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Voice Based Email System for the Visually Challenged

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Abstract - In today's digital world, email is a crucial form of communication, but it can be difficult for those who are blind or visually impaired to access and use it. The idea of a voice-based email system created exclusively for those with visual impairments is presented in this abstract. The objective is to provide a welcoming atmosphere that enables people who are blind or visually impaired to use computers on their own to send and receive emails. The suggested solution has cutting-edge components designed with visually impaired users in mind. By integrating a screen reader, users may convert text into voice and interact with the email interface aloud. Users may create emails using their voice thanks to reliable speech recognition technology that properly converts spoken words into written text. To continually develop the system and adapt it to unique tastes and needs, user input and customization options are included.

Keywords: Voice Recognition, Text-to-Speech (TTS), Speech-to-Text (STT), Visually challenged people

I. INTRODUCTION

The Voice-Based Email System for the Visually Challenged is an innovative solution designed to empower visually impaired individuals to access and manage their emails seamlessly using voice commands. With traditional email systems relying heavily on visual interfaces, this project addresses a critical gap in accessibility. By integrating speech recognition and text-to-speech (TTS) technologies, the system enables users to perform essential email operations such as composing, reading, sending, and deleting messages without needing visual input or external assistance.

This paper discusses to built using the Python programming language and the Django framework, the system combines robust web development tools with advanced voice processing capabilities. Speech recognition ensures that user commands are accurately understood, while

TTS provides auditory feedback, ensuring a smooth and intuitive user experience. The architecture prioritizes simplicity and ease of use, making it accessible even for individuals with limited technical knowledge.

This project not only enhances accessibility but also fosters independence for the visually challenged, enabling them to communicate effectively in a digital-first world. Users can log in securely, compose personalized emails, and manage their inbox through an intuitive voice-based interface. Additionally, the system supports multilingual capabilities to cater to a diverse user base.

By addressing the challenges faced by visually impaired individuals in digital communication, this project contributes to creating a more inclusive technological landscape. The integration of accessible features into mainstream platforms aligns with global efforts to bridge the digital divide and ensures that technology is a tool of empowerment for everyone.

II. LITERATURE SURVEY

The solution presented in the study Voice- Based System in Desktop and Mobile Devices for Blind People [1] is based on a voice command mechanism, in contrast to the current email system. In essence, text to number conversion is the foundation of the entire system. The system will prompt the user for voice commands once it is started in order to access the required services. It is crucial to note that the user must want to access the relevant services for this command to work. This program makes use of IMAP (Internet Message Access Protocol). When sending emails from mail servers over TCP/IP, email clients frequently use this Internet protocol. The principal activity type, the screen, will be the first one to appear at the beginning of the year. The user only needs to tap one button on this screen for the device to start responding to voice instructions. There is just one full-size

button, and you may tap it anywhere on the screen. The user can then send an email and use voice commands to read it.

Saurabh Sawant et al. offer a solution in their study [2] for those who are visually impaired or illiterate to increase their involvement with email systems. Screen readers and Braille keyboards used in IVR systems are no longer required thanks to

this solution. There, both speech-to-text and text-to-speech conversions have been used. Other operations also make use of voice commands. To register, enter your email address and password. Use PHP mailer, a PHP feature, for the functionality. It is a library that enables email sending so that the user's mail can be retrieved from the server of IMAP. For searching mail in inboxes, the Knuth-Morris-Pratt algorithm is utilized in this instance. As a conclusion, the entire system environment is voice- driven, and each level receives the proper system response. The drawback of this approach is that we can't use other email providers, such as Yahoo, etc., because it requires Gmail as a host server.

The Voice based email system for blinds [3] approach offers a stronger emphasis on user friendliness for all kinds of users, including regular users who are blind or illiterate, as compared to the current system, which lays more emphasis on user friendliness for regular users. The core of the entire system is IVR, or interactive voice response. When using this system, the computer will request the user to complete specific actions in order to access the associated services, and the user must complete those actions in order to access the related services. One of the biggest advantages of this method is that the keyboard is not required. All actions will be based on mouse click events. How blind individuals will be able to find the mouse pointer is now a question that needs to be answered.

The creation of a search engine is the aim of paper an Application of Voice Mail: Email Services for the Visually Challenged Individual [4] which only permits voice-based man and machines interaction. This was the debut of a ground-breaking page reader and search engine that is driven entirely by voice. It enables end-users to control and surf the web using user speech to navigate. In response to user text requests, current search engines secure relevant records from the server and display them as text. The paper's [5] Khan, R., Sharma, P. K., Raj, S., Verma, S. K., &Katiyar,S suggested a user-friendly email system for individuals who are blind or visually handicapped. TTS (text-to-speech) module, STT (speech-to-text) module, as well as Module for mail composition activities (which includes composing, inbox, and sending) module makes up the system design. This system uses speech-to-text functionality. using an API to implement artificial intelligence utilising Google-provided neural network models Speech-to-text in the cloud for developers.

Pacha Shobha Rani, Maddireddy Venkata Sai Likhitha, Borra Sneha Latha, “Voice Based E-Mail System For Blinds” [6] employ artificial intelligence to help the blind utilize cutting-edge technology for their development and advancement. The suggested system is a desktop program that uses artificial intelligence to reduce costs and make maintenance simple. The voice detection and conversion are utilized by the suggested system. Since it is entirely voice based and uses neither the mouse nor keyboard, it eliminates the drawbacks of the previous system. Because it uses voices, it offers an intuitive, interactive, and user-friendly GUI that even blind users who are not computer literate can use.

Design and Implementation of Text To Speech Conversion for Visually Impaired People [7] talks about a straight-forward program with text- to-speech capabilities. The application is split into two main modules: the main application module, which contains the fundamental GUI elements and manages the application's fundamental activities, such as parameter input for conversion through file, direct keyboard input, or web. Both DJ Native Swing and the open source SWT API would be used in this. The major conversion engine of the second module, which is integrated into the main module, is responsible for accepting data and converting it. This would put into practice the free TTS API.A study that was conducted resulted in the creation of a program that might assist users in sending and receiving mail in English language. It was found during this investigation that the proposed architecture outperformed the current architecture. In order to make it simple for blind people to access information, text-to-speech and speech-to- text conversion techniques were employed.

A. Limitations of the Surveyed Techniques

It is evident that mouse clicks are used for several activities in almost all the articles. It becomes more challenging for those who are blind. Additionally, because there are many languages spoken there that speech recognition software cannot grasp, the subcontinents of India do not benefit from this. English is the preferred language in its entirety.

III. METHODOLOGY

There are numerous crucial elements in the development process for an Android voice-based email system.

First, requirement collecting is done in order to comprehend the unique requirements and difficulties experienced by visually impaired people using email. In order to learn more about their preferences, ideal features, and pain spots, user research techniques such as interviews and questionnaires are used.

The planning step for the design and interface starts once the requirements have been acquired. In order to ensure ease of use for visually impaired people, a user- friendly and accessible interface is built, taking into mind high contrast colors, big buttons, and intuitive navigation. The application's speech recognition system will be integrated as the following phase. To reliably translate spoken words into written text, this calls for the incorporation of a trustworthy voice recognition library or API, such as Cloud voice-to-Text or Pocket Sphinx. The application incorporates accessibility features that follow Android accessibility rules. This includes features that improve usability and accessibility for those who are blind or visually impaired, such as high contrast mode, haptic feedback, keyboard navigation, and gesture- based controls. To enable communication with email servers, integration with an email API or protocols like IMAP or SMTP is essential. As a result, users who are blind may use the program to send, receive, and manage

emails.

User data is protected by security and privacy safeguards. To prevent unauthorized access to email accounts, encryption technologies are included for data transmission and storage. Voice-based user authentication is also available. In order to discover and fix any usability or accessibility concerns, the produced system goes through extensive testing, including usability testing with users who are visually impaired. The design and functionality are iterated upon in response to user and accessibility expert feedback, enhancing the overall user experience.

1. *Speech-to-text conversion*: To receive user voice, Android supports a range of interfaces for speech recognition listeners. The recognizer intent comes first. Before returning to the previous activity, it first accepts the user's speech as input. The ten available languages on the platform can be selected by voice recognizer when speaking input. The verbal response must then be captured while performing another or ongoing task. The response is converted into text by the code, which is then either displayed or transmitted once more as input to the text-to-speech converter.

2. *Text-to-speech conversion*: This is a crucial component of the program. It examines the text, creates an audio version of it, and then plays it through the user's microphone. This text to speech capability was created and is supported, especially for persons who are blind or visually handicapped. To obtain the text, a class object is constructed. The function that converts text to speech receives the text as an argument. In the listener function, the transformed text is transmitted to the user as an internal voice.

3. *Mail Programming Module*: Email appears to be one of the most useful services now offered online. Many internet-based services use the SMTP protocol to transfer mail from one user to another. SMTP is a sending protocol used to send mail, whereas POP (post office protocol) or IMAP (internet message access protocol) are used to receive emails at the recipient's end.

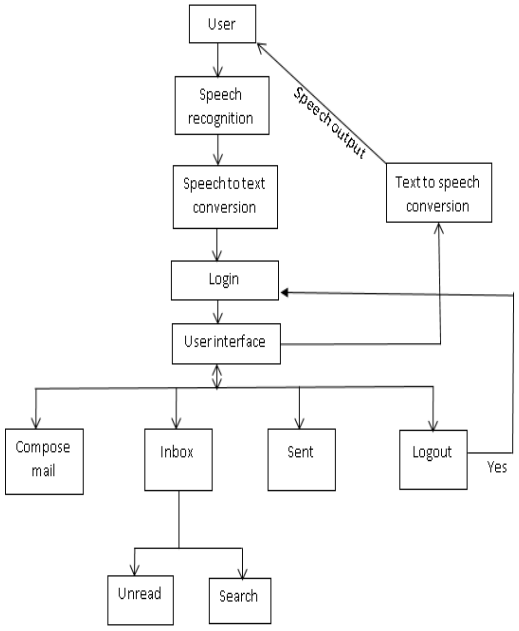
4. *Sending email*: A distributed email will contain components, such as a header and a separate body. The customer and server line up a sequence of responses to the client's request before sending the email. The header is different from the body in that it will come to an end when there are no more lines. The message body by reception contains the specific information. After a null line, each data point in the body is taken.

A. System Architecture

The architectural diagram displays the system design for the voice-based email system for visually challenged users. The architecture consists of numerous parts and how they interact to enable users to send emails using voice commands. Let us talk about the architecture in more detail. The User component represents the visually impaired user who interacts with the system. The Speech Recognition component captures the user's spoken speech instructions. With voice recognition technology, which converts spoken words into text, the system can process the user's requests.

The Email Server component is in charge of handling the email-related functions. By connecting to the email service provider's server, it enables email sending and receiving. The Email Server component checks the user's login details with the Authentication component before beginning email operations. The authentication component establishes a safe and regulated environment by verifying that the user has authorization to access their email account.

When a user tries to log in, the system prompts them for their login details. The authentication component authenticates the credentials by comparing the provided credentials to the user data that has been saved. If the credentials are legitimate, the system moves on to the next phase. Even if the user's login credentials are entered incorrectly, the system will prompt them to do so again until they are properly authorized. After the user has been validated, they can proceed to the "Compose Email" component. At this stage, the user follows audio directions to input the recipient's email address, message body, and topic. The NLP component processes the user's input before extracting the relevant data.



An accessible user experience is produced via the system's Text-to-Speech (TTS) Converter component. This section converts the system's output into voice format, including email content or confirmation messages. The TTS Converter enables the system to interact with the visually impaired user vocally, allowing them to effectively receive and understand the system's replies. Arrows on the architectural diagram depict the information flow and interactions among the parts. The arrow pointing from the User component to the Speech Recognition component, for example, depicts the flow of the user's spoken input. The arrows between the components depict how information and control are passed between them in a manner like this.

B. Design

1. *User Interface Design*: The user interface for the voice-based email system has created by simple HTML and CSS

2. *Logo Screen*: When users initially launch the program, they are welcomed by the Logo Screen, which serves as the system's initial visual depiction of the voice-based email system. This page presents the user interface and displays the application's amiable and distinctive logo or symbol.

3. *Login Page*: After viewing the Logo Screen, users are sent to the Login Page, which acts as the doorway to their email account. On the login page, the User ID and Password sections are both very important. They both are already fed to the code.

4. *Message Page*: After successfully authenticating into the system, the user is then sent to the Message Page, where they may create and send emails. There are many text areas on the Message Page where users may type the necessary email details:
    a. *Recipient Email Address Field:* Users can use this field to input the recipient's email address. There is a text entry form available that is like the User ID field on subject line for their email. Users may speak the subject into a text entry box while utilizing voice recognition.
    b. *Message Subject Field:* This allows users to provide a brief yet informative subject line for their email. Users may speak the subject into a text entry box while utilizing voice recognition.
    c. Message Text Field: The Message Text box allows users to enter email content in a larger text input area. Users may enter the message's text, along with any attachments or additional information, using the virtual keyboard or voice input

C. Implementation

• Login: A Boolean that denotes a user's ability to log in. It verifies the user's credentials and returns a Boolean value indicating if the login process was successful or unsuccessful.

• Compose Email: A void function allows the user to create an email by passing parameters for the subject, message content, and recipient's email address.

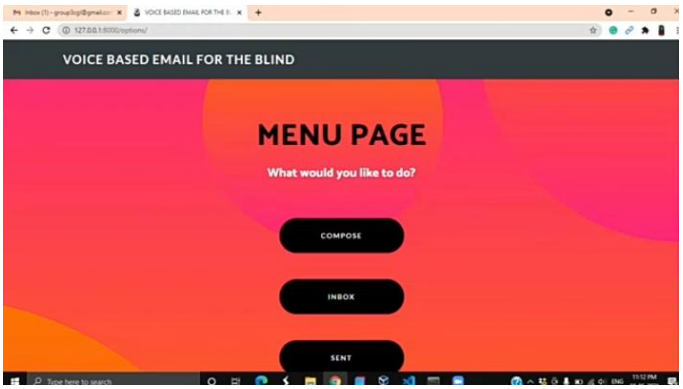
• Confirm Content: A Boolean value is used to verify the email's content. It provides a Boolean result that indicates if the user has approved or disapproved of the material.

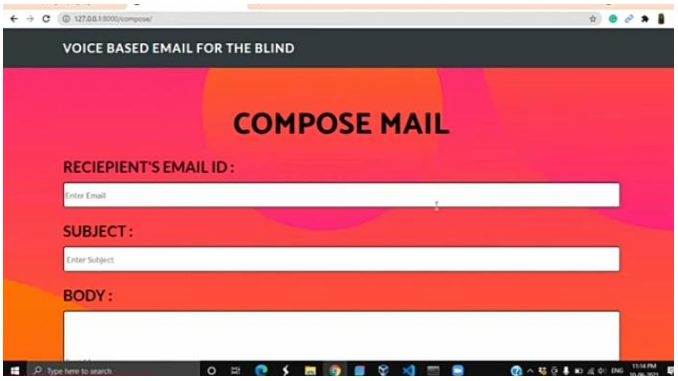
• Send Email: The process of sending the composed email is started by the void function sendEmail().

IV. RESULT AND DISCUSSION

These are the output of the system which is negotiated through voice. Starting the system the programs are brought to the visual studio. Next the compilation is done. As the main source of the system is python we need to run the program in the terminal in the command prompt. After the system verification is done website is ready.

The website can be run through local host with stable internet connectivity. The login details is already given in the program so clicking anywhere on the screen leads to menu page. After selecting the compose option through voice guidance it will be directed to the compose page.





Required information of the receiver's mail, subject, body details are filled through voice and the details are updated. Finally the mail is sent to the receiver. Hence the complete emailing process is done only by voice such as logging in to the system, selecting the option such as composing the mail and the sending the mail to the desired user.

V. CONCLUSION

This paper has successfully designed and developed a voice-based email system that enables users to send emails using voice commands. The system has demonstrated high accuracy in speech recognition, fast response times, and a user-friendly interface. The results of the user testing and evaluation have shown that the system is effective, efficient, and easy to use. The voice-based email system has the potential to revolutionize the way people interact with email, particularly for individuals with disabilities, elderly individuals, and those who prefer a hands-free experience. The system can also be integrated with other voice-based applications, such as virtual assistants, to provide a seamless and intuitive user experience.

Future work can focus on improving the system's accuracy, expanding its functionality, and exploring its applications in various domains. Additionally, the system can be commercialized and made available to the public, providing a innovative solution for email Further, this project has demonstrated the feasibility and potential of voice-based email systems, and it is expected to have a significant impact on the way people interact with email in the future.

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