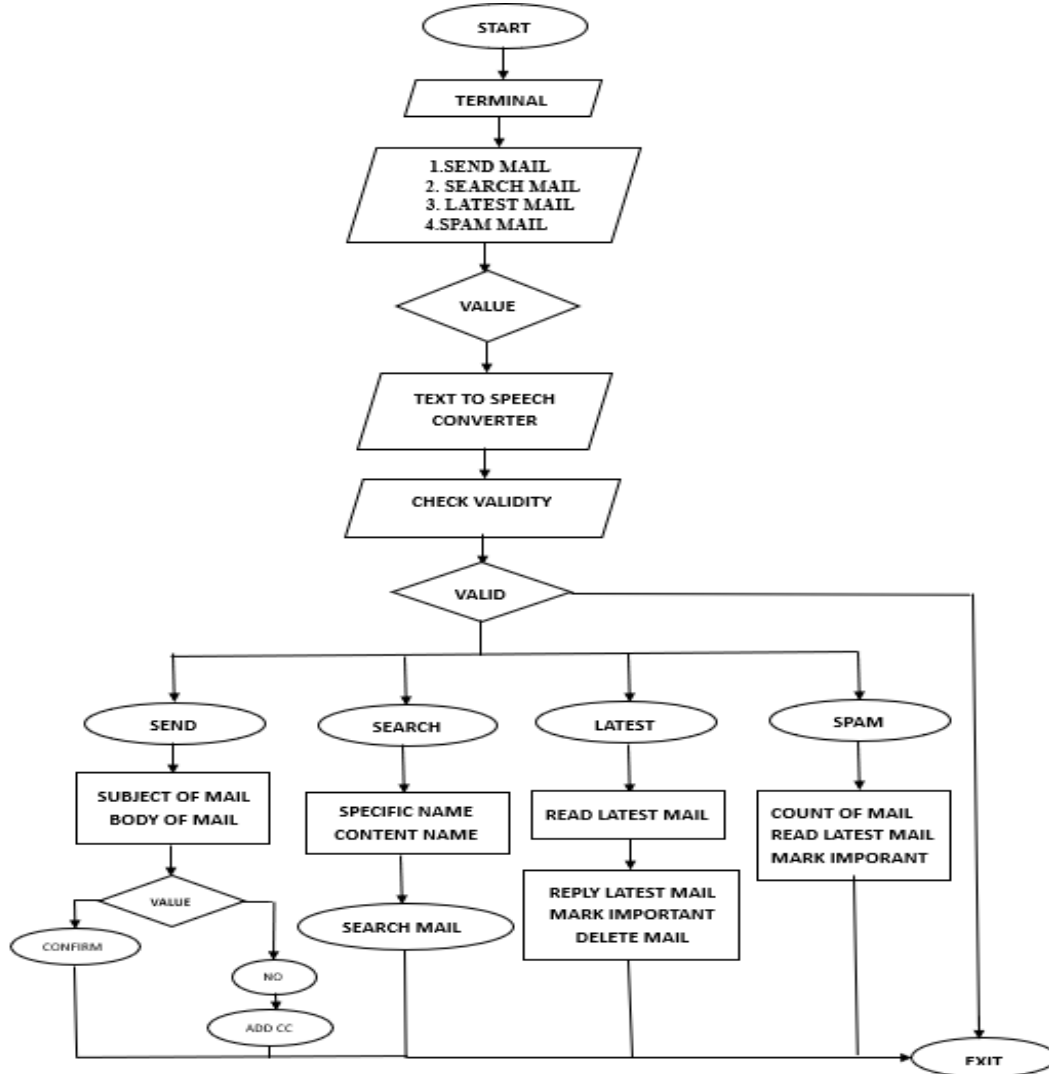


Fig 1: System Diagram 1

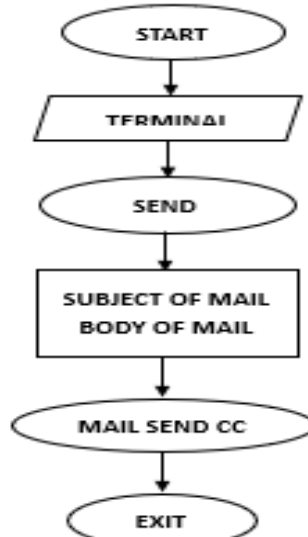


Fig 2: System Diagram 2

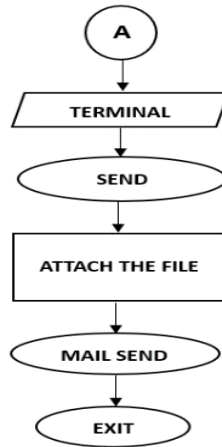


Fig 3: System Diagram 3

IV. DESIGN METHODOLOGY

The architecture of this project consists of three parts: Hardware Configuration, Software Configuration, and Operation. Let's discuss each section in detail. For the implementation of this project, we will require hardware products such as a desktop to run the application and a microphone to communicate with the application. The program is under development using coding languages like Python and will be using Flask. As well, Google Speech API will be used for communication. In addition, speech-to-text conversion will be performed while the user inputs the data.

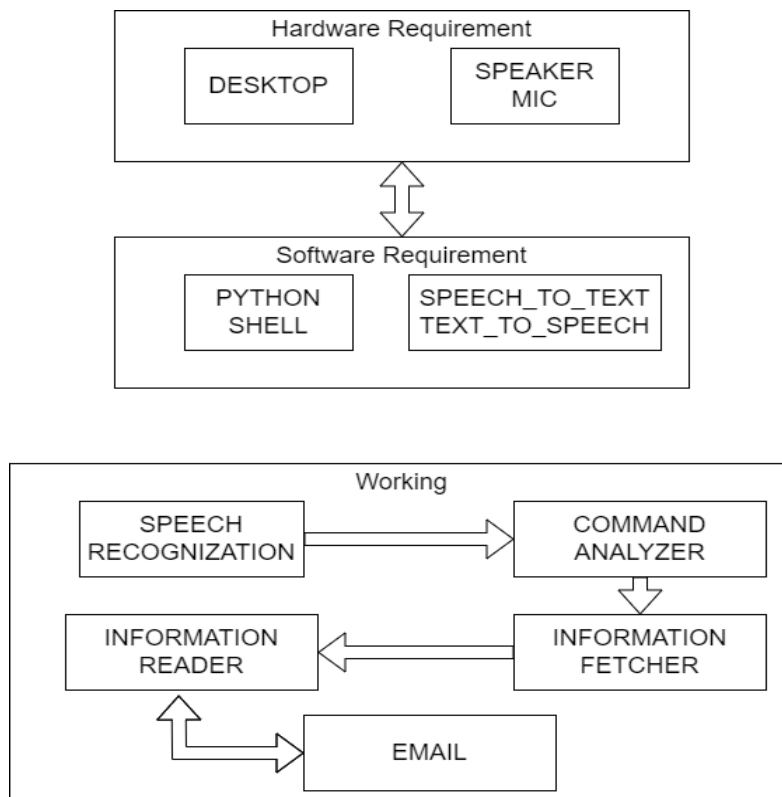


Fig 4: Design Methodology

1. Tech Stack

1. Language: Python A dynamically semantic, object-oriented, high-level programming language. Python is well-known for its high-level, built-in data structures, dynamic typing, and dynamic binding. It is also used frequently for rapid application development and as a scripting or glue language to connect existing components. Python's easy-to-learn syntax and focus on readability reduce the expenses associated with maintaining programs. Additionally, Python's support for modules and packages streamlines the process of

writing modular programs and packages streamlines the process of writing modular programs and reusing code.

2. API:

1. **Speech Recognition:** It is used for individuals to perform actions through voice instead of using a keyboard. This software takes input through voice and saves it in mp3 format. After saving, it performs a particular task and deletes after the function is over. The user dictates the messages and the system accepts the message in voice format.
2. **IMAP:** The Internet message access protocol is used to fetch mail from Gmail so that the receiver can read the messages easily. The received messages are in Gmail itself IM/AP helps the user to connect to Gmail.
3. **SMTP:** Simple mail transfer protocol helps to connect to Gmail. It helps in composing emails. It also acts as a connection to Gmail which helps in sending emails.
4. **Playsound API:** The playsound module contains only a single function named playsound (). It requires one argument: the path to the file with the sound we have to play.
5. **Email:** An email API short for email Application Programmable Interface is an interface that allows developers to connect an application or service to an email service provider and use the provider's functionality (including sending emails, creating lists, or pulling email stats) without having to build it themselves.
6. **Pywhatkit:** Python offers numerous inbuilt libraries to ease our work. Among them WhatsApp is a Python library for sending WhatsApp messages at a certain time, it has several other features too. Some features of the whatsit module are Sending WhatsApp messages, playing a YouTube video, Performing a Google Search, etc.
7. **Googletrans:** Googletrans is a free and unlimited Python library that implements Google Translate API. The most basic use of the Google Translate API is, of course, translating words or sentences from one language into another. To do so, we have to import the Translator class from the Google module.

V. RESULT AND ANALYSIS

1. **Send Mail:** In the Send Mail module, the system requests the sender's email ID, subject line, and body. After every step, a TTS module then called Senders Email ID, Subject and Body mail to be read out loud by the system and to be confirmed by the user much the same. The system then transmits the text to the email module and the email is appropriately formatted. The system asks the user whether you have to add an emoji and then says add after that system asks which emoji you have to add e.g. sad, happy, and angry. You have to speak specific emoji that you want to add in your Email. The system asks the user whether they have to send the mail using CC then says add and after selecting CC add the recipient's name after recognizing the recipient's name the mail has send successfully. System ask the user to attach the (Fig.5, & Fig.6)

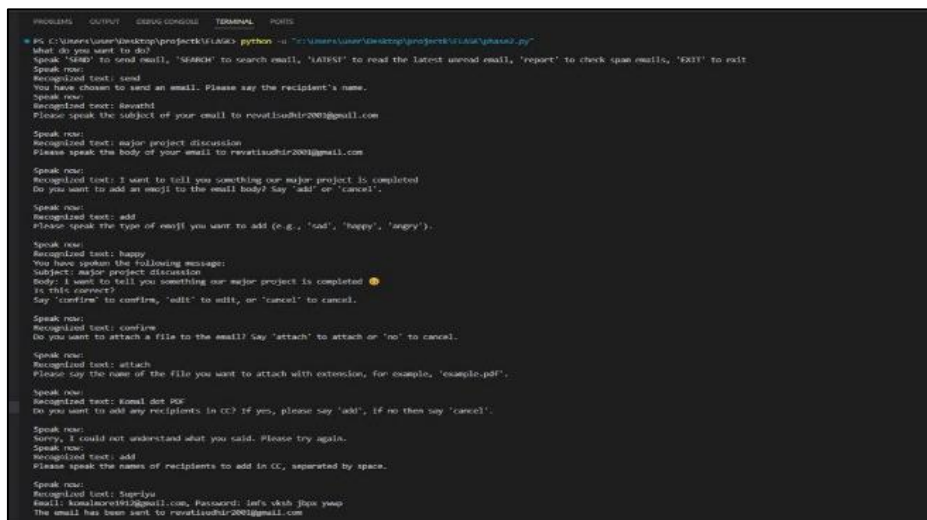


Fig 5: Send Mail using emoji, CC and attach file



Fig 6: Output of Send Mail using emoji, CC and attach file

2. Search mail: In Search Mail, using the subject the user can search mail. Users have to speak about the subject. The System will search. If found, using the text-to-speech module system will read the mail. Otherwise, the System will directly say mail is not found. (fig.7 & fig.8)

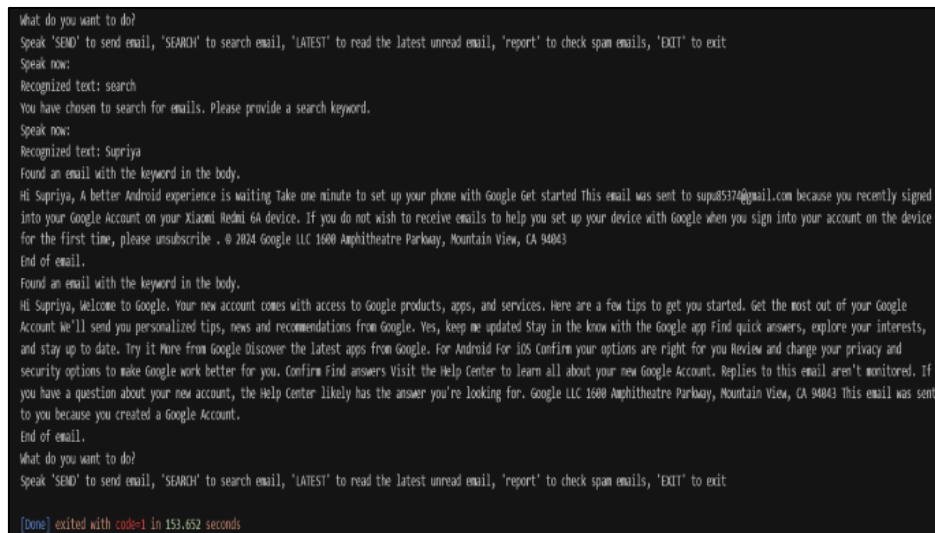


Fig 7: Search Mail

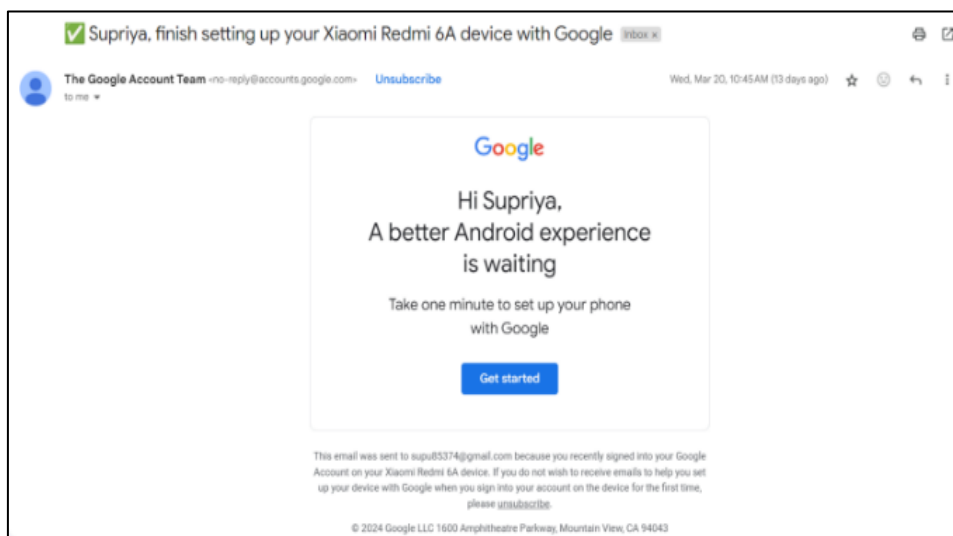


Fig 8: Search Mail output

3. Latest Mail: In the Latest Mail, the user requests system to find the latest mail and read out loud the latest mail from mail box. The system asks the user that whether you have to delete the latest mail then say delete and after deleting the mail from the mailbox the system reads out loud the mail has been deleted. The system asks the user that whether you have to delete the latest mail then say delete and after deleting the mail from the mailbox the system reads out loud the mail has been deleted. System asks the user whether

you have to reply the latest mail them say reply, and the user can reply to the latest mail directly. (Fig.9, Fig.10, Fig.11, Fig.12, & Fig.13)

```

What do you want to do?
Speak 'SEND' to send email, 'SEARCH' to search email, 'LATEST' to read the latest unread email, 'report' to check spam emails, 'EXIT' to exit
Speak now:
Recognized text: latest
Found a new unread email.
Subject: hello
Email Content:
how are

Do you want to delete this email? Say 'delete', 'reply', or 'cancel'.
Speak now:
Recognized text: delete
The email has been deleted.
What do you want to do?
Speak 'SEND' to send email, 'SEARCH' to search email, 'LATEST' to read the latest unread email, 'report' to check spam emails, 'EXIT' to exit

[Done] exited with code=1 in 58.87 seconds
    
```

Fig 9: Read and Delete Latest Mail

```

What do you want to do?
Speak 'SEND' to send email, 'SEARCH' to search email, 'LATEST' to read the latest unread email, 'report' to check spam emails, 'EXIT' to exit
Speak now:
Recognized text: latest
Found a new unread email.
Subject: to discuss the IEE paper
Email Content:
how much work is done ,when we register it?

Do you want to delete this email? Say 'delete', 'reply', or 'cancel'.
Speak now:
Recognized text: reply
Please dictate your reply.
Speak now:
Recognized text: first show a paragraph that shows an interesting result
Your reply has been sent.
What do you want to do?
    
```

Fig 10: Replying Latest Mail

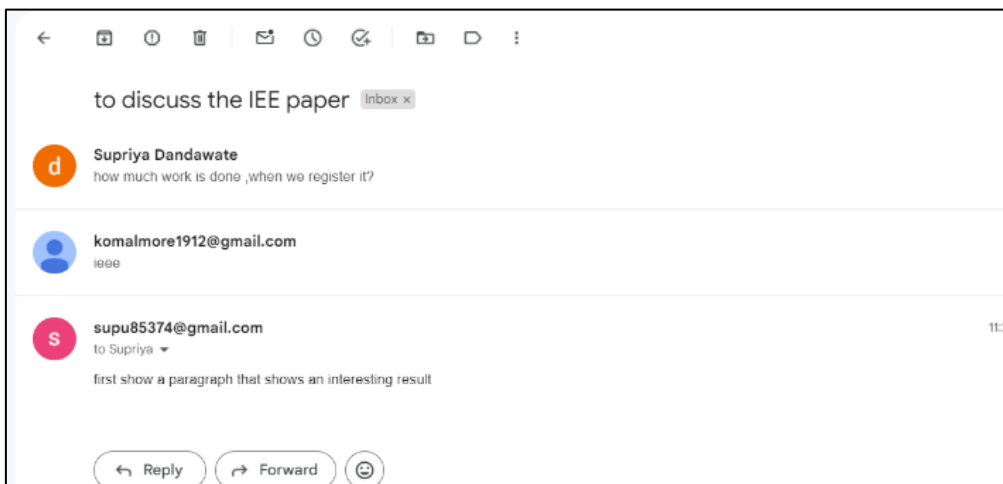


Fig 11: Output of replying Latest Mail

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Do you want to reply to this email? Say 'reply' or 'cancel'.
Speak now:
Recognized text: cancel
Do you want to delete this email? Say 'delete' or 'cancel'.
Speak now:
Recognized text: cancel
Do you want to mark this email as important? Say 'mark' or 'cancel'.
Speak now:
Recognized text: mark
The email has been marked as important.
    
```

Fig 12: Mark Important to Latest Mail

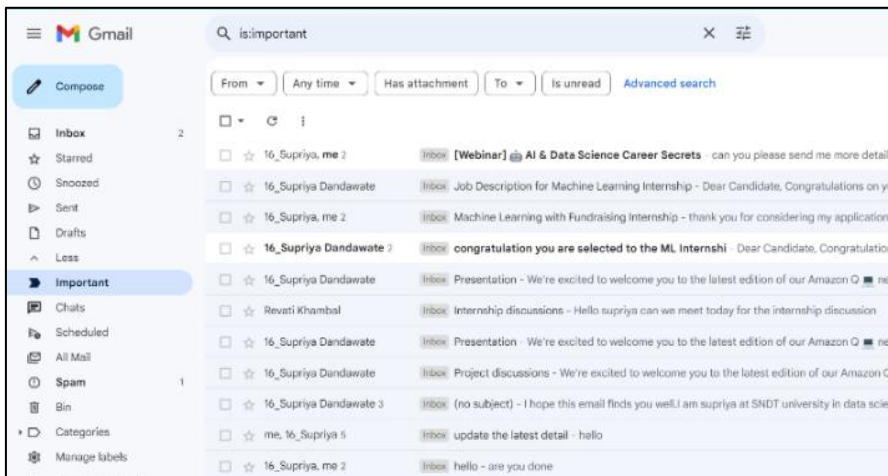


Fig 13: Output mark important to Latest Mail

- Spam Mail: The system asks the user to report the mail system directly reads out loud the count of the mail available in the spam mailbox again system asks to delete the spam mail when we say delete the mail is deleted from the spam mailbox successfully system asks whether you have to mark important spam mail, we say important to mark the spam email as important. (fig.14, fig.15,fig.16, & Fig.17)

```

What do you want to do?
Speak 'SEND' to send email, 'SEARCH' to search email, 'LATEST' to read the latest
unread email, 'report' to check spam emails, 'EXIT' to exit
Speak now:
Sorry, I could not understand what you said. Please try again.
Speak now:
Recognized text: report
You have 6 unread spam emails.
Do you want to read the latest spam email? Say 'read' or 'cancel'.
Speak now:
Sorry, I could not understand what you said. Please try again.
Speak now:
Recognized text: read
Found a new unread spam email.
Subject: opportunity
Email Content:
Hi Supriya,

Here are some of the latest opportunities matching your prefe

Do you want to delete this spam email? Say 'delete', 'important', or 'cancel'.
Speak now:
Recognized text: delete
The email has been deleted.
    
```

Fig 14: Count of Spam Mail and Delete spam mail

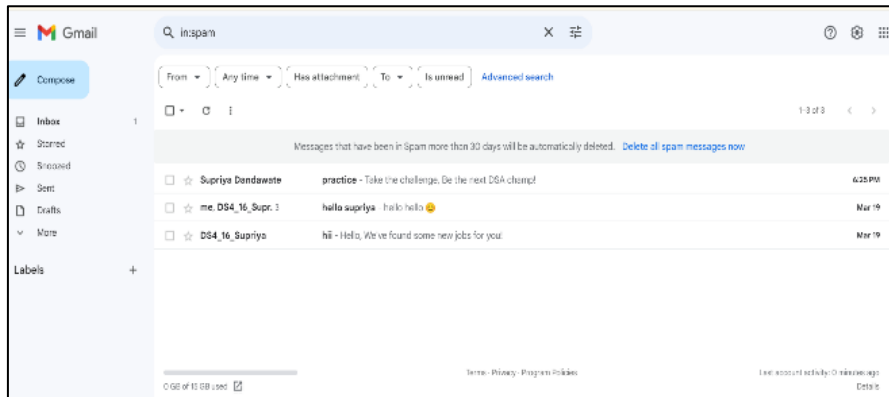


Fig 15: Output Count of Spam Mail and Delete spam mail

```

what do you want to do?
Speak 'SEND' to send email, 'SEARCH' to search email, 'LATEST' to read the latest
unread email, 'report' to check spam emails, 'EXIT' to exit
Speak now:
Recognized text: report
You have 5 unread spam emails.
Do you want to read the latest spam email? Say 'read' or 'cancel'.
Speak now:
Recognized text: read
Found a new unread spam email.
Subject: practice
Email Content:
Take the challenge,

Be the next DSA champ!

Do you want to delete this spam email? Say 'delete', 'important', or 'cancel'.
Speak now:
Recognized text: important
The email has been marked as important.
    
```

Fig 16: Mark Important Spam Mail

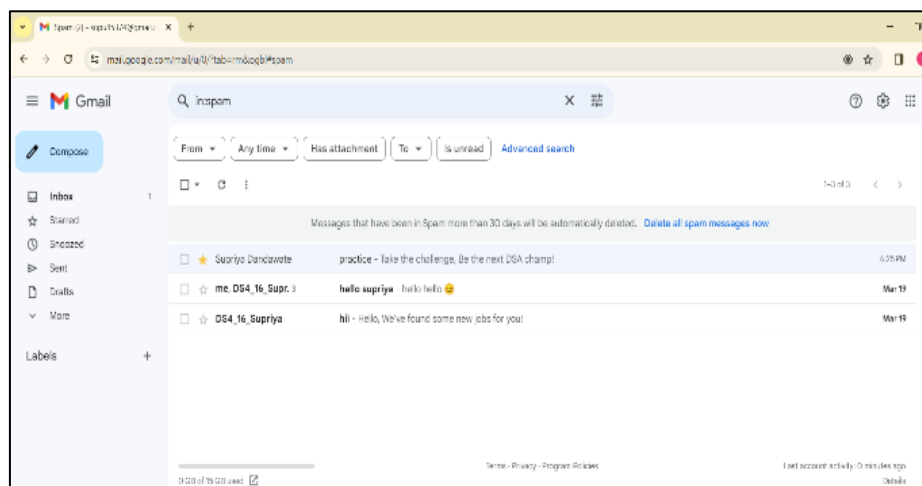


Fig. 17: Mark Important Spam Mail

VI. CONCLUSION

The research analyzed helps people with a visual interface to access email in a problematic way, which is the most comprehensive type of contact in the world today. The proposed framework helps decrease the barrier. For example, remember and use the mouse clicks and keyboard shortcuts that were used by the person who was visually weakened when receiving the email.

The main disadvantages of the Email Interface can be utilized as future improvements for this project. There are two major disadvantages in this application i.e. accurate speech recognition and the attachment of the image or document. Therefore, going forward, we may add the image or attachment of the document to the sender. Navigation for people with visual impairments through voice instructions and haptic feedback can be added to enhance the existing system.

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