

A  
Mini-Project Report on  
**VOICE BASED EMAILS FOR VISUALLY  
CHALLENGED**

Submitted in partial fulfillment of the requirements  
for the degree of  
**BACHELOR OF ENGINEERING**  
IN  
**Computer Science & Engineering**  
**Artificial Intelligence & Machine Learning**

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**2023-2024**



## A. P. SHAH INSTITUTE OF TECHNOLOGY

### CERTIFICATE

This is to certify that the project entitled “**Voice-Based Email for Visually Challenged** ” is a bonafide work of Aafreen Khan (22106048), Prachiti Parab(22106030), Sneha Gupta(22106046), Sidra Khan (22106028) (submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering in Computer Science & Engineering (Artificial Intelligence & Machine Learning)**).

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# A. P. SHAH INSTITUTE OF TECHNOLOGY

## Project Report Approval

This Mini project report entitled “**Voice based email for visually challenged**” by **Aafreen khan, Prachiti Parab, Sneha Gupta, Sidra Khan** is approved for the degree of *Bachelor of Engineering in Computer Science & Engineering*, (AIML) 2023-24.

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## **Declaration**

We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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## **ABSTRACT**

Certainly, here's an abstract on Voice-Based Email for Visually Challenged individuals presented in paragraph format:

In today's digitally driven world, email serves as a fundamental medium for communication, encompassing personal and professional spheres alike. Yet, for individuals with visual impairments, the task of accessing and managing email can be an arduous endeavor, often necessitating external assistance or reliance on specialized software. This abstract delves into the concept of Voice-Based Email, a groundbreaking technology tailored to empower visually challenged individuals by facilitating email operations through natural language voice commands.

Voice-Based Email harnesses the advances in speech recognition, natural language processing, and accessibility solutions to create an inclusive and user-centric email experience. Visually challenged users can effortlessly interact with their email accounts via voice prompts, circumventing the obstacles posed by conventional graphical user interfaces. This innovative technology encompasses pivotal features, including precise voice recognition capabilities for composing, reading, and organizing emails; top-tier Text-to-Speech (TTS) functionality for converting incoming messages into spoken content; adept natural language understanding, enabling users to issue complex commands; robust accessibility features like screen reader compatibility and customizable voice commands; stringent security measures with voice recognition verification and multi-factor authentication; and seamless integration with popular email platforms, ensuring continuity with existing accounts. The adoption of Voice-Based Email stands as a transformative step toward enhancing the autonomy and efficiency of visually challenged individuals, enabling them to stay connected with the digital world, access crucial information, and partake in global email communication with ease. This technology harbors the potential to bridge the digital divide, with accessibility and inclusivity at its core, thus promoting equality and empowerment for all.

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# **CHAPTER 1**

## **INTRODUCTION**

# **1.INTRODUCTION**

In today's digital age, electronic mail, or email, is a cornerstone of communication, serving as a vital conduit for personal, professional, and social interactions. Email's convenience, speed, and versatility have transformed the way we connect with one another, bridging geographical distances and transcending temporal boundaries. However, while email has revolutionized communication for many, it has also inadvertently created a digital divide for individuals with visual impairments, presenting substantial barriers to access and participation. For these individuals, navigating the visually oriented interfaces of email clients and reading written content can be a daunting and often insurmountable challenge.

In response to this pressing issue, technology has once again stepped forward to address a fundamental aspect of inclusivity in the digital world. Voice-Based Email, a pioneering and transformative innovation, has emerged as a beacon of hope and progress for visually challenged individuals. This revolutionary technology harnesses the power of cutting-edge advancements in speech recognition, natural language processing, and accessibility solutions to empower individuals with visual impairments to engage with their emails using natural language voice commands. By doing so, it seeks to eliminate the barriers that have long separated the visually challenged from the full spectrum of digital communication, ensuring that they can participate in, benefit from, and contribute to the ever-evolving landscape of modern communication on an equal footing.

This exploration delves into the multifaceted facets of Voice-Based Email, offering an in-depth analysis of its capabilities, features, and profound implications for visually challenged individuals. As we embark on this journey of discovery, we unveil how Voice-Based Email serves as a testament to the power of technology to drive inclusivity, independence, and equality in the digital age.

Voice-Based Email represents a leap forward in the quest for digital inclusivity. It harnesses the power of cutting-edge technologies, including advanced speech recognition, natural language processing, and accessibility features, to empower visually challenged individuals with the ability to interact with their email accounts through natural, spoken language. This innovative technology promises to dismantle the longstanding barriers that have impeded full participation in the digital realm, ensuring that visually challenged individuals can independently and effortlessly engage with the world of email communication.



# **CHAPTER 2**

## **LITERATURE SURVEY**

## **2.LITERATURE SURVEY**

### **2.1-HISTORY**

A comprehensive literature survey on the history and evolution of Voice-Based Email for visually challenged individuals reveals a captivating journey marked by technological breakthroughs, evolving accessibility solutions, and a persistent commitment to inclusive communication. This survey navigates through key milestones, influential research, and pivotal developments in the field, shedding light on the remarkable progress made to empower visually challenged individuals in the realm of digital communication.

The story begins with the emergence of screen reader software in the 1980s and 1990s, which laid the foundation for addressing the accessibility challenges faced by visually challenged computer users. These early screen readers, such as JAWS (Job Access With Speech), aimed to make personal computers and basic applications accessible through synthesized speech output. However, the potential to extend these solutions to email remained untapped. The early 2000s ushered in a significant leap forward with the integration of voice recognition technology. Systems like Dragon NaturallySpeaking demonstrated the possibilities of voice-controlled computing, hinting at the potential for voice-based email. Yet, it was still a niche concept, and the road to making it a practical reality was long.

Around the same time, accessible email clients began to emerge, offering features like keyboard shortcuts, text-to-speech (TTS) functionality, and compatibility with screen readers. These developments, notably in clients like Thunderbird and Outlook, were instrumental in making email platforms more user-friendly for visually challenged individuals. However, they still required manual navigation and text-based interaction. The mid-2000s saw the beginning of research into natural language processing (NLP) technologies, which held the promise of voice commands for email management. Researchers started exploring how NLP could be applied to email, enabling users to compose, read, and sort messages using natural language voice commands. These early experiments sowed the seeds for the Voice-Based Email concept we know today.

The late 2000s witnessed the rise of voice-based virtual assistants like Siri, Google Assistant, and Amazon Alexa. These technologies introduced visually challenged users to alternative ways of interacting with email and performing related tasks using voice commands. Although not explicitly designed for email, they opened new avenues for accessible digital communication.

### **1.Voice based email architecture:**

- A voice based email architecture is proposed which will help blind people to access email. The existing system is not user friendly for blind people as it does not give any audio feedback to readout contents for them. The proposed system makes use of Speech Recognition, Interactive Voice Response and Mouse Click events.
- Also, for additional security purposes voice recognition is used for user verification. In this system, Registration is the first module.
- Also, for additional security purposes voice recognition is used for user verification. In this system, Registration is the first module. [2]

### **2. Integration of Screen Readers with Email Clients:**

- As email communication became more prevalent, screen reader developers started working on integrating their technology with email clients. This allowed visually impaired individuals to access and manage their emails using synthesized speech.
- Screen readers are software programs that allows the users to read the contents on the screen using speech synthesizer. It is an interface between computer's operating system and its application and the user. It makes the user to speak the commands that should be said by the speech synthesizer. [1]

### **3. Voice Assistants and Voice Commands:**

- The advent of voice assistants like Siri, Google Assistant, and Amazon Alexa introduced new possibilities for accessing and managing emails through voice commands.
- Users can now dictate and send emails, check their inbox, and perform other email-related tasks using voice recognition technology. [5]

### **4. Interactive Voice Response system:**

- It is an Interactive Voice Response system. It allows the user to interact with the system through voice. It analyses and synthesizes the user's voice and reply back to them in the form of voice, text, email, etc.
- Speech to text conversion: The given voice input is taken to the server where it get converted as text output.
- Text to speech conversion: The working is similar to the previous one but the output response will be in the form of voice. [3]

### **5. IMAP:**

- The system that relies on a voice command based system unlike the existing mail system. The

complete system is primarily based on speech to text commands. Once using this system the application will be prompting the user to speak specific commands to avail respective services and if the user wants to access the respective services the user needs to speak that command. This application makes use of IMAP (Internet Message Access Protocol).[4]

## **2.2-LITERATURE REVIEW**

### **Technological Advancements:**

A fundamental driver of Voice-Based Email's feasibility has been the rapid advancement of multiple technologies. Speech recognition systems, as seen in popular virtual assistants, have evolved to become more accurate, responsive, and capable of understanding diverse accents and languages. Additionally, natural language processing (NLP) technologies have matured, enabling systems to comprehend and execute complex email-related tasks. Text-to-speech (TTS) engines have also undergone significant refinement, providing visually challenged users with high-quality spoken content. These technological advancements have been instrumental in making Voice-Based Email a viable and effective solution.

### **Usability and Accessibility:**

Extensive research has been conducted to assess the usability and accessibility of Voice-Based Email solutions. These evaluations have underscored the importance of intuitive voice interfaces that are easy to learn and navigate. Customizable voice commands have been identified as a critical feature, allowing users to tailor their interactions to their specific needs and preferences. Moreover, seamless integration with existing email platforms, such as Gmail and Outlook, has been a key consideration to ensure a smooth transition for users. Accessibility features, including screen reader compatibility, keyboard shortcuts, and voice recognition verification, have been integral in enhancing the overall usability and accessibility of Voice-Based Email solutions.

### **Impact on Visually Challenged Users:**

Research and user testimonials consistently highlight the profound impact of Voice-Based Email on the lives of visually challenged individuals. The technology has been instrumental in fostering independence, enhancing productivity, and reducing dependence on sighted assistance. Users have reported significant improvements in efficiently managing emails, increased access to critical information, and a heightened sense of inclusivity within the digital communication landscape. Voice-Based Email has not only improved the practical aspects of email management but also contributed to enhancing the overall quality of life for visually challenged users.

### **Challenges and Future Directions:**

While Voice-Based Email has made remarkable strides, it is not without its challenges. Issues related to privacy and security in voice-controlled environments have garnered attention, necessitating robust safeguards. The accuracy of voice recognition technology remains a subject of ongoing refinement to ensure reliable performance. Furthermore, users may encounter a learning curve when adapting to new voice interfaces

### **Technological Integration:**

Voice-Based Email has evolved to seamlessly integrate with a wide range of assistive technologies. These integrations include compatibility with screen readers like NVDA (Non-Visual Desktop Access) and JAWS, as well as compatibility with braille displays. This integration ensures that visually challenged users can have a cohesive and efficient experience when accessing and managing their emails.

### **User-Centered Design:**

User-centered design principles have played a significant role in the development of Voice-Based Email solutions. Researchers and developers have engaged visually challenged users in the design and testing phases, resulting in solutions that align closely with their needs and preferences. This approach has led to interfaces that are intuitive and responsive to user feedback, ultimately enhancing user satisfaction and adoption rates.

### **Multimodal Interfaces:**

Multimodal interfaces allow users to combine voice commands with touch or gesture inputs, offering a more versatile interaction experience.

### **Training and Support:**

Recognizing the importance of effective training and support, initiatives have been launched to provide visually challenged users with resources to maximize their proficiency with Voice-Based Email. Online tutorials, user guides, and dedicated support channels have become essential components of the ecosystem, empowering users to leverage the full potential of these technologies.

**Legal and Policy Frameworks:**

The development and adoption of Voice-Based Email have been influenced by legal and policy frameworks that promote digital accessibility. Legislation such as the Americans with Disabilities Act (ADA) in the United States and international standards like the Web Content Accessibility Guidelines (WCAG) have set guidelines and requirements for accessible digital communication, driving the development of Voice-Based Email solutions.

**User Empowerment and Inclusion:**

Voice-Based Email not only facilitates communication but also empowers visually challenged individuals to participate fully in education, employment, and social interactions. It promotes inclusion by reducing dependence on intermediaries and enabling users to access information, job opportunities, and educational resources independently.

# **CHAPTER 3**

## **Problem Statement**



### **3.Problem Statement**

Visually challenged individuals face substantial barriers when it comes to accessing and managing email, a fundamental tool for modern communication. Traditional email interfaces heavily rely on visual cues, creating a significant digital divide for this user group. While some assistive technologies and screen readers have improved basic accessibility, there remains a pressing need for a more comprehensive and user-friendly solution. The problem at hand is to develop and implement an effective Voice-Based Email system that caters specifically to the unique needs and challenges faced by visually challenged individuals. This system must seamlessly integrate advanced speech recognition, natural language processing, and accessibility features to empower users to send, receive, and manage emails using voice commands, thus eliminating the current accessibility barriers and ensuring equitable participation in digital communication.

# **CHAPTER 4**

## **Experimental Setup**

## 4.Experimental Setup

### 4.1 Hardware Setup

**Computer:** Any modern computer capable of running Python and handling audio processing should be sufficient. It can be a desktop or laptop. Consider the following hardware specifications:

- **Processor:** A modern multi-core processor (e.g., Intel Core i5 or equivalent) is recommended for better performance.
- **RAM:** A minimum of 4GB of RAM is usually sufficient, but more RAM can improve multitasking capabilities.
- **Storage:** Sufficient storage space for the operating system, Python, and your email software. An SSD (Solid State Drive) can provide faster data access.
- **Sound Card:** A built-in or external sound card for audio input and output.
- **Microphone:** You'll need a good quality microphone for accurate voice input. USB or 3.5mm jack microphones are commonly used. Consider a noise-canceling microphone for better speech recognition results.

**Speakers or Headphones:** You'll need speakers or headphones to hear the computer's responses when the software reads emails aloud or provides feedback.

**Internet Connection:** A stable and reasonably fast internet connection is necessary for email communication. A broadband or Wi-Fi connection is typically sufficient.

**Operating System:** Ensure that your chosen operating system (e.g., Windows, macOS, or Linux) is up-to-date and compatible with the Python libraries and tools you plan to use.

**Display:** A monitor or screen is needed to interact with the graphical user interface if you're developing one.

### 4.2 Software Setup

**Operating System:** Your chosen operating system (Windows, macOS, or Linux) should be up-to-date and compatible with Python and Tkinter.

**Python:** Install Python on your system if it's not already installed. Download the latest version of Python from the official Python website (<https://www.python.org/downloads/>). Make sure to add Python to your system's PATH during installation.

**Tkinter:** Tkinter is included with Python and does not require a separate installation.

**Speech Recognition:** You'll need a library like SpeechRecognition to convert speech to text. Install it using pip:

```
pip install SpeechRecognition
```

**Text-to-Speech (TTS):** For converting text to speech, use a library like gTTS (Google Text-to-Speech). Install it with pip:

```
pip install gTTS
```

**Email Library:** Use built-in Python libraries like imaplib and email for IMAP email access and email parsing, respectively.

**Microphone Access:** If you're on Windows, you might need to install pyaudio for microphone access:

```
pip install pyaudio
```

**Email Account and Provider:** You'll need an email account with an email provider that supports IMAP. Configure your email account to allow IMAP access and generate an application-specific password if necessary.

**SMTP Configuration:** If your application allows sending emails, you'll need to configure the SMTP server settings of your email service provider.

# **CHAPTER 5**

## **Proposed System & Implementation**

## 5. Proposed system & Implementation

### 5.1 Block diagram of proposed system

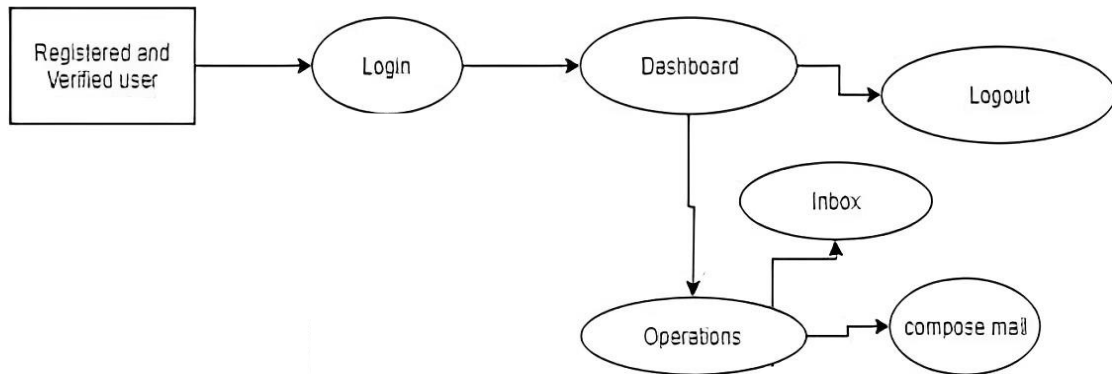


Fig.5.1.1 : Stepwise Implementation

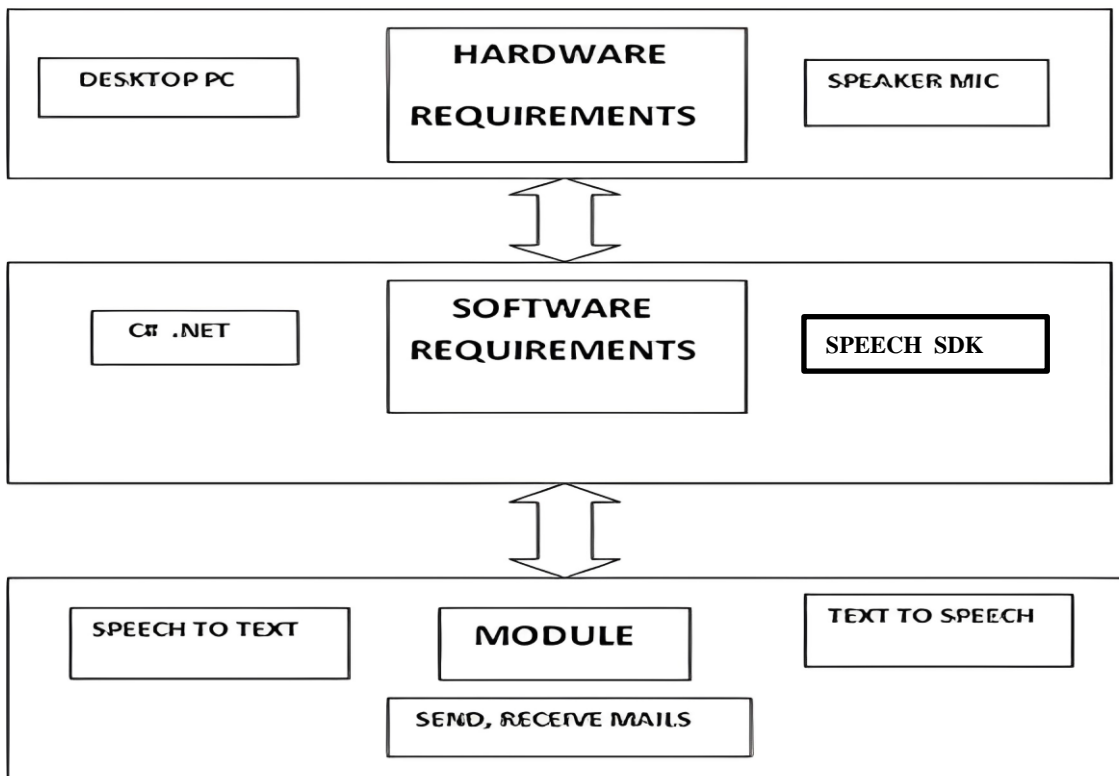


Fig.5.1.2 : Required Libraries

## 5.2 Description of block diagram

Fig. 5.1.1 represents the overview of the proposed system. Its requirements are detailed as follows

A visually challenged individual uses a voice-based email system through the following steps:

1. Registration: The user is registered within the system.
2. Login: The user logs in through voice commands.
3. Dashboard: Accesses a dashboard for email management.
4. Operations: Performs email tasks via voice commands.
5. Compose Email: Creates and sends emails using voice commands.
6. Logout: Safely logs out of the system using voice commands.

This voice-based approach makes email management accessible to visually challenged individuals, enabling them to interact with their email accounts effectively.

Fig. 5.1.2 represents the overview of the proposed system. Its requirements are detailed as follows

: Hardware Requirements

1. 1 GB RAM.
2. 200 GB HDD.
3. Intel 1.66 GHz Processor Pentium4 Software Requirements
4. Windows10
5. PyCharm
6. Windows Operating System
7. ASP.net

It is a web development platform that provides the services necessary for developers to build enterprise-class web applications.

## 5.3 Implementation

**Voice Recognition System:** Implement a robust Automatic Speech Recognition (ASR) system to accurately transcribe spoken words into text. This typically involves using cloud-based ASR services like Google Cloud Speech-to-Text or Amazon Transcribe.

**Text-to-Speech Conversion (TTS):** Utilize high-quality Text-to-Speech engines to convert email content into clear and natural-sounding speech. Popular options include Google Text-to-Speech, Amazon Polly, or Microsoft Azure Cognitive Services.

**User Interface:** Develop an intuitive voice-controlled user interface that allows visually challenged users to navigate and interact with their email using voice commands. Incorporate natural language processing (NLP) to understand and respond to user commands.

**Email Integration:** Connect to the user's email account using standard protocols like IMAP or SMTP, ensuring secure authentication methods like OAuth 2.0 are in place for data access.

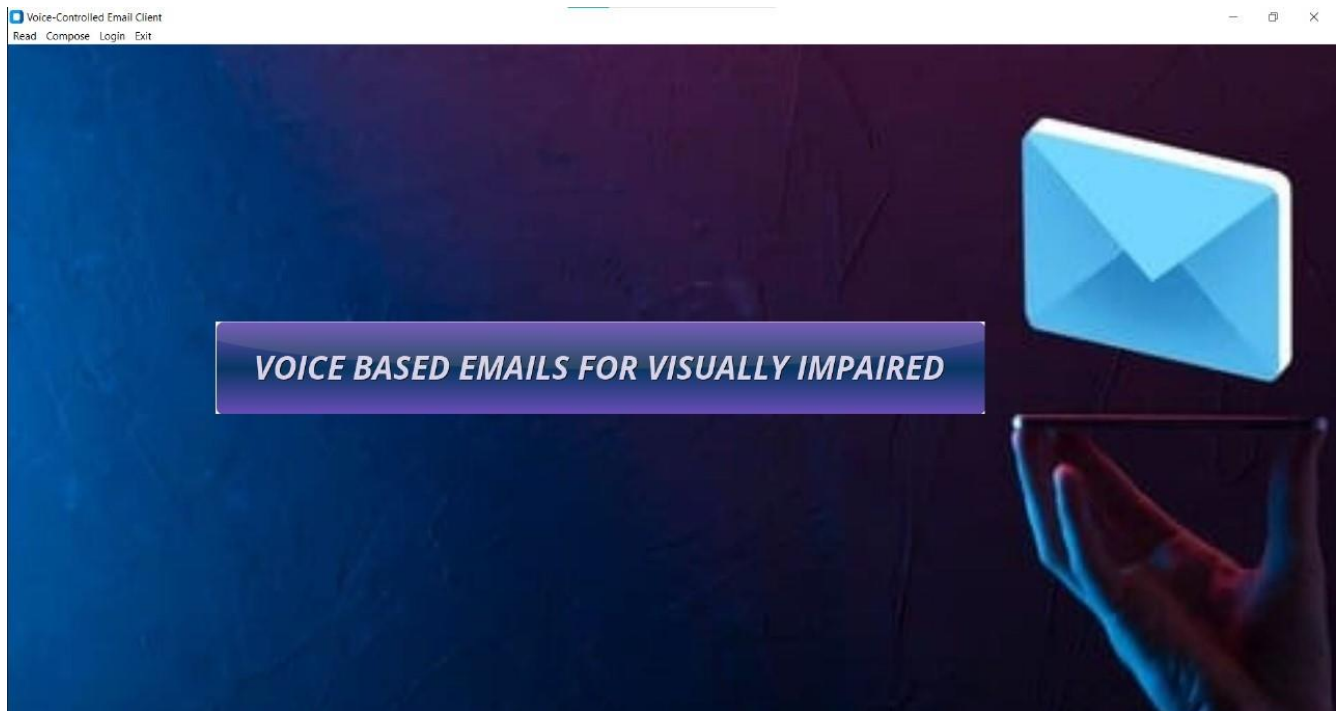
**Email Management:** Create a wide range of voice-based commands for actions like reading emails, composing, sending emails.

**Voice Commands:** Develop a comprehensive set of voice commands that cover various email-related actions, ensuring that the system understands and responds to natural language requests effectively.

**Accessibility Features:** Ensure compliance with accessibility standards such as WCAG (Web Content Accessibility Guidelines) to make the system usable for individuals with various disabilities. Allow users to customize voice speed and volume.



## Front-end Implementation:



## Backend-Logic Implementation:

```
AttributeError: 'NoneType' object has no attribute 'lower'

Speak now:
Please provide your login information.
Please speak your Gmail email address
Speak now:
Please speak your Gmail password
Speak now:
Login successful.
```

```
AttributeError: 'NoneType' object has no attribute 'lower'

Speak now:
You have chosen to compose an email.
please speak receiver's email
Speak now:
You have spoken the email
jojo 25 kho kho at the rate gmail.com
please speak the body of your email
Speak now:
You have spoken the message
hello
The email has been sent. Please choose another action. Click anywhere on the screen and say 'compose' to compose another email, 'read' to read your inbox, or 'exit' to exit.
Speak now:
Please say the serial number of the email you wanna read starting from latest
Speak now:
Subject: None
From: jojo25coco@gmail.com
Email content:
hello

Email reading complete. Please choose another action. Click anywhere on the screen and say 'compose' to compose an email, 'read' to read your inbox, or 'exit' to exit.
Speak now:
You have chosen to exit. Goodbye!
```

# **CHAPTER 6**

## **Conclusion**

## **6. Conclusion**

### **6.1 Conclusion**

We have designed a method that will make it easier for those with visual impairments to use email services effectively. This approach may assist in overcoming several obstacles that blind people previously encountered while trying to access emails. Screen readers, which might lessen the cognitive strain of memorising tasks, have been removed. The major goal of developing the kind of system outlined in the study is to increase the sense of community among those who are blind in this little environment. The decision tree takes a distinct path since each operation has a distinct consequence, making the system considerably more compatible. People who are physically disabled will be able to access the world with the aid of our system. Anyone may use this email system with ease, regardless of their age group. It contains features of speech to content as well as content to speech with discourse reader, making planned structure manageable for those who are externally disabled as well. Now, visually challenged individuals may send and receive mail with ease using only voice instructions and very little keyboard or mouse use. It has helped eliminate the challenges that blind people experience and transformed them into more typical persons.

### **6.2 Future Scope**

In the future, this application may be improved and used for various services in addition to email, such as messaging, taking notes, and voice-operated operation of other applications. Furthermore, even the smallest amount of keyboard shortcuts may be removed with the help of high-tech tools. In the future, voice's capabilities could be expanded to include picture attachments and other features included in regular E-Mail, including indentation and font selection.

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## Referred Book:

Python crash course by Erish Matthes

<https://www.sarkarirush.com/python-crash-course-pdf/>