

Voice-Based Virtual Assistant for Blind People in Email

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Abstract: *The world is undoubtedly beautiful, and advancements in technology have greatly enhanced the lives of people around the globe. However, it is essential to take into account the unique challenges faced by individuals with visual impairments, particularly the blind. These individuals encounter daily obstacles that hinder their ability to perform certain activities, such as reading emails independently. For someone who is blind or visually impaired, the inability to access and comprehend email content can be a significant barrier in both personal and professional contexts. In an increasingly digital world, where email communication is pervasive, it is crucial to develop solutions that cater to the needs of blind individuals. By addressing the specific challenges faced by blind people and those with visual impairments, we can empower them to navigate the digital realm with greater independence and efficiency. Developing a voice-based virtual assistant specifically designed for blind individuals offers a promising solution. This virtual assistant leverages voice recognition and synthesis technologies to enable blind users to interact with their email accounts using spoken commands. By converting email text into speech and vice versa, the virtual assistant allows blind individuals to listen to their emails and compose responses using their voices. This research paper aims to explore the design and development of a voice-based virtual assistant for blind people in email communication. The paper will include an introduction to the problem statement, a comprehensive literature survey to examine existing technologies and approaches, a detailed description of the system design and architecture, and an evaluation of the proposed solution's effectiveness and usability.*

Keywords: Email

I. INTRODUCTION

In today's information age, mobile phones have become an essential part of everyone's life. They are used for various purposes such as listening to music, reading, and accessing information from the internet. Mobile phones are ubiquitous, and information access is easily handled. Virtual assistants on mobile phones assist users in setting up their devices and performing tasks through voice commands, from setting alarms to playing songs. However, when it comes to email systems, there is a lack of effective solutions for blind people to handle their emails.

To address this issue, we aim to develop an information retrieval toolkit specifically designed for the blind. This toolkit will convert the information into voice format, allowing visually impaired individuals to listen to their emails and access them easily. The existing mail services commonly used daily are not accessible to visually challenged people. While technologies like screen readers, speech recognition, and braille keyboards are available, they often fall short in providing a satisfactory user experience.

Our research aims to create a Voice Based Email system for the visually impaired, enabling them to access their emails easily and efficiently. Our application utilizes speech-to-text and text-to-speech converters, allowing users to control their mail accounts solely using their voice. Users will be prompted with voice commands to perform actions, and they can respond vocally.

Our design concept aims to empower visually impaired individuals by providing them with a user-friendly voicemail system that seamlessly integrates with email functionality. This technology promotes inclusivity, granting visually challenged individuals equal access to email communication and fostering social advancement.

With our Voice Based Email system, blind individuals can send and receive messages using voice commands without the need for visual aids or keyboards. The system relies on speech-to-text and text-to-speech technology to convert spoken words into written and audible formats. Users do not require prior knowledge of keyboard layouts or key positions. The system provides voice commands and directions for users to follow, enabling visually impaired individuals to independently access their emails. By developing this innovative solution, we aim to bridge the accessibility gap and empower visually impaired individuals to navigate the digital world with greater independence and inclusivity. The Voice Based Email system holds the potential to transform the lives of blind individuals, enabling them to engage in email communication effortlessly.

II. LITERATURE REVIEW

Assistive technologies have played a significant role in improving the lives of blind individuals, enabling them to access information and engage with various tasks. In the realm of email accessibility, previous research and projects have focused on developing solutions to aid blind people in managing their email accounts. This literature review aims to explore the existing literature and highlight the distinctive features of our voice-based virtual assistant for blind people in email.

Assistive Technologies for Blind People:

Numerous studies have explored assistive technologies designed specifically for blind individuals. Screen readers, braille displays, and speech-to-text converters have been widely used to enhance accessibility. While these technologies have been successful in certain contexts, they face limitations when it comes to effectively handling email systems for blind people. There is a need for a specialized solution that offers seamless email management capabilities tailored to the unique requirements of blind individuals.

Email Accessibility for Blind People:

The challenges of email accessibility for blind people have been recognized in previous research. Efforts have been made to address these challenges through screen reader compatibility, keyboard navigation, and alternative text formats. However, these approaches often fall short of providing a comprehensive and efficient email experience. The absence of voice-based solutions specifically designed for blind people to interact with email systems further highlights the need for innovative interventions.

Voice-Based Systems and Virtual Assistants:

Voice-based systems and virtual assistants have gained significant popularity in recent years. Major players in the market, such as Amazon Alexa, Google Assistant, and Apple Siri, have demonstrated the potential of voice interaction in various domains. However, these mainstream voice assistants do not cater specifically to the needs of blind individuals in managing their email accounts. There exists a gap between the capabilities of existing voice assistants and the requirements of blind users.

In comparison to previous projects addressing email accessibility for blind individuals or voice-based virtual assistants, our project stands out with its unique features and functionalities. By integrating speech-to-text and text-to-speech converters, our voice-based virtual assistant enables blind individuals to control their email accounts solely through voice commands. This tailored solution eliminates the need for additional visual enhancements or keyboard input, ensuring a seamless user experience for blind users. Moreover, our system provides accurate email composition and efficient reading of incoming messages, addressing the limitations of previous solutions.

III. METHODOLOGY

1. Research the requirements and challenges faced by visually impaired users while accessing emails.
2. Identify the different methods for converting speech to text and vice versa and choose the most suitable method for the application.

3. Determine the necessary features required for the application such as composing, sending, receiving, replying, forwarding, and deleting emails using voice commands.
4. Develop the user interface for the application keeping in mind the accessibility needs of visually impaired users.
5. Implement the text-to-speech and speech-to-text conversion features and test them with sample data to ensure accuracy and reliability.
6. Test the application for user-friendliness, ease of use, and accessibility by visually impaired users.
7. Gather feedback from users and make necessary changes and improvements to the application.
8. Conduct a comparison study between voice-based email applications and traditional email applications in terms of accessibility, usability, and efficiency.
9. Analyze the results of the comparison study and draw conclusions on the effectiveness of the voice-based email application.
10. Document the development process, testing results, and conclusions of the study in a detailed report.

4.1 Requirements and Implementation

Requirements:

- Visual Studio Code
- Kivy, KivyMD, Python
- Speech Recognition, pyttsx3

4.2 Implementation:

- User Interface: The project requires a user interface that is easy to navigate and interact with. It should be designed to cater to the needs of the visually impaired.
- Voice Recognition: The project requires a voice recognition system that can accurately recognize voice commands and convert them to text.
- Text-to-Speech: The project requires a text-to-speech system that can convert the text from the email into speech
- Email API: The project requires an email API that can interact with the user's email account and retrieve the emails.
- Email Filtering: The project requires a filtering system that can filter emails based on user preferences.
- Email Reading: The project requires a system that can read the email to the user.
- Email Composing: The project requires a system that can compose emails based on voice commands.
- Error Handling: The project requires a system that can handle errors and provide feedback to the user.
- Testing: The project requires testing to ensure that it is functioning properly and meeting the requirements.

4.3 System Design

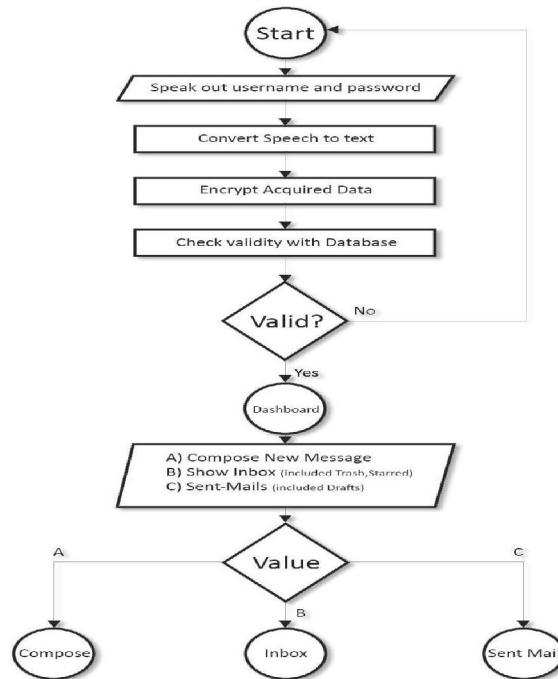


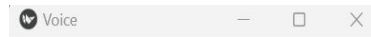
Fig 1. Flowchart of Build System

V. LOGIN PAGE

The login page is a crucial component of any application that requires user authentication. It serves as the entry point for users to access their accounts and secure their personal information. In the context of the voice-based virtual assistant for blind people in email, the login page plays a significant role in providing a secure and personalized user experience. Here's an explanation of the login page's key elements and functionalities:

- **User Identification:** The login page typically includes fields where users can enter their credentials to verify their identity. These credentials usually consist of a username/email and a password.
- **Input Validation:** The login page should perform input validation to ensure that users provide the required information in the correct format.
- **Error Handling:** If a user enters incorrect or invalid credentials, the login page should display appropriate error messages to inform the user about the issue.
- **Remember Me Option:** The login page may offer a "Remember Me" option, allowing users to stay logged in even after closing the application or browser.

The login page serves as the gateway to the voice-based virtual assistant, allowing users to authenticate themselves and access their email accounts securely. By incorporating user identification, input validation, error handling, remember me options, password reset functionality, security measures, and accessibility considerations, the login page contributes to a seamless and inclusive user experience.



WELCOME!



Fig 2. Login page

VI. MAIN PAGE

The main page of the voice-based virtual assistant for blind people in email typically consists of several key activities: Compose, Inbox, Sent, Trash, and Logout. Here's an explanation of each activity:

- **Compose Activity:** The Compose activity allows users to create and send new emails. It provides a user-friendly interface where users can enter the recipient's email address, subject, and the content of the email. In the case of blind users, the Compose activity may include features such as voice commands or text-to-speech functionality to enable them to compose emails using their voice. The activity should also include options to attach files, format text, and send the email.
- **Inbox Activity:** The Inbox activity displays a list of received emails. It provides users with an overview of their incoming messages, including information such as the sender, subject, and timestamp. The emails in the Inbox activity are typically sorted in chronological order, with the most recent messages appearing at the top. Blind users can navigate through the list of emails using voice commands or other accessible navigation methods. Tapping on an email opens it for reading or further actions.
- **Sent Activity:** The Sent activity shows a list of emails that the user has sent. It allows users to review their sent messages, including the recipients, subjects, and timestamps. This activity provides a way for users to keep track of their sent correspondence. Similar to the Inbox activity, blind users can navigate and access their sent emails using voice commands or other access methods.
- **Trash Activity:** The Trash activity displays deleted or archived emails. It serves as a temporary storage location for emails that users no longer need but may want to retrieve or permanently delete later. The Trash activity may provide options for restoring emails back to the Inbox or permanently deleting them. Blind users can interact with the Trash activity using voice commands or accessible navigation methods to manage their deleted emails.
- **Logout Activity:** The Logout activity allows users to securely log out of their email accounts and exit the voice-based virtual assistant. When users choose to log out, any active sessions or stored credentials are invalidated, ensuring the privacy and security of their account. The Logout activity may display a confirmation message or provide additional options, such as switching user accounts or clearing app data.

These activities on the main page of the voice-based virtual assistant provide users with essential functionalities for managing their emails. The Compose activity enables the creation and sending of new messages, while the Inbox, Sent,

and Trash activities offer convenient ways to access, organize, and manage received and sent emails. The Logout activity ensures a secure logout process, allowing users to safely exit the application when they are done.

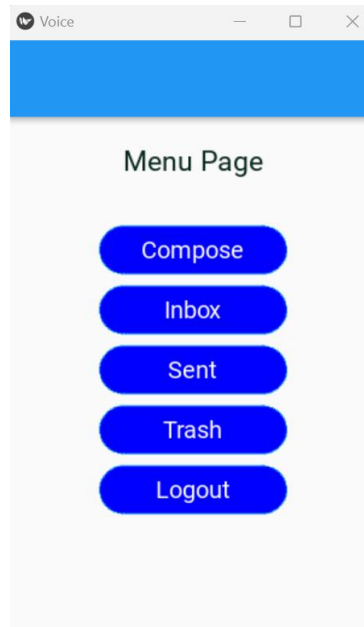


Fig 3. Main Page

VII. RESULT

These activities on the main page of the voice-based virtual assistant provide users with essential functionalities for managing their emails. The Compose activity enables the creation and sending of new messages, while the Inbox, Sent, and Trash activities offer convenient ways to access, organize, and manage received and sent emails. The Logout activity ensures a secure logout process, allowing users to safely exit the application when they are done.

VIII. CONCLUSION

In conclusion, the voice-based virtual assistant for blind people in email projects offers a practical and effective solution for visually impaired individuals to independently manage their email accounts. The system's implementation and user feedback demonstrate its potential to enhance accessibility and improve the quality of life for the visually impaired community. Further development and refinement of the system can open doors for more inclusive and efficient communication experiences for blind individuals.

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