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Intelligent E-mail System for Blind People using Braille Language

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Abstract

Now-a-days, internet has become one of the basic facilities for people of every age group and every field. Everyone has some or other kind of work which is related to internet. E-mail system is a component of internet which is really important for each individual. These facilities can be accessed easily by common people but it is difficult for specially abled people like blind people, deaf people etc. to use these services like e-mail system. In this paper, we have described how blind people can use e-mail services easily without being dependent on other people sending e-mails. This system aims to take input through voice and braille language which will make it easier for blind people as they are proficient in braille language. It will perform all e-mail operations on human voice commands like composing, sending, reading and searching e-mails.

Keywords: *braille, e-mail, STT and TTS converter, voice command.*

I. INTRODUCTION

People are moving gradually into digital world. All are trying to become completely digital by using internet facilities in almost each and every area. Email is such an amenity that one can never think of leaving behind. Today, each individual needs to have an e-mail account as it is stated as the most formal and legal way of communication in corporate world but it is troublesome for blind people to use these services. So, this system aims to help blind people to use e-mail easily so that they don't need to be dependent on others. This is a mobile application that can be installed in mobile phones and used. Email operations can be used by giving voice commands to the system. It has a braille keyboard module that will take input for the body of the email in braille language. They know the braille representations for all alphabets, digits, special characters etc. as standard braille chart is universally available. Blind people are educated in that language from there childhood so they are very quick in typing or reading braille. Earlier, inventors tried to make systems that would take voice based inputs and send e-mail or perform some operations through mouse clicks. But, this was not possible for everyone to understand or use and faced problems. Some mobile companies also launched phones for blind people working with morse codes but these morse codes were not known by everyone. Morse codes are usually used by undercover agents to communicate secretly through codes. This needs separate

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knowledge and practice as morse codes are not used in daily routine. As people who can see, are educated through alphabets and numbers etc. from childhood. In same way, blind people already have knowledge about braille as they are educated in braille language. This system would help them a lot in composing, sending and listening e-mails on their own.

II. LITERATURE REVIEW

Previous inventors worked on the similar systems. The "VoiceMail architecture in desktop and mobile devices for the blind people" was done by TirthankarDasgupta, AakashAnuj et.al. in 2012. They used Automatic Speech Recognition(ASR)[1] for voice recognition of the user and gave audio feedback. The "Voice based email system for blind" which was previously implemented by the authors Pranjal Ingle, HarshadaKanade, ArtiLanke in 2016. They focused on the system which used mouse clicks[5] for different operations.

The "Voice based email for blind people" which was implemented by DhanashreeZope, Pooja Nevewani, Pooja Teje in 2017. This group worked mainly on the system which was dependent on ASR(automatic speech recognition)[3] application on respective machines. This systems were speaker dependent which proved to be a disadvantage. "Voice based interactive system for visually impaired" was implemented by Sadaf Abdul rauf, Gulnoor Ahmed in 2016. They focused on the use of dictation pads[4] for taking the input of the user. These systems did not have efficient voice based operations. They didn't work on braille language. Therefore, we proposed this Intelligent e-mail system which will include the braille keyboard and various voice based operations.

III. PROPOSED SYSTEM

The proposed system is a voice based system for e-mail that will enable blind people to compose, send and receive e-mail through speech and send message in braille language. This model will be configured according to the details of the blind user. Then, user can independently use this mobile application easily. They can give details like the e-mail address of the recipient, subject and body of e-mail through voice commands. If the user wishes to give the body of the e-mail in braille language, then they will give a command "open keyboard" which will open the braille keyboard and then they will give the desired input. This will be done by speech to text conversion. Once all the details are filled, the user can give command "send" to send the composed e-mail. They can also click the send button for sending it. There are situations where the user wants to search an e-mail or some of its contents. Then, the user can give the e-mail address of the recipient whose message is to be searched, and the system will read the message using text to speech conversion. There are some keywords that are used for the system, so that it can perform the desired operations. These keywords can be seen as under:

1. Send to: User will say "send to" followed by the email address of the recipient.
2. Subject: The user will use the keyword "subject" and give the subject of the current email.
3. Send: The user will give command "send" to send the email.
4. Read emails: This command will read all the emails of the user's inbox.
5. Read emails from: The user will say "read emails from" followed by the email address of the sender whose email is to be searched.
6. Open keyboard for recipient: This command will open the braille keyboard for the recipient's e-mail address.

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7. Open keyboard for subject: This command will open the braille keyboard for entering the subject.
8. Open keyboard for body: This command will open the braille keyboard for main body of the e-mail.

The user can listen to the received messages in their inbox. All the fields of the e-mail are read while reading out the message ie. the sender's e-mail address, subject and the body of the e-mail. This system will reduce the dependency of the blind people on other people and will help them to access their e-mail account anywhere easily.

This system can be represented by use case diagram which can seen as under:

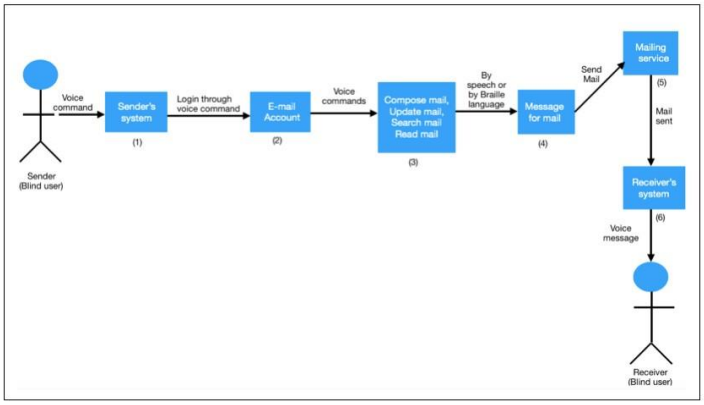

Figure 4.1: Use case diagram of Intelligent e-mail system

The above figure comprises:

(1) Sender's system: The blind user's mobile phone from which email will be sent.

(2) E-mail Account: User's email account.

(3) Compose, update, search, read email: The user will be able to perform these operations using voice commands.

(4) Message for email: This message will be given in braille language and through voice.

(5) Mailing service: Email will be sent using SMTP(Simple Mail Transfer Protocol).

(6) Receiver's system: The blind user's mobile phone on which email will be received to read emails.

The blind user or the sender uses the mobile phone from which the user will send emails through voice command.

The user will compose, search, update, read emails and will also perform all these operations using voice command. The message will be given through voice and braille language which will used as main body for email. E-mail will be sent using simple mail transfer protocol. On the receiver side, the blind user will receive email from the another user's mobile phone and will these e-mail through speech.

IV. IMPLEMENTATION

The proposed system has been implemented for visually impaired people to use e-mail services easily. It is a feasible mobile application which requires less space in mobile phones. It requires around 5-10

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MBs of space in phone. This application will be installed through its android package(APK) file. After it is opened, our main layout will be opened.

Following steps needs to be followed for opening and performing different operations:

1. Open the mobile application.
2. Click on the “Enter Recipient” for entering the email address of the recipient through voice.
3. Click on the “Enter Subject” for entering the subject for the e-mail through voice.
4. Click on the “Body” tab for entering the main body of the e-mail. This message can be given through voice and braille language.
5. Click on any of the above tab and say “send” to send e-mail. The “Send e-mail” button can also be pressed for sending e-mail.
6. Click on any tab and say “open keyboard for recipient” to open the braille keyboard for recipient’s e-mail address.
7. Click on any tab and say “open keyboard for subject” to open the braille keyboard for giving input for subject for e-mail.
8. Click on any tab and say “open keyboard for body” to open the braille keyboard for entering the main body of e-mail.

Following steps must be followed to open the keyboard and give input message:

1. Click on any one of the tab from the main layout and give voice command “open keyboard for recipient/subject/body” to open the braille keyboard.
2. The 3*3 dot pattern will be opened which is according to the alphabet representation of standard braille chart which is globally available.
3. These dots must be tapped in order to give input message according to the chart.

V. RESULT

The outcome of this proposed system is that it helps blind people to use e-mail services on their own and use many operations easily. We also came across some of the advantages of this system which are listed below:

1. It performs many operations on voice commands for visually impaired people.
2. It has an option for a braille keyboard to give input in braille language.
3. It is easy to install mobile application and requires less space.

We conducted a small survey for this application and tested it on 8-10 blind students. They found it easy for composing e-mails and sending them. They used the braille keyboard for writing the message. They were able to listen to their received e-mails from their inbox. This system has proven to be 95-98% efficient. This system can be used for people of all age groups with proper guidance of its operations and methods.

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VI. CONCLUSION

The voice based system has many features that can help blind people use the e-mail services easily. It also guides them to give input in braille language which is familiar to them. It performs all e-mail operations on the voice commands like composing, sending, reading, searching e-mails from the user's e-mail account. This application is found to be more useful than existing application.

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