



FOSTERING INCLUSION: BRIDGING THE GAP WITH VOICE-ENABLED MESSAGING FOR THE VISUALLY IMPAIRED PEOPLE

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Abstract—The Internet is utilized extensively in nearly all forms of communication applications. In contemporary society, communication technologies play a significant role in enhancing social and personal interaction. The amalgamation of technologies with the Internet has facilitated easy communication. Nevertheless, there exist approximately 253 million individuals globally who experience visual impairment, which poses a significant challenge for them to leverage this technology. Email serves as a means of transmitting a substantial amount of confidential and time-sensitive information. It enables users to communicate with others by sending messages and significantly contributes to communication in the business world. Consequently, the proposed system endeavors to develop an email system that accommodates both novice users and visually impaired individuals for effective communication. In contemporary times, it is feasible for a user to receive and send emails through the use of voice command. The objective of this proposed system is to introduce a model that will facilitate the conversion of speech to text for email composition and vice versa through the aid of speech recognition, natural language processing and machine learning. The technology is entirely reliant on voice command, thus, making it highly advantageous.

Keywords—Speech recognition, Natural Language processing, Machine learning

I. INTRODUCTION

Email has completely changed how we communicate, making it possible to share

information quickly and effectively with people all over the world. However, because traditional email systems rely on visual signals and feedback, accessing and utilising them can be difficult for people with visual impairments. The World Health Organisation (WHO) estimates that there are 253 million visually impaired individuals in the world, 36 million of whom are blind. For a considerable segment of the populace, digital communication technologies like email, which are primarily intended for sighted users, provide obstacles. Ensuring equitable access to information and communication technologies (ICTs) and fostering inclusion require attending to the accessibility needs of visually impaired people in digital communication. There are various obstacles that visually impaired people face when utilising conventional email services. These difficulties include handling email attachments, navigating the interface, and writing and reading emails.

Effective interaction with the email interface is difficult for visually impaired users due to its dependence on visual signals such buttons, menus, and icons. Moreover, these issues are made worse by the dearth of accessibility features in many email programmes and webmail services, which restricts how usable email is for people with visual impairments. In order to guarantee that people with disabilities are able to fully engage in digital communication and information exchange, accessible technology is essential. It is imperative to provide email systems that are accessible to individuals with visual impairments in order to foster inclusivity and improve their communication skills. The term "accessible technology" refers to a broad category of features and capabilities, such as

speech recognition software, screen readers, and alternate input methods, that are made to meet the various demands of people with disabilities.

Developers can provide a more inclusive and user-friendly communication medium for visually impaired people by adding these capabilities to email platforms. The voice-based email platform does not require keyboards or visual feedback because it is entirely focused on voice interactions. Modern speech recognition technology is used by the system to translate spoken words into text for email writing, and natural language processing is used to understand and carry out user commands.

The software also has text-to-speech capabilities that let users who are blind or visually handicapped hear incoming emails. Voice prompts help users through the email production and management process, making the user interface straightforward and simple to use. Additionally, the software is multilingual and multilingual dialect compatible, meaning that visually impaired people everywhere can utilise it. The voice-based email platform was developed using important technologies, including machine learning and natural language processing.

The system is trained to identify and comprehend speech patterns using machine learning techniques, enabling precise voice-to-text conversion. Email text is analysed and comprehended using natural language processing, which helps the system produce intelligent responses and carry out user-invited actions. These technological advancements make it possible for the platform to offer visually impaired people a smooth and effective user experience, improving their ability to communicate independently and more successfully.

The lives of those who are visually impaired could be greatly impacted by the creation of an email platform that is voice-based. The platform can enable visually impaired people to communicate more efficiently, maintain social connections, and obtain information more easily by giving them access to a more user-friendly and accessible communication tool. Furthermore, users with visual impairments can make use of the platform's existing functions to improve their overall user experience because it is compatible with modern smartphones. Because it helps visually impaired people to communicate more successfully in a professional setting, the platform may also increase career chances for them.

Abraham [4] and his team conducted a study that found the most commonly requested feature for

smartphone usage among respondents with severe visual impairment and blindness was that of image and color description functionality. Interestingly, many of the participants were unaware that up to 90% of their desired functionalities were already available and compatible with current smartphones.

The field of machine learning is experiencing exponential growth, as it allows computers to autonomously learn from prior data. A diverse set of algorithms are employed in machine learning, which assist in the creation of mathematical models and the generation of predictions based on historical information. As of late, machine learning has been applied to a variety of tasks, including but not limited to image recognition, speech recognition, and email filtering. Several techniques exist within machine learning, such as Supervised, Unsupervised, and Reinforcement Learning. Machine Learning is regarded as a subset of artificial intelligence, with a primary focus on the development of algorithms that facilitate a machine's ability to learn from data and past experiences independently. Machine learning empowers a computer to learn from data, enhance its performance based on prior experiences, and make predictions without explicit programming.

Speech recognition (Figure 1) refers to the procedure of transforming vocal instructions into textual format, and is alternatively referred to as Speech to Text or Computer Speech Recognition. Presently, a variety of speech recognition applications employ machine learning algorithms. A typical conversational AI application utilizes three subsystems to perform the tasks of processing and transcribing audio, understanding the intended meaning of the inquiry, generating a textual response, and subsequently enunciating the response to the human interlocutor.

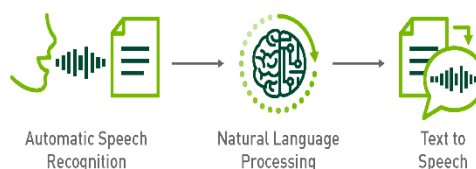


Figure 1. Speech Recognition

The attainment of these procedures is accomplished by the concerted operation of several deep learning solutions. Firstly, the processing of the raw audio signal and transcription of text from it is executed through automatic speech recognition

(ASR). Secondly, natural language processing (NLP) is employed to derive significance from the transcribed text (ASR output). Lastly, the production of human speech from text is facilitated by speech synthesis or text-to-speech (TTS). The optimization of this multi-faceted process is intricate, as each of these steps necessitates the construction and utilization of one or more deep learning models. When endeavoring to develop a deep learning model that delivers the highest level of performance and accuracy for each of these areas, a developer is presented with numerous approaches and experiments that can diverge according to domain application. It is noteworthy that Google Assistant and Alexa have implemented speech recognition technology to enable the following of voice instructions.

Natural Language Processing (NLP) is a Machine Learning technique that enables interaction between intelligent systems and users in a natural language, such as English. Natural Language Processing is essential for instructing intelligent systems, like Machines, to perform specific tasks. The domain of NLP is concerned with the development of computers that can perform useful functions using human language. Natural Language Understanding (NLU) is an NLP subfield that facilitates the comprehension and analysis of human language by extracting metadata from content, including concepts, entities, keywords, emotion, relations, and semantic roles. NLU is primarily utilized in Business applications to comprehend customer problems in both spoken and written language. NLU encompasses the following tasks:

(1) Transforming the input into a valuable representation, and

(2) Analyzing various language facets.

NLP is an algorithm that is specifically utilized for speech recognition. However, it is also an integral component of the field of artificial intelligence that concentrates on the communication between humans and machines via language, including speech and text. Two types of speech recognition exist: speaker-dependent and speaker-independent. Dictation software typically employs the former, whereas the latter is commonly utilized for telephone applications.

The input and output of an NLP system can be Speech and Written Text. Components of Natural Language Processing:

i. Mapping the given input in natural language into useful representations.

ii. Analyzing different aspects of the language.

iii. NLP helps users to ask questions about any subject and get a direct response within seconds.

iv. NLP offers exact answers to the question means it does not offer unnecessary and unwanted information.

v. NLP helps computers to communicate with humans in their languages.

vi. It is very time efficient. Most of the companies use NLP to improve the efficiency of documentation processes, accuracy of documentation, and identify the information from large databases.

The ultimate goal and purpose of the highly innovative technology of voice recognition is to accurately and precisely identify and distinguish the individual who is speaking. The paramount aim of speech recognition, on the other hand, is to comprehend and grasp the meaning and message conveyed by the spoken words and phrases. This cutting-edge technology is extensively utilized to efficiently and effectively pinpoint and recognize a particular individual by meticulously analyzing and scrutinizing various aspects of their speech, such as the tone, pitch, and accent of their voice. The remarkable and groundbreaking technology of voice recognition is also employed in various other applications, including menu navigation and hands-free computing, thereby revolutionizing and enhancing the overall user experience and convenience.

The paper is organized as follows. Section II that describes related work on voice based Email system. Section III that describes the proposed system. Section IV that describes the implementation & results. Finally conclusions and future work are given in section

II. LITERATURE REVIEW

A revolutionary email system has been designed to aid those with visual impairments in effortlessly accessing and utilizing email services. This groundbreaking system harnesses the power of voice recognition technology and advanced natural language processing to accurately comprehend and respond to user commands. By employing speech-to-text conversion and mouse operations, users now have the freedom to interact with the system, completely eliminating the need for a traditional keyboard. The primary objective of this innovative system is to furnish visually impaired individuals with a seamless and accessible mode of communication, empowering them to independently access vital programs and services. Moreover, this remarkable system extends its advantages to

individuals who encounter difficulties while reading, rendering it advantageous for a diverse range of users. To ensure utmost security and privacy, the system ingeniously incorporates facial recognition for user authentication. By and large, this voice-based email system endeavors to revolutionize communication accessibility for those with visual challenges, providing them with an all-encompassing and self-reliant experience.

In [1] a cutting-edge vocal companion is being introduced, with the ability to comprehend vocal prompts, carry out requested tasks, and deliver results through the use of artificially generated speech or alternative methods. This pioneering creation aims to offer a heightened level of accessibility and autonomy, ensuring seamless access to vital programs and services.

The author [2] endeavors to fabricate an electronic mail system attainable to those with visual impairments, empowering them to employ this mode of communication seamlessly. The system underscores the utilization of mouse-based manipulation and the transformation of speech into written text, obviating the necessity for a typewriter. It is fashioned for comprehensive utilization, accommodating individuals with challenges in reading, while placing great emphasis on lucid and effective vocal responses.

The art of speech recognition encompasses the magical transformation of spoken words into text, an act of utmost importance in the realm of biometric identification and the wondrous world of voice-controlled automation systems. This particular study, with its unwavering focus, delves deep into the realm of comprehension, analysis, and enhancement of the very essence of speech recognition. It embarks upon a journey to unravel the mysteries of the pre-processing stage, the extraction of noteworthy features, and the intricate process of categorization. Moreover, it dares to explore the enigmatic realms of Hidden Markov Models [3] and the ethereal wonder of Artificial Neural Networks, all in a quest to amplify the prowess of voice recognition systems.

To enhance the overall accessibility of the system, a web-page reader and a novel voice-based search engine [5] are incorporated. These features enable users to navigate and control the internet browser through their voice commands, providing a more seamless browsing experience. Unlike traditional search engines that rely on text-based queries, the voice-based search engine allows users to interact with the computer using their voice, providing a more natural and efficient way to browse and retrieve information from the internet.

The system in [6] delves into the necessity of auditory guidance in harnessing the vast potential of the internet, with a specific focus on enhancing the experience for those with impaired vision. It goes beyond mere email assistance and encompasses pivotal everyday applications such as the Calculator and Music. By incorporating voice aid, the ultimate goal is to ensure that internet technology becomes truly inclusive and advantageous for every user, irrespective of their visual acumen.

[7] presented a groundbreaking proposal for an email architecture that revolutionizes the way blind individuals access their electronic mail. The current system, regrettably, fails to cater to the unique needs of visually impaired users, lacking the crucial audio feedback necessary for them to comprehend the contents. However, the innovative proposed system ingeniously integrates Speech Recognition, Interactive Voice Response, and Mouse Click events to bridge this gap. Moreover, to ensure utmost security, voice recognition is incorporated for user verification purposes. Within this remarkable system, the initial module is the Registration module, which gracefully collects comprehensive user information by elegantly prompting users to input the required details. Subsequently, the second module, aptly named the login module, gracefully requests that users provide their username and password for seamless access.

The author [8] presents an innovative and economically viable camera-driven mechanism designed to elevate the self-reliance of visually impaired persons while engaged in retail experiences. The mechanism efficiently seizes product labels, applies an array of algorithms within the MATLAB platform to analyze and interpret the textual content, subsequently transforming it into auditory signals by means of cutting-edge text-to-speech technology. These audible signals are then seamlessly transmitted to the user, empowering them to effortlessly obtain crucial information from printed text autonomously.

The Voice Based Email for the visually challenged serves as a means to effortlessly and effectively access mail. This innovative application utilizes the power of speech-to-text and text-to-speech converters, empowering individuals to manage their mail accounts solely through the use of their voice. With this technology, users can seamlessly read, send, and engage in a variety of other productive tasks. By employing the aid of voice commands, the system guides users in executing specific actions, to which they respond accordingly. Thus, the utilization of the Speech-to-

Text and Text-to-Speech technologies, integrated within the net framework, comes into play. The Speech-to-Text functionality, also referred to as Automatic Speech Recognition, transforms spoken words into written text, facilitating the composition of emails with ease. On the other hand, the Text-to-Speech module generates audio output that vocalizes the contents of received emails, including the sender, subject, and body of the message.

An extensive review of the literature on email system accessibility for people with visual impairments finds a growing corpus of work devoted to resolving the particular difficulties this group faces. The literature emphasises how crucial accessible technology is to fostering inclusivity and self-sufficiency for people with visual impairments. Because these people rely so heavily on visual cues, they frequently have trouble accessing and utilising traditional email systems. Researchers have looked into a number of tools and techniques, such as voice-based interfaces, keyboard shortcuts, screen readers, and speech-to-text converters, to improve email system accessibility.

The ability of screen readers, in particular, to provide aural feedback regarding the content presented on the screen has been extensively investigated. This ability enables visually impaired individuals to properly traverse email interfaces and access information. The ability for users to dictate email content using their voice and have it transformed into text for editing and sending is another promising application of speech-to-text converters. The research also emphasises how crucial it is to incorporate accessibility considerations into the design of email systems, including features like keyboard shortcuts, screen reader compatibility, and user-friendly interfaces. In order to make sure that email systems satisfy the demands of visually impaired users, case studies and best practices highlight the necessity of user testing and feedback. Future study initiatives include enhancing screen reader efficiency and accuracy, broadening.

III. PROPOSED METHODOLOGY

The proposed system aims to develop a comprehensive voice based Email system for visually challenged people. This system utilizes various technologies, including IVR, speech-to-text converters, mouse click events, and screen readers, to create an accessible and user-friendly email experience.

The main objective of the work is to develop a Voice Based Email system specifically tailored for visually challenged individuals. The system aims to provide an easy-to-use interface that allows visually impaired users to access Gmail and send emails independently. By eliminating the need for third-party assistance, visually challenged individuals can maintain their privacy and independence when communicating through email. Figure 2 describes the overall architecture of the proposed system.

The Voice Based Email system utilizes speech-to-text and text-to-speech conversion technologies to facilitate the email composition process. Users can simply speak their email content, which is then converted into text using speech-to-text converters. The system (Figure 3) also incorporates text-to-speech conversion, allowing users to verify the dictated content by listening to the email before sending it. The architecture of the system is made up of a number of parts, such as screen readers, speech-to-text converters, mouse emulators, and IVR systems. Together, these elements offer visually impaired consumers a smooth email experience. The email system and the user are facilitated by the IVR system, which asks the user to give commands and responds with audio depending on what the user says. While voice instructions can be translated into virtual mouse clicks for engaging with an interface, spoken words can also be converted into text for email composing using speech-to-text converters and mouse emulators. Users who are visually challenged can explore and interact with the interface with ease thanks to screen readers, which offer voice feedback regarding the content presented on the screen.

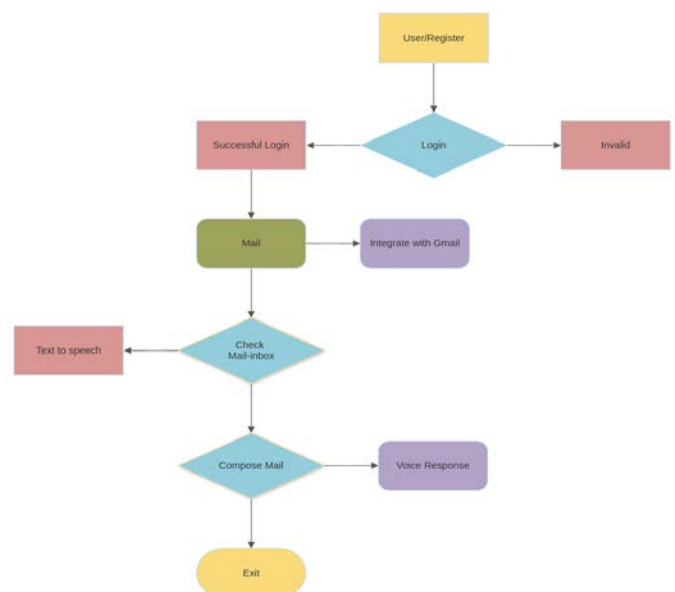


Figure 2. Proposed Architecture

A. Login/Register

The first module of the proposed system is the Login/Register module. This module focuses on creating an accessible and user-friendly login and registration process for the email application. Users are guided through the following steps:

Step 1: Ensure that the device has assistive technologies installed, such as screen readers or voiceover.

Step 2: Download and install the email app on the device.

Step 3: Open the app and navigate to the "Register" or "Create Account" button. Provide personal information like name, birthdate, and gender.

Step 4: Choose a username and password, considering both ease of use and security.

Step 5: Review and agree to the terms of service and privacy policy.

Step 6: After creating the account, users can log in by navigating to the "Login" or "Sign In" button and entering their username and password.

Step 7: Enable additional accessibility features available in the app, such as high contrast mode or enlarged text.

Step 8: Support from the app's customer service team is available if needed.

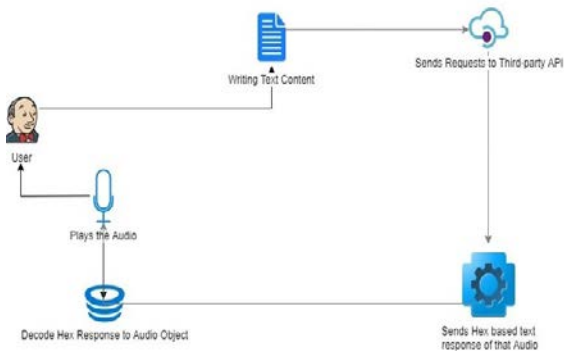


Figure 3. System Design

B. Compose Mail

The Compose Mail module focuses on enabling users to compose emails using speech-to-text and text-to-speech conversion. The process can be simplified as follows:

Step 1: Open the email app and access the "Compose" or "New Message" option.

Step 2: Utilize the app's accessibility features, such as voice recognition or a touch screen keyboard with larger keys, to input the recipient's email address.

Step 3: Navigate to the "Subject" field and use voice-to-text conversion to dictate the subject line.

Step 4: Access the message field and use voice recognition software to dictate the content of the email.

Step 5: After composing the email, use the app's accessibility features to send it, either by navigating to the "Send" button or using a voice command.

Step 6: A text-to-speech feature can be utilized to verify the content of the email before sending.

C. Speech to Text Converter

The Speech to Text Converter module focuses on converting spoken speech into text. This module consists of two main parts: the feature extraction module and the speech recognition algorithm module.

Step 1: The feature extraction module extracts relevant characteristics from the input speech signal, such as pitch, tone, and frequency, using signal processing techniques like Fourier transform, MFCC, or LPC.

Step 2: The speech recognition algorithm module utilizes algorithms and models to recognize the speech and convert it into text. It involves acoustic modeling, language modeling, and decoding to find the most likely sequence of words.

Step 3: By combining these modules, the speech-to-text conversion accurately transcribes spoken language into written text.

D. Gmail Integration

The Gmail Integration module enables users to receive voice-based emails within the application and listen to them. The process can be summarized as follows:

Step 1: When a voice-based email is received in Gmail, it is automatically transcribed into text using speech recognition software.

Step 2: The text is then converted into voice using text-to-speech technology, allowing users to listen to the message clearly.

Step 3: Features like automatic transcription and text-to-speech conversion enhance the user experience, providing an effortless way to receive and listen to messages.

Step 4: The integration of the voice-based email project with Gmail ensures that physically challenged individuals can stay connected and communicate with their contacts conveniently.

E. *Check Inbox*

In the Check Inbox module, users can access their email inbox to read messages. The general process involves:

Step 1: Logging in to the email account and navigating to the inbox.

Step 2: Selecting the desired message to open and view the subject and content.

Step 3: Using a software or application that integrates Google text-to-speech (gTTS) to convert the message text into audio.

Step 4: It is essential to obtain proper authorization before accessing someone else's inbox to respect privacy laws and ethical considerations.

F. *Text to Speech Converter*

The Text to Speech Converter module focuses on converting written text into synthesized speech. This technology provides access to written information in a spoken format, benefiting individuals with visual impairments, reading difficulties, or learning disabilities. The module is widely used in various industries and can be integrated into different devices, making digital content more accessible and inclusive for all users.

IV. RESULTS AND DISCUSSIONS

Voice-activated correspondence is a groundbreaking advancement that has been conceived with the intention of assisting individuals with physical limitations in achieving a higher level of communication ease. Through the utilization of vocal directives, individuals are empowered to create and dispatch messages without the reliance on a tangible keyboard or touchscreen. This revolutionary technology bears the capacity to render communication more attainable for a diverse array of individuals who grapple with various disabilities, such as visual impairment, blindness, or limited mobility.

The purpose of the study was to investigate how voice-based email can improve communication and independence for people who are visually impaired, as well as if it can increase awareness of their special needs and talents.

A survey of voice-based email users with visual impairments was conducted as part of the study. The purpose of the survey was to collect information about the participants' experiences with the technology, including how easy it was to use, how it affected their capacity for effective communication, and any difficulties they encountered. The

participants' opinions of how voice-based email technology could contribute to increasing awareness of the needs and capacities of people with visual impairments were also gathered through the survey.

The proposed concept gives rise to a revolutionary system that brings forth a remarkable Voice-empowered Electronic mail system designed exclusively for individuals with visual impairments. This ingenious application is meticulously crafted to offer unparalleled assistance to the visually challenged community, facilitating seamless and effortless access to their electronic correspondences. With its ingenious voice-operated mailing service, this groundbreaking system empowers individuals with visual impairments to independently peruse and dispatch mail without relying on external assistance.

The system ingeniously utilizes a cutting-edge speech recognition application, bestowing visually challenged individuals with an exceptional voice input method for their mailing apparatus. By harnessing the power of voice, users can effortlessly record and transmit messages, enabling them to maintain valuable connections with loved ones, acquaintances, and professional colleagues, all the while seamlessly transcending the physical barriers that once impeded their communication. This groundbreaking technology can be impeccably tailored to meet the unique requirements of each user, offering customizable features such as speech recognition software that ingeniously assists individuals with limited mobility or dexterity.

The outcomes of research conducted on vocalized correspondence for individuals with physical limitations have, for the most part, been favorable. These investigations have revealed that vocalized correspondence can serve as a potent and proficient means for individuals to craft and dispatch messages. Users have conveyed their gratitude for the ease and practicality of utilizing their voice as a means of communication, affirming that it has greatly assisted them in maintaining connections with loved ones and professional acquaintances.

A singular examination discovered that voice-oriented correspondence was especially advantageous for individuals who lacked sight or had visual deficiencies, as it granted them the ability to construct and transmit messages without the necessity of utilizing a reader for screens or a display for braille. Another examination found that voice-oriented correspondence was equally advantageous for individuals with limitations in mobility, as it permitted them to utilize their vocal cords to navigate menus and draft messages without

the requirement of employing a tangible keyboard or mouse.

In general, the utilization of vocalized correspondence for those with physical disabilities exhibits itself as a technology that holds great promise. This technology has the ability to augment accessibility and convenience in communication for a vast array of individuals. Nevertheless, additional investigation is required in order to comprehensively grasp the advantages and restrictions of this technological advancement. Moreover, it is essential to pinpoint methodologies that would enhance its usability and efficacy.

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Project: Voice based Email for Visually Challenged People
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1. Compose a mail.
Subject :
ok done!!
result2:
{ 'alternative': [{'confidence': 0.88687539, 'transcript': 'Python project'}],
  'final': True}
You Subject is : Python project
Your message :
ok done!!
result2:
{ 'alternative': [ { 'confidence': 0.88687527,
                    'transcript': 'voice based email for visually
                    'challenged people'},
                  { 'transcript': 'voice based email for visual
                    'challenge the people'}],
  'final': True}
You said : voice based email for visually challenged people
Congratulation Your Mail send - Using simple text message
PS C:\Users\lenovo\Downloads>

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Figure 4. Compose a Mail

Figure 4 depicts how the mail can be drafted. The compose mail option given an opportunity for the user to enter the text that they want to mail through voice. The speech to text convert will convert the messages that are spelled out into text. Similarly, the Figure 5 figure-out the text to speech process for reading the mail.

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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\lenovo\Downloads> & 'C:\Program Files\Python39\python.exe' -i
lib\python\debugpy\adapter/../../debugpy/launcher' '54839' '--'
Check your inbox
Number of mails in your inbox : [b'316']
Number of UnSeen mails : ('OK', [b'111 112 113 114 116 117 118 119
141 142 143 145 146 147 148 149 150 152 153 155 156 158 159 160
8 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206
228 229 230 231 232 233 234 235 236 237 238 239 240 241 243 244
6 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282
From: Sangee <sangeechokki19300@gmail.com>
Subject: Final Year Project
Content: Voice Based Email project works perfectly

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Figure 5. Read the Inbox

According to the survey's findings, voice-based email technology improved the participants' capacity for efficient communication. Many participants said that managing their email correspondence and creating and sending emails were made simpler by technology. Additionally, participants reported feeling more independent and self-assured in their interpersonal communication skills thanks to voice-based email technology.

Additionally, the survey results indicated that voice-based email technology might increase awareness of the special requirements and talents of people who are visually impaired. Many participants expressed the opinion that sharing their experiences with others through technology could help them learn about the obstacles they confront and the methods they employ to overcome them. Additionally, participants thought that by dispelling myths and prejudices about people with visual impairments, technology may promote empathy and understanding in the community.

Overall, the study's findings point to the potential big impact voice-based email technology could have on the lives of those who are visually impaired. Voice-based email technology can help the visually impaired live better lives by improving their capacity for independent and successful communication and by increasing awareness of their special needs and talents. In order to better understand the long-term impacts of voice-based email technology and to find strategies for enhancing its usability and accessibility for those with visual impairments, more research is required.

V. CONCLUSION

Voice-based email has been a game-changer for those who are blind or visually impaired, giving them a more efficient and independent way to communicate. This cutting-edge technology offers people with physical restrictions a fresh and creative way to interact with others, enhancing their lives in the process. Voice-based email gives those who would otherwise find it difficult or impossible to use traditional forms of communication—like writing or typing—the freedom and ease to express themselves. Moreover, the voice-based email initiative may promote greater understanding of the special requirements and capacities of people with physical disabilities. Through demonstrating the benefits of this innovative technology, it has the capacity to demolish any preconceived ideas or assumptions that people may have about those who are physically limited, which will foster a greater sense of empathy and understanding.

Voice-activated email technology is a major improvement in accessibility for those who are blind or visually impaired. These people have historically had trouble accessing and utilising email systems that mostly rely on feedback and visual cues. On the other hand, voice-based email systems offer a different kind of correspondence that is more

adapted to the requirements of people who are visually impaired. For people with physical restrictions, this technology provides a more accessible and user-friendly alternative by allowing users to compose, send, and manage emails using voice instructions.

The capacity of voice-based email to enable more effective and independent communication among people with visual impairments is one of its main advantages. Voice-based email gives these people more flexibility and convenience in expressing themselves by doing away with some of the constraints of standard email systems, like the need to write or type. Their everyday life may be significantly improved by this, as they may be able to maintain relationships with friends, family, and coworkers and engage more actively in social and professional engagements.

In addition, voice-based email presents further opportunities to improve the quality of life for people with physical disabilities. For instance, by offering a more easy and accessible method of communication, it might lessen feelings of loneliness and isolation. Additionally, it can enhance their access to data and services—like online shopping and banking—which are becoming more and more crucial in the modern digital age.

Voice-based email technology offers more than just useful advantages; it can also have a wider social influence. It has the ability to dispel myths and stereotypes about people with physical disabilities by demonstrating the benefits of this technology. Voice-based email technology can promote more empathy and understanding in society by showing that these people are capable of using cutting-edge tools to communicate successfully and independently.

Overall, voice-based email is a valuable tool that helps people who are blind or visually impaired communicate more effectively and independently. With its innovative and creative way of fostering social connections, this ground-breaking technology could improve the lives of people who are physically unable to interact with others. Voice-based email gives these people the freedom and convenience to express themselves by eliminating the physical barriers that would prevent them from using traditional communication techniques. In addition, the voice-based email initiative can help raise awareness of the special needs and talents of

people who are physically limited, which could lead to a greater level of empathy and understanding in society.

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