

Email System for Visually Impaired Person

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Abstract- *The increasing use of technology and its unlimited opportunities continue to make full use of the Internet for the current architecture. Email is one of the most widely used features of the Internet, serving as a basic prerequisite. In today's world, long distance communication has become progressive and very efficient due to the internet-connected communication remains. But for people with vision problems, these communication technologies are difficult to access. Many technologies have been created for the visually impaired people, through which they can get all the technical facilities like normal people and many facilities are being extended for these visually impaired people. Everyone present in any job needs to access mail in some way, so the purpose of this paper is to create a desktop application that will be beneficial for visually impaired individuals so that they can use every feature that a normal person uses to send and receive mail, without involving any third party. The aim of this project is to create an application that requires minimal use of the keyboard and no use of the mouse. All actions take place through text-to-speech and speech-to-text interaction. This project will also be equally useful for people who are blind. This project is focused on sending and receiving mail. This framework will be beneficial for those who have other limitations in addition to being visually impaired.*

Keywords— *Voice Based Email, Text-to-speech converter, Speech-to-text converter, Speech Recognition*

I. INTRODUCTION

The most common mail services used in our daily lives cannot be used by visually impaired people. Various technologies have been provided to make these systems convenient for visually impaired individuals, such as screen readers, automatic speech recognizers, speech-to-text and text-to-speech, Braille keyboards,

etc. However, these technologies are not as useful for them because they do not respond accurately like a normal system.

Existing technologies such as screen readers, automatic speech recognizers, speech-to-text and text-to-speech, which have emerged, have made this partially easier for visually impaired people. However, a voice-based email system relying solely on these technologies raises privacy and security issues for visually impaired users. Therefore, there arose a need to create a fully voice-based application through which emails could be sent or received while ensuring security and privacy. Thus, we came up with this system 'Voice-Based Email for the Blind,' which helps visually impaired people easily use email functionalities.

The most important aspect we are focusing on while developing this system is ensuring user security by incorporating speaker verification during sign-in.

This project proposes a python-based desktop application, designed especially for visually impaired people. This application administers a voice based emailing service where they can read and send emails on their own, without any guidance through their gmail accounts. Here, the users can use certain keywords that will perform certain actions for e.g. Read, Send, Compose Mail etc.

Therefore, to access email, a visually impaired person does not need to rely on any third-party application as they are not secure. This application is a Python-based desktop application for visually impaired people that uses speech-to-text and text-to-speech modules so that every individual can manage their account solely through voice input. This system will always guide the user to perform the desired actions based on their respective commands. The main reason for developing this project is that the use of the keyboard has been partially eliminated and mouse operations are not

repeatedly used, so many tasks will be based solely on voice.

II. LITERATURE REVIEW

In this section, we present a comprehensive review of the literature on current technical challenges. The objective of this paper is to create a search engine that allows only voice-based human-machine interaction. The proposed system in this paper relies on a voice command-based system, which is different from existing mail systems. The entire system is primarily based on speech-to-text commands. After using this system, the application will prompt the user to speak specific commands in order to access the relevant services, and if the user wants to access those services, they must speak that command. This application uses IMAP (Internet Message Access Protocol). It is an Internet standard protocol used by email clients to retrieve email messages from the mail server through a TCP/IP connection.

For enhanced security purposes, voice recognition is also used for user verification. In this system, registration is the first module. This module collects complete information from the user by asking which details need to be entered. The second module is the login module, where the system asks the user to provide a username and password. This is done through voice commands. Another voice sample is taken for voice verification. After that, once the login is completed, the user is directed to the inbox page. After logging in, the user can perform regular functions of the mailing system. The system options are: Compose, Inbox, Sent Mail, Trash.

This paper proposes an email system that can be easily used by blind people. It uses a speech-to-text converter, a text-to-speech converter, and the Viterbi algorithm. The algorithmic logic works in such a way that as soon as the user spells a word, the system identifies the most acceptable word and matches it with the pronounced specific word.

The user needs to register to the website when they visit the site for the first time. This system reduces some drawbacks of the existing system. The drawback of this system is that the efficiency of the Viterbi algorithm decreases as the number of errors increases

as well as it requires more space. Saurabh Sawant has proposed a system to improve the interaction of visually impaired and illiterate people with the email system. This system eliminates the use of IVR technologies that relied on screen readers and Braille keyboards. It employs speech-to-text and text-to-speech conversion.

Payal Doodhwale proposed a voice-based system for desktop and mobile devices for blind people. This architecture helps blind individuals easily access the operating system's email and multimedia functions. The GUI design can be accessed using voice commands and mouse clicks, eliminating the need for keyboard use.

III. EXISTING SYSTEM

By 2019, a total of 4.3 billion email accounts had been created on various mail sites worldwide, and by the end of 2020, it is estimated that there will be 4.5 billion accounts or more. This number suggests that email is the most widely used mode of communication in today's world. Email services commonly available on the internet, which we use in our daily lives, cannot be used by visually impaired people. This problem exists because these applications do not provide any feature or service that allows a user to listen to the screen content.

Since visually impaired people cannot see what is on the screen, they are unable to determine where to click on the screen to perform the necessary tasks.

For a visually impaired person or an illiterate person who cannot read or write, using a computer or any computer application for the first time is not as convenient as it is for a regular user, even if it is user-friendly. Today's available mail services are of no use to visually impaired people. The reason is that these systems are not helpful to them in any way, as they cannot provide any kind of audio feedback to read the content for them. Since they cannot imagine the things present on the screen, performing actions like mouse clicks seems particularly difficult for them. Although screen readers are available, they still present some kind of difficulty.

IV. PROPOSED SYSTEM

The most important aspect we are considering while developing this system is that the user's privacy will not be compromised, as we are incorporating voice recognition for user verification.

The second important aspect is that users of this system will not need any kind of requirement. Some basic information about keyboard shortcuts or where the keys are located. All the functions used in our system are based on simple mouse click operations, making the system very user-friendly. The system will continuously prompt the user about which click will perform which operation, thereby making it easier for the user as they will not need to remember the operations.

In the proposed system, a desktop application is to be developed that can be used by people with various visual impairments to access emails easily and efficiently. All existing voice-based email systems provide their own developed email services and do not include the use of Google's Gmail. So, keeping this in mind, the objective is to develop this application by connecting it with the Gmail client, thereby providing users with an additional benefit.

The purpose of this idea is to provide basic functionalities such as composing, sending, receiving, and checking the inbox, as well as advanced features like voice-based operations, mail search, and provisions for both voice and text. Each basic functionality will allow the user to send and receive emails through voice-based operation.

Module Description

1. Speech- to-Text Converter

The speech-to-text converter recognizes speech, filters what you say, analyzes the sounds, and then digitizes it into a format that it can read. The recognized text can be saved in a file. The .Net and C#.Net platforms are used to develop it.

Our speech-to-text system directly captures speech and converts it into text. Speech recognition systems can be divided into several blocks: feature extraction, a database of acoustic models built based on training

data, a dictionary, a language model, and a speech recognition algorithm.

2. Text-to-Speech Converter

Using voice synthesis techniques, it converts text into voice output. Visually impaired people use it to focus on the read material; now it is widely used to deliver financial data, e-mail messages, and other information to everyone via phone. Text-to-speech is also used on devices such as portable GPS instruments to announce street names when giving directions.

Voice-based email applications allow users to send emails, listen to what they have written, and receive emails, which they can listen to via voice commands. In emails, the application uses the SMTP protocol to send emails and the POP3 protocol to receive emails. SMTP (Simple Mail Transfer Protocol) is a reliable protocol for sending emails. The POP3 server stores emails and displays them upon request. It is also implemented in our application, where emails are downloaded at the user's request.

V. METHODS

A. Text to Speech API:

As we can see, all operations are performed by voice and some shortcut keys click events only. At some places voice input is needed.

This converts regular text messages into speech format. A regular text can be heard through an audio file. The input is simple text, and the output is in audio format which can only be listened to. Each word can be heard through sound, and a blind person can successfully read the entire message using this API.

B. Speech Recognition:

This is used to perform actions through voice without personally using a keyboard. This software takes input through voice and saves it in MP3 format. After saving, it performs a specific function and deletes it once the task is completed. The user dictates messages, and the system accepts the messages in voice format.

C. IMAP:

The Internet Message Access Protocol (IMAP) is used to receive mail from Gmail so that recipients can easily

read messages. The received messages are themselves in Gmail, and IMAP helps the user connect to Gmail.

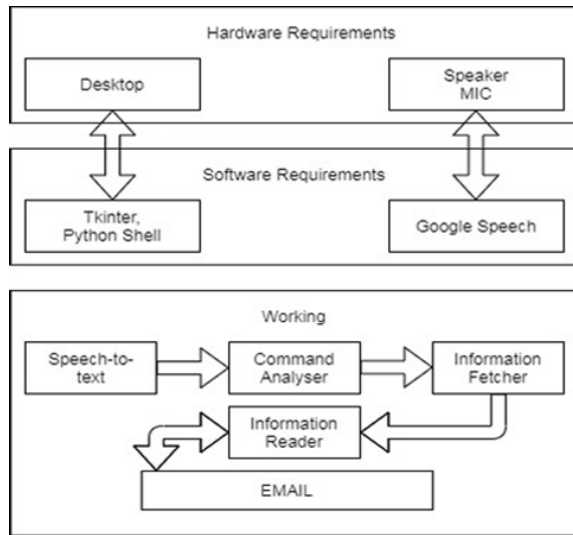
D. SMTP:

Simple Mail Transfer Protocol helps in connecting to Gmail. It assists in composing emails. It is also a medium to connect to Gmail which helps in sending emails.

E. TKINTER:

TKINTER is a Python feature that is used to create front-end applications. Using this feature, forms can be easily created. User authentication becomes very easy.

VI. ARCHITECTURE



The architecture of this project is divided into three parts: hardware requirements, software requirements, and functionality. Let's take a detailed look at each section. To implement this project, we will need hardware items such as a desktop to run the application and a speaker and microphone to interact with the application. The software is being developed using programming languages like Python and will utilize tkinter. Additionally, the Google Speech API will be used for dialogue. Speech-to-text conversion will also be performed while taking input from the user.

VII. DESIGN

User Interface Design: Here, the main objective of the website is to focus more on understanding the system's prompting rather than the look and feel of the system, as this system is primarily developed for visually impaired people, for whom the appearance of the system would be less important and the ability to understand the prompting would be more significant.

Database Design: The system manages a database for user authorization and stores the user's mail. There are some database tables that store data of inbox, sent mail, and trash, etc. These schemas will store all mails of the service related to that particular user.

System Design: As shown in the diagram above, this is a level-2 Data Flow Diagram (DFD) that provides the complete detailed flow of events and processes in the system.

VIII. REQUIREMENT

Software

Operating System : Windows 64-bit
 Front end : tkinter
 Back end : Speech Recognition, Open CV
 Programming language: Python 3.8

Hardware

Input : Mouse, keyboard, camera
 Output : Speaker

IX. RESULTS AND DISCUSSION

IMPLEMENTATION

Since the system is for the visually challenged people who are naïve to computers or have very little experience in using technologies available to assist them in using the computers we have kept continuous prompting done by the system in language understandable to them.

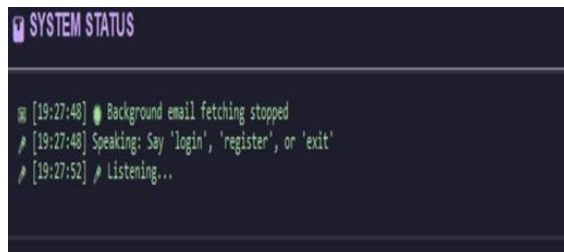
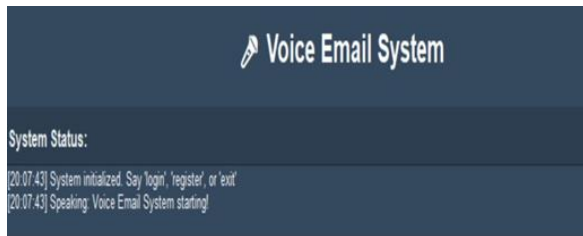
The user will just need to follow the instruction specified and perform actions according to their need. As the users are considered naïve to computer systems, we are not keeping any functionality in which use of keyboard related operations are used. The complete

website will work on just mouse click operations and speech commands.

Registration

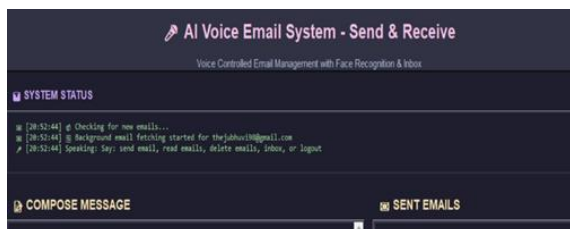
Registration is the first module of the system. Any user who wishes to use the system should first register to obtain username and password. This module will collect complete information of the user by prompting the user as to what details needs to be entered.

Once the registration is done the user can login to the system. The user will need to speak up the details to which the system will again confirm by prompting alphabetically and these details are stored in database for speaker identification. If the information is not correct user can re-enter else the prompt will specify the operation to be performed to confirm.



Login

This module will perform authentication check every time the user would require accessing his/her account. It will accept username and password in speech format and convert it to text. This text will then be used to authenticate the users. Once the user is found authentic s/he is redirected to their respective homepage.



Compose

This is the most important module of the complete system. Once in this module user can create the mail he/she wants to send. The main difference between the existing system and our system is that unlike other normal system our system will ask for recording and the recorded audio file will be sent to the other end as an attachment.



Inbox

The user can view all the mails received to the account through this option. Once in this option the system will be continuously prompting the user about which click operation needs to be performed to navigate through the page and perform operations on the received mail. The user also has the option to delete the mails received. The deleted mails will be stored in the trash section.

```
System: Welcome back kusuma!  
System: Say: send email, read emails, delete emails, inbox, or logout  
User: inbox  
System: Inbox operations. You can check new emails, read inbox, or view inbox.  
System: Say: check emails, read inbox, view inbox, or back to menu  
User: view inbox  
System: Inbox displayed with 1 unread emails.  
System: Say: check emails, read inbox, view inbox, or back to menu  
User: read emails  
System: You have 1 unread emails. Reading them now.  
System: Email 1 from kusumak gowda  
System: Subject: |  
System: Message: Hlo  
System: All emails have been marked as read.
```

Sent Mail

The mails sent by the user will be stored in this option. This will help the user access mails that were sent by him/her. As the user navigates between mails he/she will be prompted about the receiver and subject of that mail. This will provide ease of access to users.



X. FUTURE SCOPE

Sending emails is not a big problem for those who can see, but it is a major concern for those who are visually impaired because it is associated with many work responsibilities. This voice-based email system is useful for visually impaired individuals as it helps them understand where they are. This method emphasizes user-friendliness for all types of users, including ordinary people, visually impaired people, and illiterate people. It can be enhanced to read some emails. Marking an email as read or unread, along with all other standard features of the Gmail service.

CONCLUSION

This paper proposes a voice-based email system for visually impaired people, developed as an application that helps blind and disabled individuals access mail easily and efficiently. It provides a voice-based mailing service where visually impaired persons can read and send emails on their own without the assistance of others. Basic knowledge of keyboard shortcuts is required for this. The system has eliminated all these concepts and overcome all the difficulties faced by the visually impaired. It uses a speech recognition application that provides an effective voice input method for mailing tools for the blind. It is also useful for disabled and illiterate people. Additionally, visually impaired people do not primarily use Android mobile phones because it is difficult for them to operate. Therefore, we are developing this application, which works solely on mouse clicks and voice input. For future improvements, we can utilize external hardware devices such as biometric sensors to make user authentication more secure.

The main reason for developing the system described in this letter is to make the most widespread

communication medium of today's world, email, easier to use for visually impaired people.

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