

Creating a Voice based Email for Blind

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Abstract—Many visually impaired people face problems in their life while using apps of the phone for contacting people through calls or emails due to which it is very difficult for them to survive at any workplace and become jobless. So, we are building a voice-based email application for visually challenged people to complete their day-to-day activities quickly and efficiently. It will be fully based on voice command; it will just prompt the blind people for doing different activities then the blind user just has to say a command prompted by the application. Here we are using Google Text to Speech for converting text written in an email to voice and Speech to text library for analyzing and converting it into a body of the email. The use of the keyboard is removed, and the user just must interact with it through voice for doing their work. All the actions will solely depend on voice input given by the user. The main objective of building these applications is to make visually impaired people independent and work efficiently at their work to send, read emails without taking the help of a second person. There will be 4 features in this application: Send Email, Check Inbox, Download an Attachment of a mail, search a mail for which the user gets prompted and he must choose one option at a time. We are adding 2 more features of downloading an attachment from a specified sender and searching mail related to a specified user.

Index Terms— Speech to Text(STT), Text to Speech(TTS),Interactive Voice Response(IVR).

I. INTRODUCTION

Globally, at least 2.2 billion people have vision impairment near or distance. Vision impairment poses an enormous global financial burden with the annual global costs of productivity losses associated with vision impairment from uncorrected myopia and Presbyopia alone is estimated to be US\$ 244 billion and US\$ 25.4 billion.[1] This is a major problem nowadays and we must look for it and use an alternative to tackle this problem to avoid unwanted loss. To solve this problem, we came up with a solution to create a voicebased email system. A voice-based email application is a way of sending and receiving emails through voice commands. It is specially designed for blind people so that they can contact other people through emails. Here the blind user just must choose an option by giving voice input to the application and depending on the input by the blind user the application will perform its work. By this, some things of blind people will get easy like it will be easy for them to interact with other people through emails. Also contacting people through the mail over voice input will save a lot of time and energy.

II. LITERATURE SURVEY

On studying various similar research papers and models regarding the voice-based email application, the commonly used technologies which are used in those systems are:

Screen Readers: Screen readers[2] are the software programs that act as the interface between the computer and operating system and then with application and user. It allows the user to read the data from the screen using a speech synthesizer. The thing is one needs to point the pointer and the application will read.

Braille Keyboards : These are braille typewriters which are like a normal keyboard that is the standard keyboard that is connected to the computer, and accepts its input.

IVR: An Interactive Voice response [3] is a business phone system that interacts with the user. It listens to the user analyses the user's voice and then replies in the form of voice.

Speech to text conversion: The voice of the user is taken as input by the server and then get converted to the text.

Text to speech conversion: The text is taken as input by the server and then get converted into speech.

A survey conducted showed that there were more than 250 million visually challenged people around the globe who were unaware about how to use Internet or E-mail.

The only way by which a visually impaired person can send an E-mail was, they must dictate the entire content of the mail to a third person (not visually challenged) and then the third person will compose the mail and send on the behalf of the visually impaired person. But this was not a correct way to deal with this problem. It was very less likely that every time a visually challenged person can find someone for help. So, for the betterment of society and giving an equal status to such especially abled people many of them came up with this idea which provided the user with ability to send mails using voice commands.

Internet has become one of the basic amenities for day-to-day living. Every human being is widely accessing the knowledge and information through internet. However, blind people face difficulties in accessing these text materials, also in using any service provided through internet. The advancement in computer based accessible systems has opened many avenues for the visually impaired across the globe in a wide way[1]

In 2014, a web-based application was developed stands as the inclusive practice that can be used by all kind of people afterwards it was used for visually challenged people. The proposed system allows blind people to use Email system easily. As the input to the system does not use keyboard or mouse, users can easily give input by speaking the message.[2]

The advancement in computer based accessible systems has opened many avenues for the visually impaired across a wide majority of the globe. Audio feedback based virtual environment like, the screen readers have helped Blind people to access internet applications immensely. However, a large section of visually impaired people in different countries, the Indian sub-continent could not benefit much from such systems.[3]

A similar idea was proposed in 2016 In this system mainly three types of technologies were used namely: STT (Speech-to-text), TTS (text-to-speech), IVR (Interactive voice response). [4]

An adaptive email access for blind was developed in 2017 which was based on IVR-Interactive Voice Response While using this system the computer will be prompting the user to perform specific operations. [5]

In 2019, an idea was proposed that focused on providing the basic functionalities like composing, reading, sending, and receiving emails along with voice-based interaction. [5]

IVR describes the interaction between the user and the system in the way of responding using keyboard for the respective voice message [6]

Interactive voice response (IVR) is an advanced technology which allows a computer to interact with humans using keyboard. IVR allows user to interact with an email host system via a system keyboard, after that user can easily service their own enquiries by listening to the IVR dialogue. [7]. IVR systems generally respond with pre-recorded or dynamically generated audio voice to further assist users on how to proceed [8]. The main goal of this architecture is to provide visually challenged people got know more about the type of conditions they must survive. The prevailing email systems don't give any means of feedback or Talkback service[9]

The most common mail services that we tend to use in our day-to-day life cannot be used by visually challenged people. This is because of they do not offer any facility in order that the person in front will listen the content of the screen. As they cannot visualize what is already present on screen they cannot build out where to click to perform the required operations[10]

Limitations of the existing system are as followed:

1. Screen readers always require someone to point the cursor and then only the visually impaired person could listen to the text, and it cannot spell various technical and biological words.
2. Every person could not know the braille language and here again, one could be required to connect the keyboard to the computer.
3. If the system requires a fingerprint one can easily acquire that through various malpractices. These disadvantages are tried to remove in this application.

III. METHODOLOGY

Block diagram:

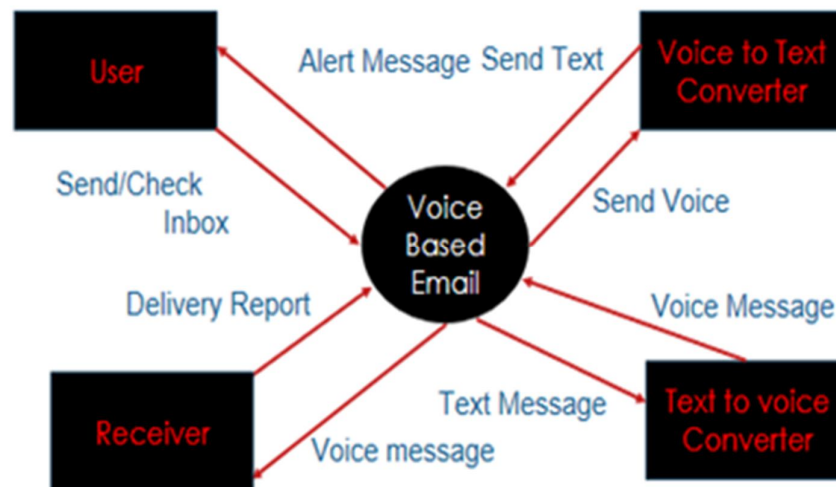


Fig 1.1: Block diagram of Voice-Based Email

In the block diagram of the proposed approach as shown in fig 1.1, we can see that users can check their inboxes, read emails, send emails, and receive alert messages from the proposed approach. Voice recognition (SR) is a multidisciplinary subject of linguistics[7] that develops approaches and technology that allow computers to recognize and translate speech into text. "Automated Voice Recognition" (ASR), "computer speech recognition," or simply "Speech to Text" are all terms used to describe it (STT). It brings together knowledge and research from the domains of linguistics, computing, and electrical engineering. Some SR systems employ[6] "Training" (also known as "Enrollment"), in which a single speaker reads text or isolated vocabulary into the proposed method. The proposed method examines a person's unique voice and uses it to fine-tune the popularity of that person's speech, resulting in improved accuracy. Users can utilize the suggested approach to give voice commands, and the Voice to Text Converter will translate those commands into text, i.e., the mail will be delivered to the chosen recipient after the user provides voice inputs. The proposed approach will teach the user in the form of voice commands to ask for completing various operations. For example, the user can check their mailbox, read their emails, send emails, and receive alert messages. Voice recognition (SR) is a multidisciplinary subject of linguistics that develops approaches and technology that allow computers to recognize and translate speech into text. "Automated Voice Recognition" (ASR)[4], "computer speech recognition," or simply "Speech to Text" are all terms used to describe it (STT). It brings together knowledge and research from the domains of linguistics, computing, and electrical engineering. Some SR systems employ "Training" (also known as "Enrollment"), in which a single speaker reads text or isolated vocabulary into the proposed method. The proposed method examines a person's unique voice and uses it to fine-tune the popularity of that person's speech, resulting in improved accuracy. Users can send voice commands through the proposed approach and then Voice to text converter will convert those commands into text i.e., the mail will be sent to the specified recipient after taking voice inputs from a user. Text to voice converter will instruct the user in the form of voice commands to ask for performing different actions.

The proposed technique gets started after encountering Start, and it examines whether the user is a new or existing one, as shown in fig 1.2. If the user is new, he must register for the proposed approach; otherwise, if the user is already registered, he must log in with credentials to the proposed approach. If a user enters the wrong login credentials, then he is prompted by the message Invalid login/ Password else Login is successful. After the user is logged in, the proposed approach gives a count of seen and unseen emails in the inbox. Also, it reads out the message of recent emails. (here Text-to-Speech is used). Users can also compose an email to send it to a valid recipient. The user must select the compose mail option to do so. If the user selects the compose a mail option, the proposed technique listens to the user's voice commands. Speech to Text is the technology used in this case. Other features added are Download an attachment and Search mail. As a result, the proposed method generates output based on the user's input. Finally, the user has the option to Logout from the voice-based email system.

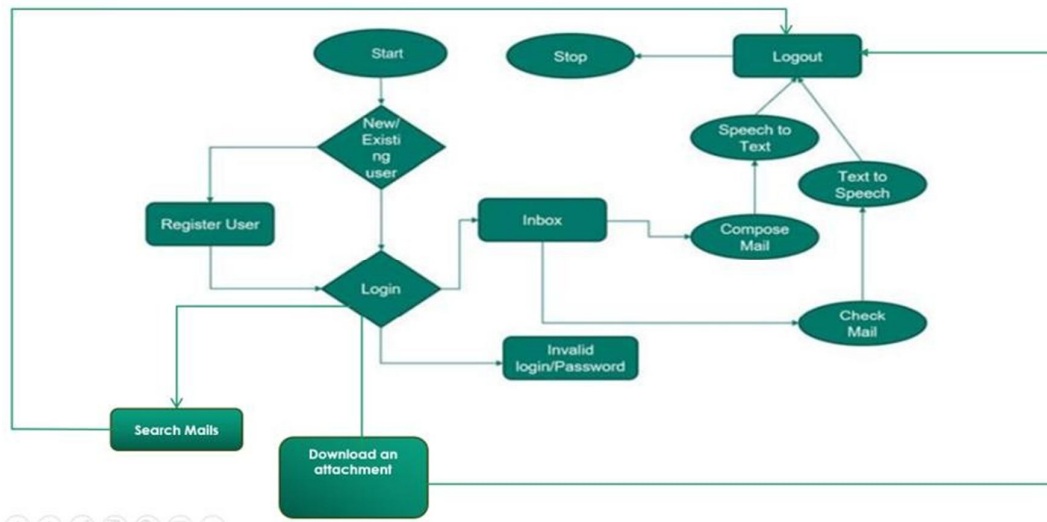


Fig 1.2: Flowchart for Voice-Based Email for blind

The proposed approach developed by us includes the following modules as follows:

Self-sign-up/sign-in: As shown in fig 1.3, This e-mail system has a feature of speech to text(STT)as well as text to speech(TTS) which makes the proposed approach easy to handle. Users can log in without taking the help of any other person. Users can give voice input of their email address and password as well for signing up into the proposed approach. The user's credentials will already be kept at the backend by the developer.

Compose a mail: Following the selection of the required category, the user can create an email by giving voice input for the recipient's email address and the email's subject text. As a result of which email can be composed. Send a message: The constructed email can be sent to the appropriate recipient, and the user will be notified once the message has been sent. For sending the email, the user must give voice input of the receiver's email address.

Read inbox: The proposed approach, on the other hand, will read emails received in the inbox section after asking the user whether they should be read or not. In addition, the proposed approach displays the total number of viewed and unseen emails in the user's mailbox. The voice engine(proposed approach) will continue to ask the user what action they want to take to support the activity. When the user has finished with the module, he can return to the main page by following the commands/instructions.

Download Attachment: In this feature an attachment is downloaded which is sent by the sender to the respective recipient. The attachment can be of any type of pdf, image, word file, etc. It will be saved in a particular path that we have specified in our code. So, the attachment will be saved in a particular folder. This helps us to download files present in the mail number provided. It also reads out the mail content.

Search Email: In this feature, we get to know how many emails for the mail number associated with a username are present. Mail related to username will be given in the form of ids.

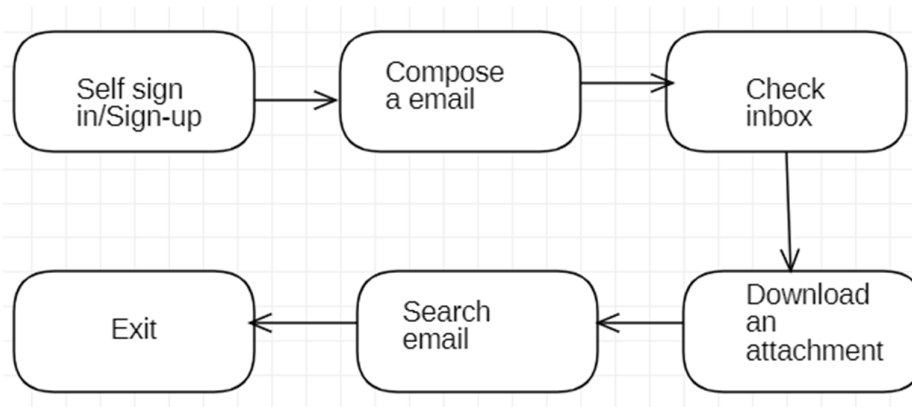


Fig 1.3: Flow diagram for modules

ALGORITHM: The proposed approach uses an algorithm that converts passwords or other credentials into hash functions and stores them in the database using various Hashing Algorithms (MD5, SHA)[5], resulting in stronger security than traditional systems. MD5 stands for the message-digest algorithm. SHA stands for secure hashing algorithm. Figure 1.3 depicts the procedure of utilizing the hashing algorithm:

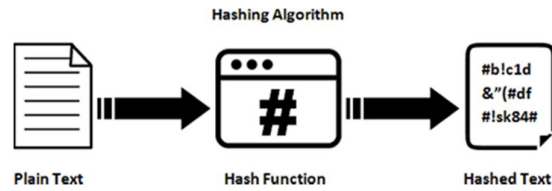


Fig 1.3: Hashing Algorithm

The user will give voice input which will be in the form of a wave and that voice input will be converted into text by the system. The waveform is shown in fig 1.4 as below.

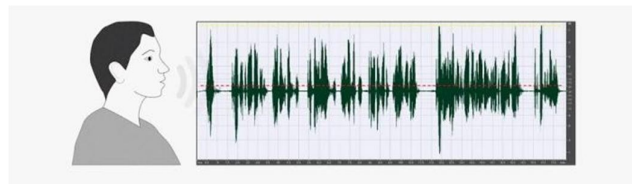


Fig 1.4: Waveform of a human voice

IV. EXPERIMENTAL RESULTS

The proposed system will make it easier for visually impaired people to use various email services. Here one doesn't need to learn the keyboard key's location and various shortcuts to run the email application as keyboard need is eliminated. As here everything must be performed only just by using voice commands the application will do the required action internally on its own. Aside from that user may be able to feed information as of messages, email through voice inputs itself.

V. CONCLUSION AND FUTURE SCOPE

Speech recognition (Speech to Text) is used in this proposed approach, and anything we say is transformed into text. Similarly, when the user receives a message, the suggested method converts the text to a voice, allowing the user to comprehend the message. One of the primary advantages is that users do not need to utilize a keyboard. All actions will be based on click events. This proposed strategy will assist blind persons in overcoming the challenges they previously had in accessing emails. We've stopped using keyboard shortcuts in conjunction with screen readers, which can help with the cognitive strain of knowing shortcuts. This study presents the structural architecture of a Voicemail system that a blind person may use to access emails more easily. The study uses a computer to assist blind people in sending and receiving voice-based email messages in their native language. As a result, visually challenged people will find the proposed method simple to utilize. Future Scope includes:

1. Users will receive voice-based notifications.
2. Users can search any email by saying it.
3. Users can delete unwanted emails.

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