

# Voice Based System in Desktop and Mobile Devices for Blind People

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## ABSTRACT

Voice mail architecture helps blind people to access e-mail and other multimedia functions of operating system (songs, text). Also in mobile application SMS can be read by system itself. Now a days the advancement made in computer technology opened platforms for visually impaired people across the world. It has been observed that nearly about 60% of total blind population across the world is present in INDIA. In this paper, I describe the voice mail architecture used by blind people to access E-mail and multimedia functions of operating system easily and efficiently. This architecture will also reduce cognitive load taken by blind to remember and type characters using keyboard. It also helps handicapped and illiterate people.

**Keywords :** Voice Mail, RSS (Real Simple Syndication), Microsoft Speech SDK.

## I. INTRODUCTION

Today in the information age computer has become a integral part of every body's life. We use a computer to hear songs, read something, accessing information from the internet. We use computer everywhere. But the information access and computer handling has to be done with the mouse and keyboard and by reading all the things present on the screen and then deciding what to do making it a visual process means we need eye sight to handle the information on the computer i.e. if we want to read news from the internet we have to first open a browser and then open a website to read news and then follow the links to read specific news. The decision making depends upon the eye sight and by reading everything that appears on the screen. So the computer and information age is not for the blind. The blind people cannot read the information and cannot view the mouse cursor to give command to the computer. They cannot access their mail and cannot send a mail. Thus the computer becomes a impractical thing for the blind people and information retrieval a tedious job. We are going to develop a information retrieval toolkit for the blind

and then transform the information into a Braille language for the blind people to read it and also keep a option of speech to read it. We are searching for a few things like how are we going to access the internet without a browser and how we are going to play the songs and read books without a mouse use.

The systems available now a day's uses screen readers which read information displayed on desktop or it prints information on Braille printer. ASR (Automatic speech recognizer) and TTS (text to speech) get used for converting speech to text and vice versa. Although these technologies are being improved continuously, some major problems still persist which make them unusable as a way of accessing email to a large segment of Blind people. These systems have following drawbacks.

1. With the help of screen readers it is difficult for blind person to access E-mail system and computer operating easily, because it has noisy audio Interface.
2. ASR is still in development stage. In case of noisy environment performance of ASR degrade.

3. Both ASR and TTS are highly language dependent. So the system developed for one language is not applicable to other.

4. Now a day's mobile is very common word it is known to almost all peoples even school goers also use mobile. Moreover, tools and technologies above for the blind users are unavailable for mobile devices.

5. These systems are not very much useful for small scale application for E-mail.

6. These available systems require use of keyboard which is very difficult for blind people to recognize and remember characters of keyboard.

Keeping in view all of these, goal of our project is to reduce limitations and problems mentioned above. Our system allows blind person to his/her voice instead of converting speech to text, the system directly sends recorded voice message to recipients mail address as an attachment. The system also provide option of desktop browser which helps to search contents in computer, Operate multimedia functions of computer such as audio, text, News on internet can be read by system. In this system we use Microsoft speech SDK which is a software development kit for building speech engine and application for Microsoft window. SDK contain SAPI i.e. you can use SDK run time to build application programming interface. This technique has following advantages:

1. Browser is used and done via a desktop application
2. The system provides an intuitive, interactive and easy to use GUI that can be easily used by a blind user even if they are not computer literate.
3. The system help not only for blind user to access Email, but it may also help other sighted people who can't type text due to illiteracy.

## II. LITERATURE REVIEW

There is bulk of information available on technological advances for visually impaired people. This includes development of text to Braille systems,

screen magnifiers and screen readers. Recently, attempts have been made in order to develop tools and technologies to help Blind people to access internet technologies. Among the early attempts, voice input and input for surfing was adopted for the Blind people. In IBM's Home page the web page is an easy-to-use interface and converts the text-to-speech having different gender voices for reading texts and links. However, the disadvantage of this is that the developer has to design a complex new interface for the complex graphical web pages to be browsed and for the screen reader to recognize.

Simple browsing solution, which divides a web page into two dimensions. This greatly simplifies a web page's structure and makes it easier to browse. Another web browser generated a tree structure from the HTML document through analyzing links. As it attempted to structure the pages that are linked together to enhance navigability, it did not prove very efficient for surfing. After, it did not handle needs regarding navigability and usability of current page itself. Another browser developed for the visually handicapped people was e-GuideDog which had an integrated TTS engine. This system applies some advanced text extraction algorithm to represent the page in a user-friendly manner. However, still it did not meet the required standards of commercial use.

There are a total number of 4.1 billion email accounts created until 2014 and an there will be estimated 5.2 billion accounts by end of 2018. this makes emails the most used form of communication. The most common mail services that we use in our day to day life cannot be used by visually challenged people. This is because they do not provide any facility so that the person in front can hear out the content of the screen. As they cannot visualize what is already present on screen they cannot make out where to click in order to perform the required operations.

For a visually challenged person using a computer for the first time is not that convenient as it is for a normal user even though it is user friendly. Although there are many screen readers available then also these people face some minor difficulties. Screen readers read out whatever content is there on the screen and to perform those actions the person will have to use keyboard shortcuts as mouse location cannot be traced by the screen readers. This means two things; one that the user cannot make use of mouse pointer as it is completely inconvenient if the pointer location cannot be traced and second that user should be well versed with the keyboard as to where each and every key is located. A user is new to computer can therefore not use this service as they are not aware of the key locations.

Another drawback that sets in is that screen readers read out the content in sequential manner and therefore user can make out the contents of the screen only if they are in basic HTML format. Thus the new advanced web pages which do not follow this paradigm in order to make the website more user-friendly only create extra hassles for these people.

All these are some drawbacks of the current system which we will overcome in the system we are developing.

Considering Indian scenario, ShrutiDrishti and Web-Browser for Blind are the two web browser framework that are used by Blind people to access the internet including the emails. Both the systems are integrated with Indian language ASR and TTS systems. But the available systems are not portable for small devices like mobile phones.

### III. PROPOSED METHODOLOGY

The architecture of our proposed system is depicted in fig.1, it shows major component of present system which are

1. G-mail System read messages on recipient mailbox.
2. RSS- Real simple syndication for news
3. Song- listen songs
4. Book reader-system read book
5. Drive browser- To search drives and folders

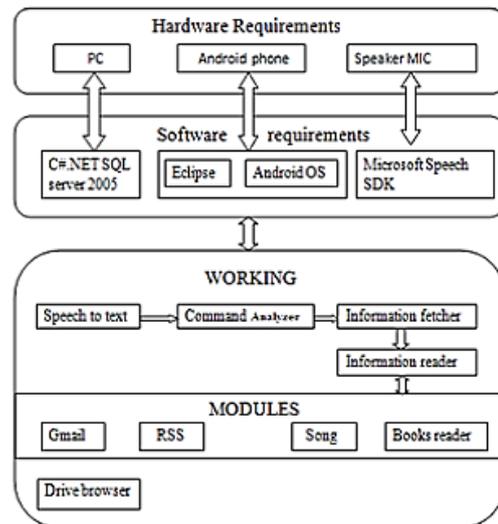


Fig. 1. Architecture of Proposed System

Concept of mailing the recorded The voice mailing system was built both for the desktop computers as well as for mobile devices. The system changes some of its configuration based on the selected devices. In the following subsections we will discuss working of the proposed system for both desktop as well as mobile platforms. Both the platform shares the same voice of the sender to the recipient. However, the GUI for both the platforms differs. In the following subsections we will discuss about each of these modules in detail.

## IV. VOICE BASED SYSTEM FOR DESKTOP

### A. Gmail:

#### 1. User Authentication System:

In user authentication module user has to give login information such as his/her username, password through voice command. for Blind users, all operation performed will get an voice based feedback.

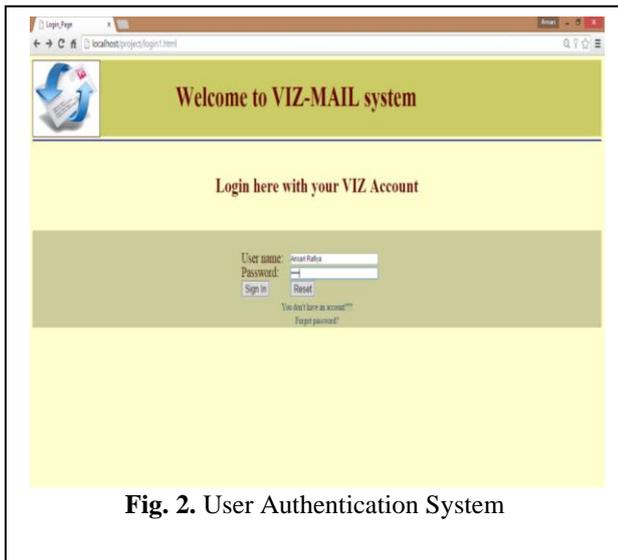


Fig. 2. User Authentication System

There are options to save a particular users profile so that the user does not have to enter the same details again.

## 2. Options in Mailing:

**a. Sending Mail:** In send mail module the compose window will open; the user has option of either to record a voice message or to type text. In order to record a voice message a user can either click on the “Initialize Recording” button or can press the mouse right button anywhere on the screen. The GUI of the system has been designed in such a way that bluntly of the position of the mouse pointer, the mouse click operation will be registered and the system will work accordingly. In order to stop the recording, again the user can either click on the —End Recording! button or release the mouse right button anywhere on the screen i.e. the recording has been initialized by pressing the mouse right click button. Once the recording is finished, the system will ask the user to select the recipients mailing address. This is done by reading out all the mail ids of the sender alphabetically. Once the recipient mail id is entered, the system will prompt the user to send the mail or to cancel the operation. In order to send the mail the user can either press the “send mail” button or Left click on the mouse to send the mail. We will define all

the mouse click operations in details in the following sections.

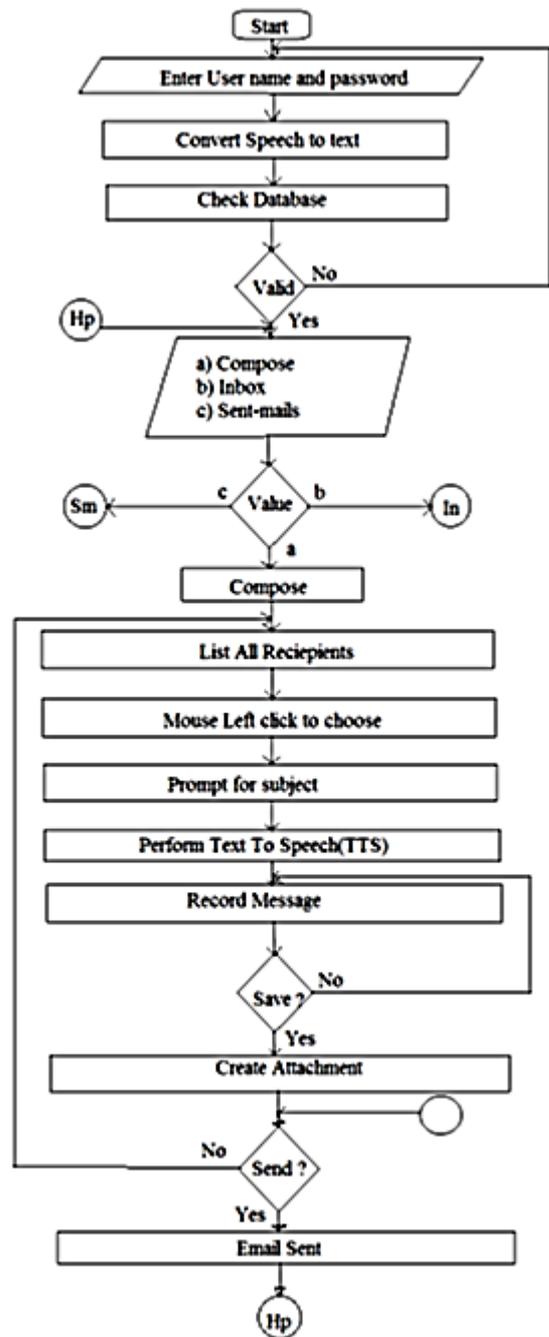


Fig. 3. Flow Chart for Composing Mail

**b. Check Inbox:** In the inbox module, the blind user can check the voice mail received in mailbox. Blind user can choose one of the two options first is checking the first ten mails and second option is check all the mail sequentially. After the user selects an option the system start to read email id given in list and then system ask to user whether the user want to

listen voice message or not, at that time system halt for a moment to receive the response. Then system performs corresponding action.

**3. GUI Accessing by Using Voice Command and Mouse Key Press:**

The GUI operation access by using voice command and mouse operation performed by the user instead of searching the short-cut key from the keyboard.

The user can apply the same keyboard command by performing different mouse operation and voice operation in our system each voice operation mapping to certain keyboard operation and also voice operation map with certain keyboard operation. This mouse operation can be change easily. Some example of mapping rules is shown in table I as below.

Mouse Click	Operation Performed	Voice Command
Right single	Compose Mail	Compose
Right double	Cancel Mail	Cancel
Right triple	NOP	NOP
Left single	Check Inbox	Open Inbox
Left double	Send Mail	Send
Left triple	NOP	NOP
Mouse Scroll Up	Select Next Mail	Next mail
Mouse Scroll Down	Previous Mail	Previous mail
Middle single	Attach Document	Attach
Middle double	Discard	Discard

**Table 1. Mouse Click and Voice Command Operations**

**B. RSS:**

RSS stands for "Really Simple Syndication". It is easy way to distribute a list of headlines, update notices and sometime content to an wide number of people. It is used by computer programs that organize those headlines and notices for easy understanding and reading.

**1. RSS Working:**

RSS works by having the website author maintain a list of notifications on their website in a standard way. This list of notifications is called as "RSS Feed". People who are interested in finding out the latest headlines or changes can check this list. Special computer programs called "RSS aggregators" have been developed that automatically access the RSS feeds of websites you care about on your behalf and organize the results for you.

RSS feeds and aggregators are sometimes called "RSS Channels" and "RSS Readers" respectively. Producing an RSS feed is very simple and hundreds of thousands of websites now provide this feature. Including major news organizations like the New York Times, The BBC and Reuters as well as many weblogs.

**C. Desktop Browser:**

Desktop browser provides voice feedback. In this system when user operate a particular drive then system inform the user by speaking out particular drive name "such as this is D drive" this help the user to confirm whether he/she in correct location or not.

**V. VOICE BASED SYSTEM FOR MOBILE**

Proposed system read messages on users mobile. As well as E-mail, other multimedia functions like (audio, text), news are handle same as discussed in voice based system for desktop. Thus, we created a version

of the same desktop application up and running on an Android based embedded platform. Roughly, the hardware requirements for our Android version of the application are as follows,

1. A touch screen device, preferably of size 4.0" x 4.0".
2. Android OS version 2.3.6 or higher.
3. CPU speed  $\geq$  400 MHz.
4. At least 30 MB of free phone memory, with support for SD card installation.
5. System requires at least 80 MB of secondary storage.

### VI. ADVANTAGES

1. The disabilities of visually impaired people are thrashed.
2. This system makes the disabled people feel like a normal user.
3. They can hear the recently received mails to the Inbox, as well as the IVR technology proves very effective for them in the terms of guidance.
4. The visually impaired people can advance from Desktop application to the web based application.

### VII. CONCLUSION

Voice mail architecture helps blind people to access e-mail and other multimedia functions of operating system (songs, text). Also in mobile application SMS can be read by system itself.

It has been observed that nearly about 60% of total blind population across the world is present in INDIA. This paper, describe the voice mail architecture used by blind people to access E-mail and multimedia functions of operating system easily and efficiently. This architecture will also reduce cognitive load taken by blind to remember and type characters using keyboard. It also helps handicapped and illiterate people.

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