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Voice-Based E-mail System for Visually Impaired People

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ABSTRACT

The development of computer-based interactive technologies has opened multiple opportunities for visually disabled people around a significant majority of the world. The virtual world focused on audio input including screen readers enabled blind people to achieve enormous accessibility to internet applications.That E-mail is consideredto have one of the widest spread forms of communication using in day to day life. Furthermore, visually impaired people cannot perform all the operations in computers with various technologies because it is completely dependent on visual perception. From the invention of emerging technologies in computers, various solutions have been implemented for visually impaired persons to be able to use and get benefit from them. Considering this as a key objective in this paper we have developed an E-mail system for Blind people which can be used efficiently and easily. In this system an individual will not be using the keyboard instead can work with mouse cursor and translation of speech to text and vice versa. This system is based on Interactive Voice Response which makes user friendly and easy to use.

Key words : Interactive_Voice_Response,Text_to_Speech, Speech_to_Text,VisuallyImpaired, Voice-based

1. INTRODUCTION

In the modern communication world, the internet plays an important role. Currently, the world is operating on an internet basis, without the internet we cannot perform any work. In that Electronic mail i.e., E-Mail is the most essential aspect of everyday life. However, few people across the world not even know to use the internet because few are Blind, and others are illiterates. As per statistics, there are around 290 million people are blind [9] [10], among that few are having low vision. There are many existing technologies are available such as Automated_Speech_Recognition(ASR)[1], Text_to_Speech(TTS),Speech_to_Text(STT)[2], Screen readers, etc., but these are not efficient enough to assist the visually impaired people. Also, many smartPhones providing various applications for speech recognition like Google Voice Assistant, IPhone's Siri are providing facilities to use the various features existing in the mobile phones like Sending a text message, Browsing, listening to the music, etc., through voice commands. But these screen readers can only speak the contents which are present on the screen, but the user has to remember most of the mouse clicks and keyboard shortcuts. To provide better assistance for the visually impaired people an Interactive E-Mail System has been developed. Our system offers that the user is intrusted by the voice such that the user does not have to think about recalling which mouse click action he/she needs to accomplish. The system completely using the Natural Language Processing system in which the natural language of the user is accepting for communicating mails efficiently and easily without anyone's help.

2. RELATED WORK

In the survey of 2017 nearly 4.95 billion E-mail accounts were created but now it has been increased to 5.72 billion by the end of 2019 [3]. It is observed that there is an increase in the number of E-Mail users across the world. In India many people are visually impaired users, they cannot use the E-mail services as normal people use in their day to day life.

T. Shabana, A. Anam, A. Rafiya, K. Aisha, etal. implemented a basic voice-based E-mailsystem [4] which consists of voice recognition, conversion of the text to speech,Screen Readers Interactive Voice Recorder (IVR) and Mouse Click events. Voice is used for providing the input and output is through the Mouse clicks, but this E-mail system cannot give feedback services.

G. Shoba, G. Anusha, V. Jeevitha, R. Shanmathi, et al. proposed that the visually disabled individuals cannot use the most basic mail system that we use in our daily lives [5] and it doesn't give facility to hear the contents from the screen for the person who sits in front of the screen. Like a normal user, the visually impaired person can't able to use the computer system conveniently even it is user friendly.There are some screen readers are existing but still, blind people have to face some same challenges as well. The screen readers read out all the information is on the display and the user has to use keyboard shortcuts to accomplish certain actions because the screen readers cannot track the position of the pointer. It signifies the two things; one is that it is inconvenient if the position of the pointer cannot be identified and second that the user will be familiar with the keyboard as to where each key is placed. So a user is new to a computer and cannot use this service because they don't know the key position.

Rahul Anwani Usha Santuramani Deeksha Raina Priya R. L et.al proposed the Vmail module [6] [7] with a lot of information about the recent technologies and it consists

ofscreen magnifiers and readers. In recent year's various technologies such as SST, TTS, IVR, Mouse Click events are developed [11][12] to assist blind people, but this system also has some drawbacks as the user had to remember user ids and passwords and few mouse click operations.

The drawbacks of the existing system are:

- The mail services do not provide audio feedback, due to that visually impaired people face difficulty.
- Every visually impaired person should know English because the present system does not have a language translator [13].
- An E-mail was created by giving Voice commands through Earphones and it will difficult for visually impaired people to carry earphones always.
- The mouse cannot be used by visually impaired people because they cannot determine the location of the mouse pointer.
- The usage of keyboard in the current systems is very difficult for blind people because they cannot recognize and remember the keyboard characters [8].

3. PROPOSED SYSTEM

Considering all the drawbacks of the existing system, we proposed a new system that minimizes the limitations and challenges. We are aiming to develop a program for visually impaired persons inwhich they can conveniently access the essential features like an E-mail in a user-Friendly manner.It is quite challenging for visually impaired individuals to use this technology, as using it needs visual recognition. Not everyone accesses and uses the internet because it required to read everything written on the screen, if it is not visible to the user then he cannot make use of the internet.

The system is consisting of Interactive Voice Recorder, Text_to_Speech, Speech_to_Text technologies.

3.1 Interactive Voice Recorder: It is an emerging technology that defines user and system communication and gives a reply by utilizing a keyboard for appropriate voice communication. The IVR enables users to communicate with the E-mail Server system using a keyboard after listening to the IVR dialogue allows users to conveniently and effectively handle their queries.

3.2 Text_to_Speech: The user receives any mail it converts from text to speech or voice so the blind person able to listen to the contents of the mail which he has received.

3.3 Speech_to_Text: To send any mail by the visually impaired person, he/she can speak that speech will be converted into the text and it will have sent to another person.

This proposed system can be used by normal users as well as a visually impaired user. This system completely based interactive voice response which eliminates the use of the keyboard and every user can use two languages i.e., English and Hindi since the language translators have been used.

4. SYSTEM DESIGN AND ARCHITECTURE

The Proposed System Design as shown in Figure 1. Our system is designed by using Python, HTML, Amazon servers. It takes input from the user through Alexa in the form speech which is connected to the Alexa Developer Console and converts into text. In the same way it converts from text to speech. The output i.e.,E-mail shown on the desktop. The communication handled here is dynamical since it is connected to the internet.

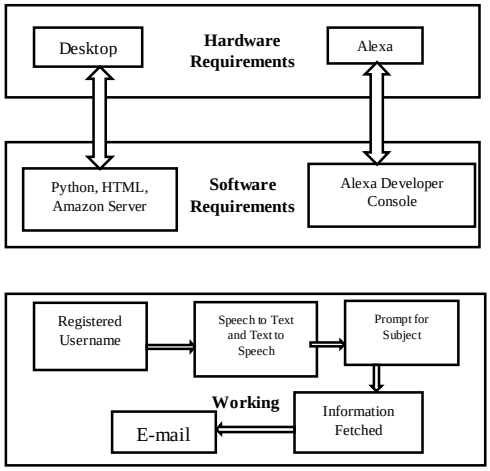

Figure 1: System Design

The below Figure 2 shows the ProposedSystem Architecture.

Step 1: Initially Alexa Dot is connected to the internet through Wi-Fi to take the input from the user.

Step 2: User can input through Speech or voice as an input to the Alexa Dot.

Step 3: After receiving input from the user the Amazon Developer Console Converts Speech to Text and Vice Versa.

Step 4: By using the JSON file the Amazon Developer Console is connected to the Amazon Web Server which consists of E-mail Function which is capable to Send and Receive the mail.

Step 5:After Sending and Receiving Mail, the Amazon Web Server sends an Acknowledgment to the user through Alexa Dot.

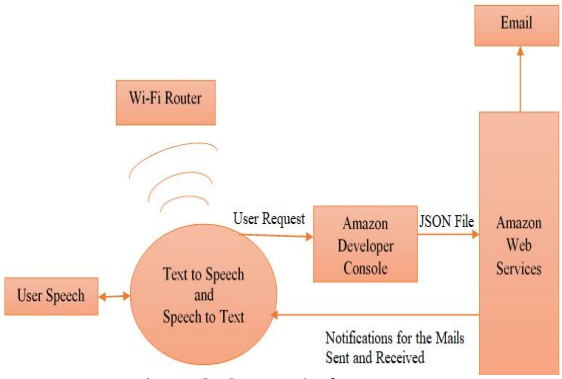

Figure 2: System Architecture

5. IMPLEMENTATION

The E-mail Application system consists of various modules as follows

5.1 Registration Page

Figure 3 shows the Registration page of the E-mail system. Any user wants to Send, and Receive the E-mailmustRegister themselves by entering their Username and Valid E-mail id, and then the user has to click Register, later the user will get their Username and Password after a successful registration. If the user enters some existing Username with Different mail id, then he will be notified with "user already exists".

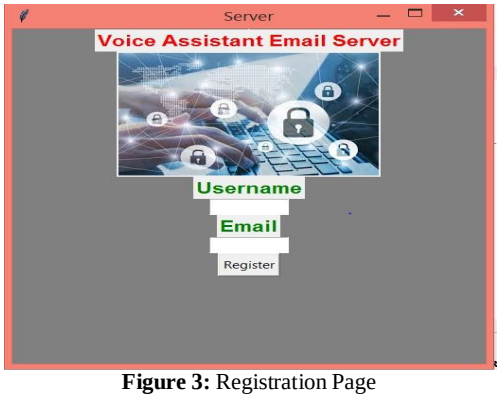

Figure 3: Registration Page

5.2 Firebase Console

Figure 4 shows the Firebase Console. The Information which the user has entered in the registration pages will be stored in the Firebase console which is also known as Google Cloud Messaging(GMC). Firebase Console is Platform for Mobile and Web Development by the Firebase. It provides a Real-Time Database and Back End Services where the services are provided in the form of API to the Application Developers that allows the application data to be synchronized and stored in Firebase Console i.e.user registered data in the registration page.

Figure 4: Firebase Database Console

5.3 Amazon Echo Dot Setup

The Amazon Echo Dot also called Alexa which provides users with Voice-based services like Responding to the user. It helps the user to send a mail through voice, however, the user communicating with Alexa through speech will converting into text by Alexa itself. It has few features like Increase, Decreases, and Mutes the Volume. Figure 5 shows an Alexa.

Figure 5: Amazon Echo Dot

5.4 Compose and Sending a Mail

The user is interacting with Alexa for sending mail through voice. The Compose and Sending mail by the user is shown in below figure 6.

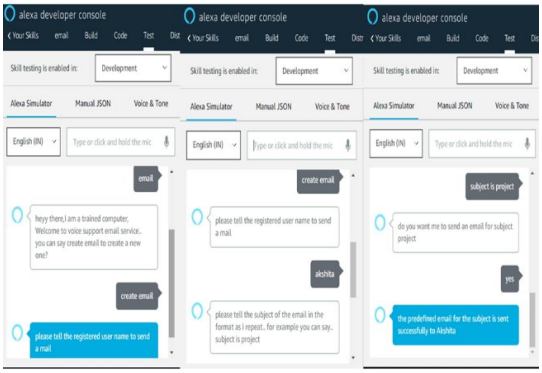

Figure 6: Composing and Sending an E-mail

5.5Receiving Mail

Figure 7 shows the receiving mail, which is sent by the user.

Figure 7: Receiving an E-mail

6. CONCLUSION

In this article we proposed an E-mail system for visually impaired people which helps to access the E-mail facilities like Sending and Receiving mail through Speech using Alexa. The user has to follow the instructions of the IVR to perform any operation in this system. This helps blind people use E-mail functionalities like normal users and it eliminates using of keyboards.

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