Email System for Visually Impaired People

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***Abstract*— In Today's world conversation over long miles has become progressive and very efficient due to communication technologies connected to internet. But people having defects regarding their eyesight and find difficult to access these communication technologies. There are many techniques made for the visually impaired people such that they can equally acquire all the facilities to technologies like general people and many features are expanding for these visually impaired humans. All the people on a job requires to access mails in some or the other way therefore, objective behind the paper is to build a desktop application which will be beneficial for visually challenged person to avail every utility that an ordinary person uses to send mails and receive emails efficiently without involving any third entity. This project aims to create an application that has minimal use of keyboard and no use of mouse at all. All the functioning takes place through text-to-speech and speech-to-text conversations. This project will equally be used for the people who are blind. The project focuses on sending and receiving the mails. Every process is interactive and done by accepting few commands such as compose mail and receive mail.**

Keywords*— *Text to speech converter, Speech to text converter, email service for blind people, keyboard shortcuts.

I. INTRODUCTION

All over the world, Internet is booming as the best invention. Today's modern era is digital and also witnesses changes frequently along with applying the changes accordingly. Digital instruments are cheap in cost and can be used by anyone easily. Individuals who are not physically perfect are deprived of using these technologies. People with weak eyesight or visually challenged people are beneficial from special projects like voice based email systems. Emails have been the most efficient manner for communication. There are many communication methods available but email is the most widely used method for every field like education as well as business sector. Not every person on the planet is aware about email services. To know what is displayed on the screen, a person should have a clear vision. If the user is not able to see the screen then usage of internet is completely pointless for the visually defected people. There are many people who posses visual challenges and wish to avail all the services normal people are accessing hence to overcome all these problems we are developing this project in order to make email facility available easily to the blind people for using it in freely manner. The person using this project need not keep in mind all the key locations. Ever action will be based on command interactions. Additionally the blind person should not worry about which mouse operations should be performed to use a particular service as the system will accept and consider the commands through voice itself. This project proposes a python based desktop application, designed especially for visually impaired people. This application administers a voice based emailing service where they can read and send emails on their own, without any guidance through their g-mail accounts. Here, the users can use certain keywords that will perform certain actions for e.g. Read, Send, Compose Mail etc.

The Voice mail system can be used by a visually impaired person to account mail services efficiently and frequently Therefore, in order to access mails the visually impaired person need not take any help through third party applications as they aren't safe. This application is a python language based desktop application for visually challenged people using speech to text and text to speech modules so that every person will be able to control their own accounts through voice inputs only. This system will always prompt the user to perform desired functions based on their corresponding commands. The main reason behind we developing this project is because the use of keyboard is partially removed and mouse operations are not frequently used, many operations will be based on voice only.

II. MOTIVATION

This system is created to help the blind or partially blind people and the people who are illiterate . This is the main and important motive of this system. This project is an application for a visually impaired user or an illiterate user who wishes to use the email services just like any other normal human being. This system will help in overcoming some of the drawbacks that were earlier faced by the visually impaired people in accessing emails.

Only certain keyboard shortcuts will be used in this system. Other than that, the use of keyboard is eliminated. This is the major advantage since there is no need to remember the location of keys on the keyboard. The main motive behind this is that the user need not to remember the functions on keyboard

since all operations will be performed on the basis of voice. The goal of this system is to make the system more user friendly and efficient to use[9]. Due to the voice based system, the user can easily operate the system and will be able to grab more speed and precision while working on it. Also without wasting time or energy user can use this system.

Pages on internet are majorly designed in a way which can be used and accessed by sighted people. The main motive of web page designers is to convey the information to web users in such a manner that is attractive as well as convenient. However such construction of a web page is not always efficient or user friendly for a blind of less eye-sighted person or an illiterate person. The main motive of the project is to address this issue.

The main motive of designing this different browser application is to construct a framework with the required tools to help visually impaired people to browse the web easily.

III. EXISTING SYSTEMS.

There are a total number of 4.3 billion email accounts which are created on different mail sites worldwide until 2019 and there will be estimated 4.5 billion accounts or even more by the end of 2020. This count suggests that emails are the most used form of communication in today's world. The normally available mail services on internet, that we use in our day to day life cannot be used by visually impaired people. This problem is because these applications do not provide any facility or service so that the person using it can hear out the content of the screen. As the visually impaired people cannot visualize what is present on the screen, they cannot make out where to click on the screen in order to perform the required operations. For a visually impaired person or an illiterate person who cannot read or write, using a computer or any application on the computer for the first time is not that convenient as it is for a normal user even if it is user friendly. Although nowadays there are many screen readers available in the market, still these people face some minor issues. Screen readers reads out whatever content is there on the screen, and to perform those operations the person will have to use keyboard shortcuts as mouse locations cannot be tracked by the screen readers. This means there are two problems; one that the user cannot make use of mouse pointer as it is completely inconvenient if the pointer location cannot be tracked and second is that the user should be very well versed with the locations of the keys on the keyboard as to where each and every key is located. A user who is new to the computer cannot use these services as they are not able to remember all the keys on the keyboard.

Another drawback that occurs in it is that the screen readers reads out the content in sequential manner i.e line to line and therefore the user will be able to understand the contents on the screen only if they are in simple HTML format. Therefore the new advanced web pages nowadays which do not follow this paradigm will face issues.

All these are some drawbacks of the existing systems available in the market, to which we will be trying to come with a solution in the system that we are developing.

IV. PROPOSED SYSTEM.

The proposed system is based on a completely unique idea and is not like the existing email systems available. The most important aspect that was considered and has been kept in the mind while developing this system is user accessibility i.e user friendliness. A web based system is said to be perfectly accessible only if it can be used efficiently without any issues by all types of people, no matter whether the people are able, illiterate or visually impaired. The current existing systems for email services do not provide the user with the facility of ease of accessibility. Therefore the system that we are developing is completely different from the current existing systems. Unlike the existing systems which majorly focuses on emphasizing more of user friendliness for normal users, our proposed system focuses more on user friendliness for all types of users which includes normal people, visually impaired people, blind people as well as illiterate people.

This entire system is based on speech-to-text and text-to-speech majorly. When the user runs the application, welcome page will be displayed.

The credentials of the user will be already stored in the system by the developer. Hence the user will not need to keep logging in to the application every time. The welcome page is where the assistant will prompt a command asking the user to choose whether he/she wants to compose a mail or read the mails in the inbox. After selecting the required category the user can compose a mail by providing the receiver's email address, subject and body message through voice inputs. On the other hand, the assistant will read the emails received in the inbox section after asking the user whether it should read the email or it should not.

The voice engine will keep prompting the user as to what operation is to be performed based on the action. The user just has to use headphones for speaking and listening and upon hearing the prompt for the action he wishes to perform [3]; he should speak the desired operations through voice inputs. Once the user is done with the particular module, he can return to the Home page by following the commands given by the assistant.

One of the important advantage of this system is that user need not require to use the mouse since all the operations will be mostly based on voice commands and certain keyboard shortcuts at some places. Therefore the user does not need to worry about the location of the mouse pointer at all. Which type of keyboard shortcut click will perform which operation will already stored in the system. This proposed system will be easily accessible to nearly all types of users as it is just based on simple keyboard shortcuts and speech conversion and there is absolutely no need to locate the mouse pointer on the screen. Also because of assistant, the people who are unable to read and write need not require to worry as they can hear the prompting done by the system and perform respective actions.

Also the idea focuses on providing basic functionalities like compose, send, receive, check inbox and along with advance feature like Voice based operation, Search Mail, provision for voice as well as text. Every basic functionality will be provided

to the user to send and receive the emails through voice based operation.

V. LITERATURE SURVEY

In this section, we have reviewed some references to describe our project.

In the paper "VoiceMail Architechture in Desktop and Mobile Devices for the Blind People" 2012 [1], Inbox and compose mail options are made. The project is built to record voice and which will be decoded in the receiver's side.

This paper "Email Access By Visually Impaired" 2013 [2], uses web accessibility, text to speech synthesizer, text analysis module and uses screen magnification module for the visually impaired people to read the details correctly.

The paper "Voice based email system-for blinds" 2015 [3], the system will prompt the user to perform the required actions and will give certain functions.

This paper "Voice Based Email for Blind People" 2017 [4], uses speech to text converter, text to speech converter and word recognition for sending and receiving the mails.

This paper "Voice Based E-mail System" 2018 [5], uses voice recognition for sending and reading received mails. It also has login feature for user authentication.

This paper "Voice Based E-mail System for Blind People" 2017 [6], creates a desktop application that performs sending and receiving of emails through voice based inputs.

This paper "Voice -Based E-mail(V-Mail) for blind" 2015 [7], is a desktop application which is voice based and completely eliminates the use of mouse and presents an easy to use GUI.

This paper "Voice based e-mail Systems for Blinds" 2016 [8], uses voice recognition and TTS and STT for voice commands. It maintains a database where user is validated and mails of the user are stored. It has sections like Inbox and compose.

The paper "Voice Recognition System for the Visually Impaired-Virtual Cognitive Approach" 2008 [9], In this paper the visually impaired person can interact with the system with the use of microphones. For the interaction there are some modules that are used like Text-to-voice module, Automatic speech recognition module[12]. Emails are read by the system where the system reads the title then the sender for the user. Users choose the email by responding "Yes" and the system read the content of email for users.[9][10]

In the paper "Voice based Email System Application for Blind and Visually Impaired Peoples" 2017 [10], Proposed System: The proposed system depends on speech command based systems far from the existing mail systems[11].As opposed to latest system that highlight a more on user friendliness of traditional users, this system pivot a lot on user friendliness of all diversity of individuals as well as normal people and visually impaired individuals.[9][10][11][12] Methodology: Here in this paper the application makes use of IMAP protocol for retrieving the email content from the mail server. This protocol is used by email users to gain email messages from a mail server .[12] Implementation: Depending on the commands given to the system, the system performs the requested action for the users. In sending activity , if a user says "SEND", the application considers it as an instruction to compose an email. The application asks for speech instruction, if the user says "READ" or "RECEIVE" , it performs the actions according to the users request.

In this paper "Voice Based Mail Attachment For Visually challenged People" 2017 [11] ,the user enters the web page by "Username" and "Password" with the help of keyboard, mouse and screen recorder.

The paper "V-Mail (Voice Based E-Mail Application)" 2019 [12]. This system covers the forecast both normal individual as well as visually impaired group. The email content is sent using SMTP Protocol and they are fetched from the server using IMAP protocol.

VI. METHODS.

A. Text to Speech API:

It converts normal text messages into speech format. A normal text can be heard through audio file. The input is a plain text and the output is in audio format which can only be heard. Each word can be heard through sound and the blind person can successfully be able to read the whole message using this API.

B. Speech Recognition:

It is used for individuals to perform actions through voice instead of using keyboard. This software takes input through voice and saves in mp3 format. After saving, it performs particular task and delete after the function is over. The user dictates the messages and the system accepts the message in voice format.

C. IMAP:

Internet message access protocol is used to fetch mails from Gmail so that the receiver can read the messages easily. The received messages are in the gmail itself IMAP helps the user to connect to gmail.

D. SMTP:

Simple mail transfer protocol helps to connect to Gmail. It helps in composing mails. It also acts as a connection to gmail which helps in send of mails.

E. TKINTER:

TKINTER is a python feature that is used to create frontend. Forms can be easily made using this feature. Authentication of a user becomes very easy.

VII. ARCHITECTURE.

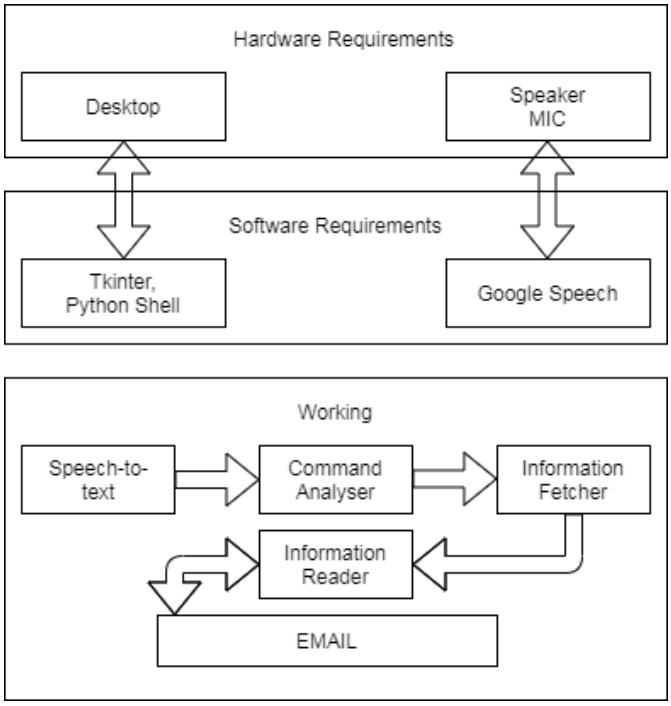


Fig.1 Architecture Diagram

The Architecture of this project is divided into three parts – Hardware Requirements, Software Requirements and Working. Let's us take a look about each section in detail. For implementing this project, we will require hardware Products like a desktop for running the application and a Speaker mic for communicating with the application. The software is being developed using coding languages like Python and will be using tkinter. Also Google Speech API's will be used for communication. Also Speech to text conversion will be done while taking inputs from the user.

VIII. DESIGN.

Design:

A. User Interface Design:

Here the complete goal of website is to focuses more on ability to understand prompting of the system rather than the look and impression of the system as the system is mainly developed for the visually impaired people, to whom the look of the system won't be important as the ability of understanding the prompting would be more important.

B. Database Design:

The system manages a database for user authorization and accumulates mails of the user. There are some database tables that store data of Inbox, Sent-Mail and Trash etc. these schemas will store all mails of the respective service that belongs to that particular user.

C. System Design:

As above shown in figure, it is the level-2 data flow diagram (DFD) which gives complete detailed flow of events and the processes in the system. As we can see all operations are performed by voice and some shortcut keys click events only. At some places voice input is needed.

IX. IMPLEMENTATION.

This system is presently being developed by us. The following section are the ones that are already developed. Their working is as follows:

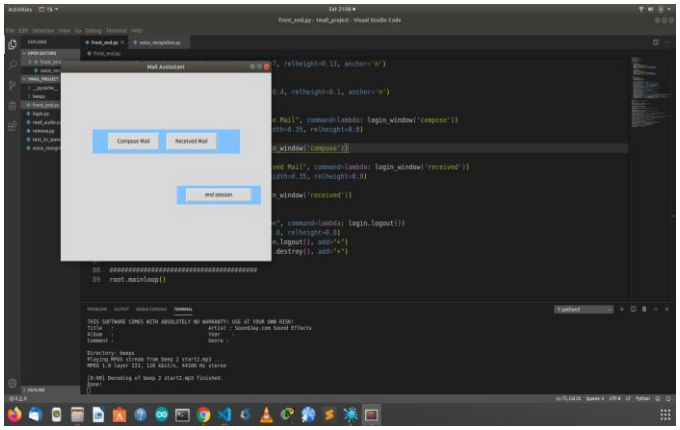
A. Home Page

This is the main and first module of the system. Any user who wishes to use the system should first register to gain username and password. Once the login is done successfully, from home page the user can perform operations that the user waits to perform. The options available are as follows:

1. Compose mail
2. Received mail
3. End session

Fig.2 Homepage

By using shortcut keys will provide the operation that needs to be performed for the service. All these functionalities are



implemented. The complete run-through of this system is given as follows:

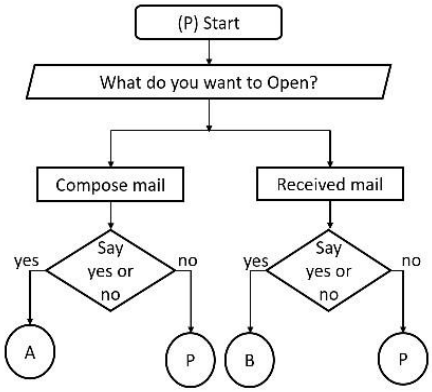


Fig.3 Start Flow

B. Login:

As the registration is done the user can login to the system. In this section it will ask the user to provide the username and password. This will be accepted in voice. Voice conversion will be done to text format and user will be told to certify whether the details are entered correctly or not. If the entry is done correctly database will be checked for entry, and if the entry is not correct it will again ask for password. As the user will speak up the details the system will again confirm by prompting alphabetically. As the user is authorized it will be directed to homepage.

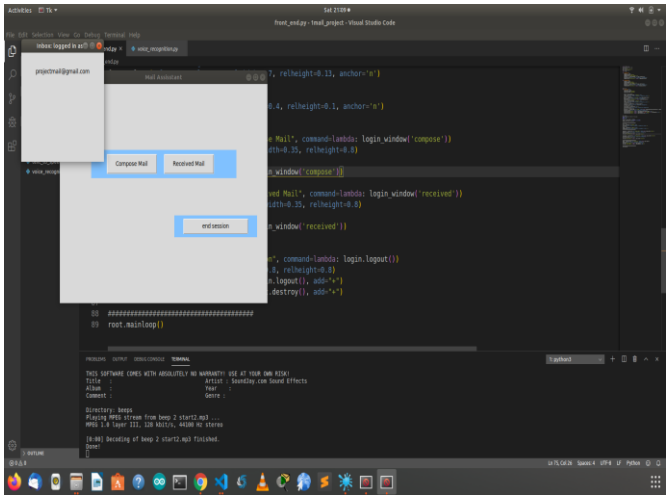


Fig.4 Login Page

C. Compose mail:

This is one of the main and most important options provided by the mail services to the user. Since the system is for visually challenged people and keyboard operations are decreased, composing mail would only be done on speech input. User can directly give message that needs to be propagated and can send it. This speech message will be stored [1] in the form of array and once the message is sent then the stored file will be replaced by another voice message that the sender will send.

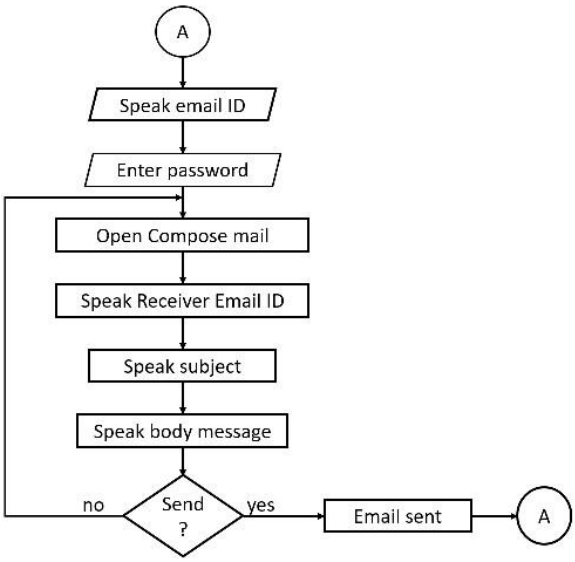


Fig.5 Compose Section

F. Inbox:

This option helps the user to view all the mails that has been received to his/her account by giving commands to the system. The user can listen to mails whatever he/she wants to listen by performing the click operation specified by the prompt. Whenever a mail is pointed the system will read the sender and the subject of the latest mail. Accordingly user will decide whether the mail needs to be read or not or it should be go to the next mail.

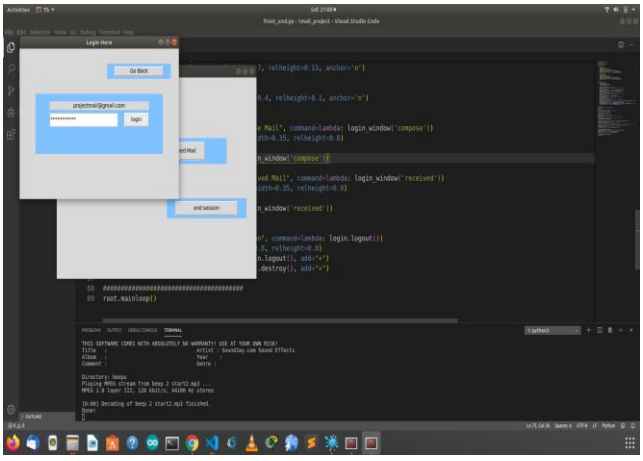


Fig.6 Inbox Section

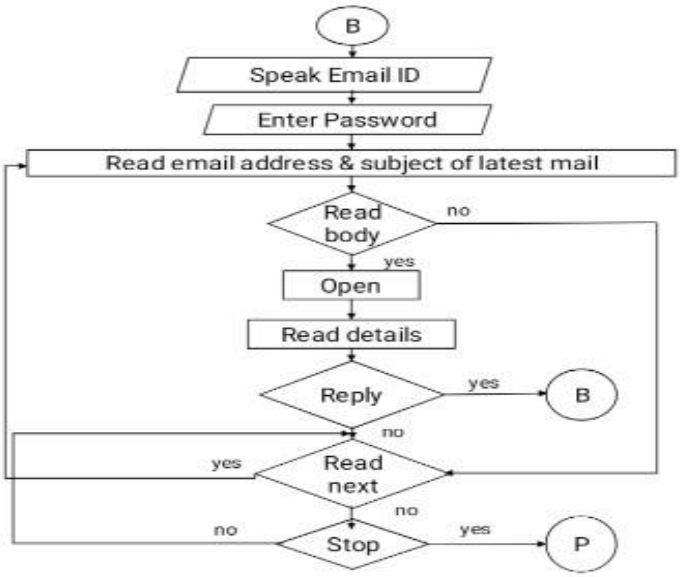


Fig.7 Receive Section

X. CONCLUSION.

In this paper we have proposed a web based application which will help the visually impaired people to access the email services easily and efficiently. This system will help in overcoming certain issues that the visually impaired people had to face earlier in using email systems. Also we have completely eliminated the concept of using keyboard shortcuts and also the use of screen readers which may help in reducing the stress load of remembering the location of the keys on the keyboard and so that user can use this system efficiently.

The user is only supposed to follow the instructions which will be given by Google speech technology. Along with this, the user might need to give the information through voice inputs wherever mentioned. Also android mobile phone are not majorly used by visually impaired people since it is difficult for them to operate it. Therefore we are creating a web based application which works on only mouse clicks and voice inputs. For further implementations, we can use external hardware devices like biometric sensors for user authentication to make the application more secure.

XI. ACKNOWLEDGEMENT.

This project is an outcome of teamwork of all members of the group without which knowledgeable undertaking would not have succeeded. Here we take this opportunity to thank all those who have contributed in the successful completion of this project. We are highly indebted to Dr. Madhavi Waghmare for her excellent guidance and constant supervision also providing necessary information regarding the project and also for her support in completing the project. This project is an outcome of teamwork of all members of the group without which knowledgeable undertaking would not have succeeded. Here we take this opportunity to thank all those who have contributed in the successful completion of this project.

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