Voice Based E-mail for Visually Impaired

Pankaj Singh Sisodiya[1], Arjun Singh Tomar[2], Kumkum Prajapati[3], Harshita Yadav[4], Kajal Sable[5]

Department of Computer Science and Engineering,
Shri Balaji Institute of Technology and Management Betul, RGPV University, M.P, India.

Abstract
This project introduces a voice-based email system designed to enhance accessibility and usability for visually impaired individuals. With the increasing reliance on email communication in various aspects of daily life, it is crucial to provide inclusive solutions that empower users with visual impairments to independently manage their email correspondence. The proposed system leverages advanced speech recognition and synthesis technologies to create a seamless and intuitive interface, allowing visually impaired users to interact with their email accounts using natural language commands.

Keywords: TTS (Text to Speech), STT (Speech to Text), NLP, Voice Recognition, User Friendly Interface

I.INTRODUCTION

A. Overview

In a world that thrives on digital communication, email has become an indispensable tool for staying connected, both personally and professionally. However, for individuals with visual impairments, accessing and managing emails can pose significant challenges. The conventional text-based interfaces of email platforms often exclude those who rely on nonvisual means to navigate and comprehend information. Recognizing the need for inclusivity and accessibility, a transformative solution emerges—Voice-Based Email for the Visually Impaired. This innovative approach aims to bridge the digital communication gap by leveraging the power of voice technology to provide a seamless and enriching email experience. For the visually impaired community, the limitations of traditional email interfaces can hinder independence, productivity, and social inclusion. Reading, composing, and managing emails require a level of visual interaction that poses barriers for those with limited or no sight. The advent of voice based email technology seeks to dismantle these barriers, offering a more intuitive and personalized way for individuals with visual impairments to engage with the digital world. This groundbreaking technology is designed to empower users through natural language interactions. By enabling spoken commands, the voice-based email system not only reads incoming messages aloud but also allows users to compose and send emails effortlessly. The auditory feedback not only facilitates communication but also enhances the overall user experience, ensuring that individuals with visual impairments can navigate their inboxes, draft messages, and stay connected with the world at their own pace. In this era of digital transformation, where technology is a driving force for inclusivity, Voice-Based Email for the Visually Impaired stands as a beacon of progress. By championing accessibility, this solution empowers individuals to break free from the constraints imposed by traditional interfaces, fostering a more inclusive and interconnected society. This journey into the realm of voice-based communication for the visually impaired signifies a step towards equal opportunities and a more accessible digital future.

B. Objective

The objective of voice-based email for visually impaired individuals is to provide them with an accessible and inclusive means of accessing and managing their emails. This technology aims to address the challenges faced by visually impaired users in navigating traditional email interfaces by leveraging voice recognition and synthesis technologies. Here are some key objectives:

1)Accessibility: Enable visually impaired individuals to independently access and manage their email accounts using voice commands, making the technology more inclusive and accessible.
2)Independence: Promote independence by allowing users to send, receive, and organize emails without relying on assistance from others. This empowers visually impaired individuals to have control over their communication.
3)Efficiency: Improve the efficiency of email management by providing a streamlined and voice-driven interface. Users can quickly navigate through emails, compose messages, and perform other essential tasks using natural language commands.
4)Integration with Assistive Technologies: Ensure compatibility and seamless integration with existing assistive technologies commonly used by visually impaired individuals, such as screen readers and braille displays.
5)User-Friendly Interface: Develop an intuitive and user-friendly interface that minimizes the learning curve for visually impaired users. The system should be designed with consideration for the unique needs and preferences of this user group.
6)Natural Language Processing: Implement advanced natural language processing capabilities to accurately interpret and respond to voice commands. This enhances the user experience and makes interactions with the email system more natural and conversational.
7)Security and Privacy: Prioritize the security and privacy of users' email accounts. Implement robust authentication measures to protect against unauthorized access, and ensure that sensitive information is handled with the highest level of security.
8)Feedback Mechanism: Provide auditory feedback and prompts to guide users through the email management process. This helps users stay informed about their actions and the system's responses.
9)Customization: Allow users to customize the voice-based email system to suit their preferences, such as adjusting speech rate, voice, and other settings.
10)Continuous Improvement: Regularly update and improve the voice-based email system based on user feedback and advancements in technology. This ensures that the solution remains relevant, efficient, and aligned with the evolving needs of visually impaired individuals.
By addressing these objectives, voice-based email for visually impaired individuals can significantly enhance their ability to communicate, work, and stay connected in today's digital world.

C. Scope of the project

The scope of voice-based email for visually impaired individuals is transformative, offering a streamlined and inclusive communication experience. By leveraging voice commands, users gain independence and efficiency in managing emails, fostering a sense of autonomy. This technology not only reduces the learning curve associated with traditional assistive methods but also integrates seamlessly with other assistive technologies, enhancing overall accessibility. The natural interaction facilitated by voice based email promotes efficient navigation, message composition, and inbox management. As a tool for inclusive communication, it enables visually impaired individuals to participate fully in the digital landscape, with the potential for continuous improvements through advancements in voice recognition technologies. Customization features, multi-modal interaction, and global accessibility contribute to the broader impact of voice based email in empowering visually impaired users to engage with digital communication on a global scale.

II. LITERATURE SURVEY

Pranjal Ingle, Harshada Kanade , arti Lanke et al..,[1] used technologies such as STT(speech to text) in which whatever we speak is converted into text , TTS (text to speech) which converts the text format of the emails to synthesized speech , and IVR (interactive voice response) which is an advanced technology that describes the interaction between the user and the system
Carmel mary Belinda et al..,[2] used modules such as app lock , registration , login , textbox used for sender mail ID , textbox used for recipient mail ID , subject box. They have also used CYCLOMATIC COMPLEXITY for home page. It is a software metric that provides a quantitative measure of the logical complexity of program. They have not worked on image and document attachment for the sender.

M. R. Pradhicsha, M. Vasanth,V. Renita et al..,[3] have worked on the system where the basic options are spoken out by the google text to speech and the voice commands from user is recognized and command is executed . There system worked on keyboard buttons such as ENTER and SPACEBAR for performing particular function.
Gagana M, Brundha K, Nita Meshram et al..,[4] in there system user will be well guided with the help of voice commands while registrating on the site . The information entered at the time of registration will be stored in database. They have used database of Google for storing user details and mai
Sumit kumar , shanu malik et al..,[5] have totally worked on voice commands of the user that clearly shows objective and solve problem of visually challenged people. There is no use of keyboard and mouse in their system , this is the main advantage. The utility is completely voice based totally permit blind human to dispatch and acquire mails easily.

III. SYSTEM ARCHITECTURE

The system's description from beginning to end is displayed in figure 3.1 below. The user must first speak their user name and password into the system. After that, the system will translate their speech into text and encrypt their data. The system will ask you what you would want to do in speech when you log in, and you will have to choose a specific task from the list of options.

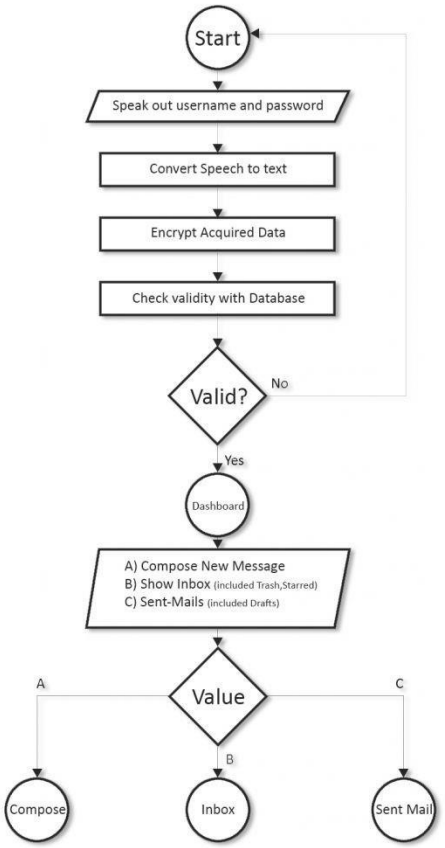

Figure. 3.1 Architecture for voice based email system

IV DESIGN

A.UI design: During this stage, the project's user interface, or UI, is created. That is, creating the HTML and CSS web pages that the user will interact with.
B.Database design: Every project's foundation is thought to be the database. User information, including name and age, is stored in a database within our application. Information regarding emails sent, received, and

drafts is also stored in this database. The ER-diagram below displays the entire suggested database design. This ER-diagram displays every table with every field as well as the connections between other tables.
C.System design: A comprehensive flow diagram of the operational system is created at this phase. This flowchart will display all of the event specifics, including the steps that need to be taken in order for an event to occur.

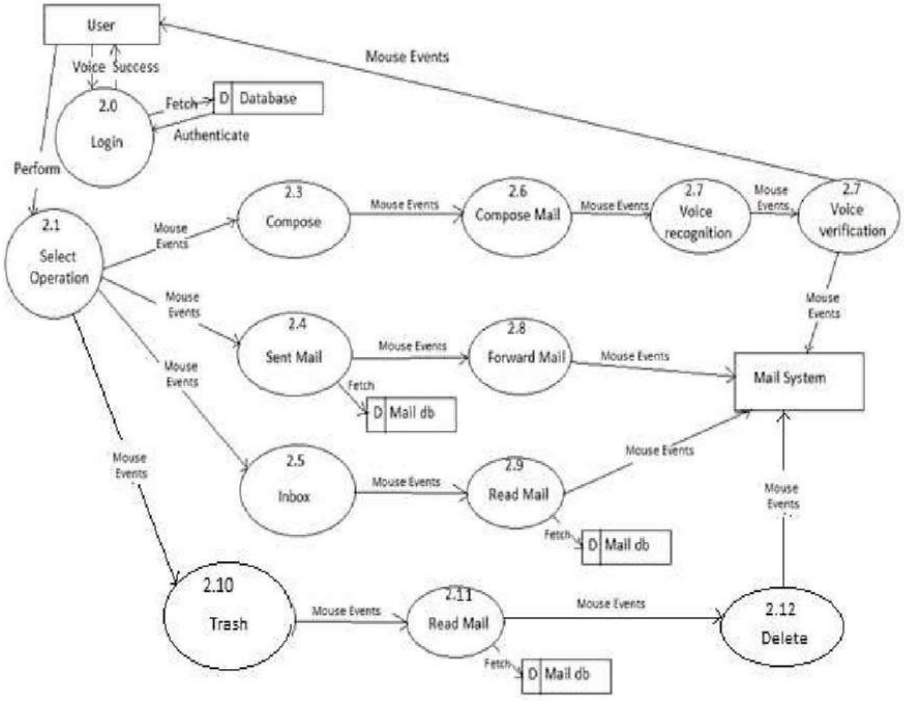

Figure 4.1. Flow diagram of our System

V. IMPLEMENTATION

A. Registration

This is the system's initial module. To get their username and password, users must first register in order to use the system. By asking the user what information needs to be entered, this module will gather all of the user's data. The user will have to confirm the details, which the system will verify once more by asking in alphabetical order. The user can re-enter if the information is incorrect; if not, a prompt will indicate what has to be done to confirm.

B. Login

The user can log in to the system after completing the registration process. The username and password will be requested from the user by this module. In discourse, this will be acceptable. After speech to text conversion, the user will be prompted to confirm that all information has been submitted accurately. The database will be reviewed for entry once the entry has been completed accurately. It will take the user to the homepage if they are permitted.

C. Forgot Password

An authorized user may choose the forgotten password module if they are unable to remember their password and are consequently unable to log in. The user will initially be prompted to enter their username in this module. The security question will be looked up in the database based on the username. When registering, you were asked this question. The computer will ask the question aloud. In turn, the user needs to indicate the response that they gave during the registration process. The user is given the option to update their password if both match.

D. Home Page:

When the user successfully logs in, they are forwarded to this page. The user can now carry out any actions they want to from this page. The choices that are accessible are:

1. Inbox
2. Compose
3. Sent mail
4. Trash

The mouse click action required for the necessary service will be provided by prompting. The occurrence of double right click is reserved especially for the user's ability to log out of the system whenever they like. The prompt that appears immediately after login will provide more information on this every one of these features is in place. The following modules will be implemented as part of the proposed system and will be included in the system. The following is a comprehensive walkthrough of this system:

E. Compose mail

Among the most significant choices offered by the mail services is this one. The compose mail option's capability would not work with the current mail system. As the system is designed for individuals with visual impairments, keyboard actions are strictly prohibited, and voice input and mouse operations are the only ways to compose mail. Typed input won't be necessary. The user has the ability to immediately record and deliver messages that need to be distributed. This voice treatment will take the shape of an attachment. The message the user intended to transmit can be heard on the recording by the recipient. The user wouldn't need to attach the file. There will be a record option available within the compose window. Once recorded it will confirm whether the recording is perfect or not by letting the user hear it and if the user confirms it will be automatically attached to the mail.

F. Inbox

The user can view every email that has been received into their account by using this option. The prompt will instruct the user on how to click in order to listen to the emails they wish to. To navigate among various mails, a popup will indicate which actions to do. Every time a mail is chosen, the user will be asked to identify the sender and the subject of that specific message. As a result, the user can choose whether or not to read the email or to delete it. Deleted emails are kept in the trash section.

G. Sent mail

This feature will record every email the user sends. This option will meet the user's needs if they wish to access these emails. The user must follow the instructions provided by the prompt to travel between emails in order to access the sent mails. A prompt asking the recipient's name and the mail's subject will appear when the control arrives on a certain message. The user will benefit from this by being able to comprehend and extract the necessary mail more quickly.

H. Trash

This feature will log every email that the user deletes. Deleted emails may come from sent or inbox emails. This feature can be used by the user at any point in time to recover deleted emails.

VI. RESULTS AND DISCUSSIONS

A . Libraries used by the system

The suggested system speech_recognition package is installed with the pip command from the Python library. Speech recognition is a crucial component of many everyday home applications, artificial intelligence applications, etc. Another crucial package for sending mail from the sender's address to the recipient's email address is called Yagmail. A module from google-text-tospeech named gTTS is used to perform text to speech. Email access via the IMAP protocol is accomplished through the usage of the client-side imaplib package for Python. It makes email message manipulation possible for the client software. Tkinter and Pyglet are imported to create a decent user interface and to give utilities for constructing multimedia application interfaces.

B. Speech to text proposed approach

When creating a speech-to-text (STT) system for an email platform that uses voice commands, a thorough process includes multiple important steps. First, the user provides audio input via a microphone or voice-activated device. The recorded audio is preprocessed, which includes noise reduction for better input quality and normalization to guarantee constant loudness levels. The audio is then divided into smaller frames in order to efficiently capture temporal dynamics. The acoustic features of speech within each segment are then described using feature extraction techniques, such as spectrogram representations or Mel-frequency cepstral coefficients (MFCCs). Utilizing deep learning architectures such as Convolutional Neural Networks (CNNs)

or Recurrent Neural Networks (RNNs), the system integrates an auditory model that is trained on a variety of datasets to identify different languages, accents, and speaking way . Furthermore, the integration of a language model could improve contextual knowledge. This all-encompassing method seeks to faithfully translate audible words into written language, promoting smooth voicebased email system communication.

C. Text to speech proposed approach

For a voice-based email application to have a text-to-speech (TTS) system that produces clear and natural-sounding audio output, a methodical approach is essential. The first step in the process is to extract the text from the email. Preprocessing is done on this content to get rid of any special characters or formatting errors that could interfere with speech synthesis. After that, a text analysis stage is utilized to identify components including tone, emphasis, and punctuation. Using natural language processing (NLP) techniques improves the synthesized speech's prosody and intonation, making the result more expressive and lifelike. Allowing users to select from a range of voices will allow them to customize their TTS experience and have a more enjoyable and personalized experience with the voice-based email system. The goal of this all-encompassing strategy is to provide an efficient and intuitive text-to-speech (TTS) solution for email correspondence.

VII CONCLUSION

In this study, we suggest a solution that will facilitate effective email service access for those with visual impairments. This approach will assist in resolving some of the issues blind individuals previously encountered while trying to access emails. To lessen the cognitive load of knowing keyboard shortcuts, we have done away with the idea of employing keyboard shortcuts in conjunction with screen readers. Additionally, since keyboard usage is eliminated, any inexperienced user who is unaware of where the keys are on the keyboard should not worry. To access the various services provided, the user simply needs to click in accordance with the IVR's instructions. Other than this, when instructed, the user may need to enter information by voice.

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