International Journal of Modern Trends in Engineering and Research
www.ijmter.com
e-ISSN No.:2349-9745, Date: 2-4 July, 2015

Communication media for Blinds Based on Voice

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Abstract- Outdoor communication has became a harder task for visually impaired people in this complex urban world. Advances in technology are causing them to fall behind, sometimes even putting their lives at risk.Today,314 million people in the world are visually impaired, in which 45 million are blind. Proposed system can be used by blinds to access their mails easily and efficiently. Thus, reliance of visually impaired people on others for their mailing activities is reduced. Here, user will have to give only voice commands to the system and it will act accordingly. Some keywords will be predefined such as read, compose, send etc.The mail composed by user via voice commands will be converted to text and then sent to normal person on the other side.

Keywords- Voice Based Email for Blinds ; Mailing System for Visually Impaired ; Communication Media for Blinds

I. INTRODUCTION

In today's era of internet technology communication is becoming more faster. Electronic mail is one of these applications . Electronic mail[1] most commonly referred to as e-mail since 1993 is a method of exchanging digital messages from an author to recipients. Modern email operates over the Internet or other computer networks. Some previous email systems required that the author and the recipient both should be online at the same time, with instant messaging .

Now-a-days email systems are based on a store-and-forward model. Email servers accept, forward, store and deliver messages. Both the users and their computers are not required to be online simultaneously; they need to be connect only to a mail server. The term electronic mail was used for electronic document transmission.

Voice based email system is system in which information is exchanged in speech format. In 1980 the term Voicemail was strike by Televoice for introduction of the first nationwide Voicemail service.

Voicemail [2] systems were developed in the late 70s by Voice Message Exchange (VMX). The report said that the number of voicemail messages declined 8 percent compared to 2011.The available systems are not very much useful for small scale application for E-mail. The systems require use of keyboard which is very difficult for blind people to recognize and remember characters of keyboard. Also, a trainer is required to access mails each time. We are developing an e -mail system for blinds and handicapped people for efficient and independent use. The blind people cannot read the information and cannot view the mouse cursor to give command to the computer, thus our system makes this task easier to access mails only by providing voice commands to it. It manages voice and e-mail messages from your PC via messaging and also accesses all critical communications from a single screen. This paper is organized in the following sections. Section 2 discusses about the related work done for speech to text conversions and vice versa. Section 3

describes the proposed system and algorithms used in implementing this system; likewise section 4 elaborates user interface of the system.

II. LITERATURE SURVEY

Bulk of information is 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 for surfing was adopted for the Blind people. A sight-blessed person can interact with the computer with the help of different input/output devices, while a visually impaired person is somehow forced to use specially designed devices or programs to interact with computers. The visually impaired person uses different types of equipments and programs that enable him/her to enter data into computers or control them.
In the year 2010 a system was proposed by Rudan Bettelheim, David Steele[3] in which the speech recognition application continually samples the audio input adjusting for varying background noise conditions.
Kuldeep Kumar, R.K.Aggarwal [4] used Hidden Markov Model Toolkit (HTK) in the year 2011. In this paper, the speech recognition system for Hindi language is developed. This system recognizes the isolated words using acoustic word model.
In the year 2012 Nelson Morgan [5] projected some of the methods developed over the last decade that incorporate multiple layers of computation to either provide large gains for noisy speech on small-vocabulary tasks or modest but significant gains for high-SNR speech on large-vocabulary tasks.
FPGA Spartan3 Kit was developed by Dhananjay Laghate [6] in the year 2013 which resembled the Braille system for Text or Speech Conversion.
Komal Chauhan & Kamal Kant [7] have proposed a system wherein the user will be able to type text on computer by providing a voice input through his mobile phone. They used customized grammar rule based on Locale for voice transmission. However,a voice based Email System is implemented by few researches and needs rigorous work to be done.Thus we proposed system that uses Hidden Markov model for better efficiency.

III. SYSTEM ARCHITECTURE

The system as depicted in Fig(1) shows that the blind person provides voice input to the system. This input is then recorded and converted into text format. The text message is sent to the receiver where it gets converted into speech format. And vice versa is done for text to speech. Blind user will only have to give voice commands to access their mails.

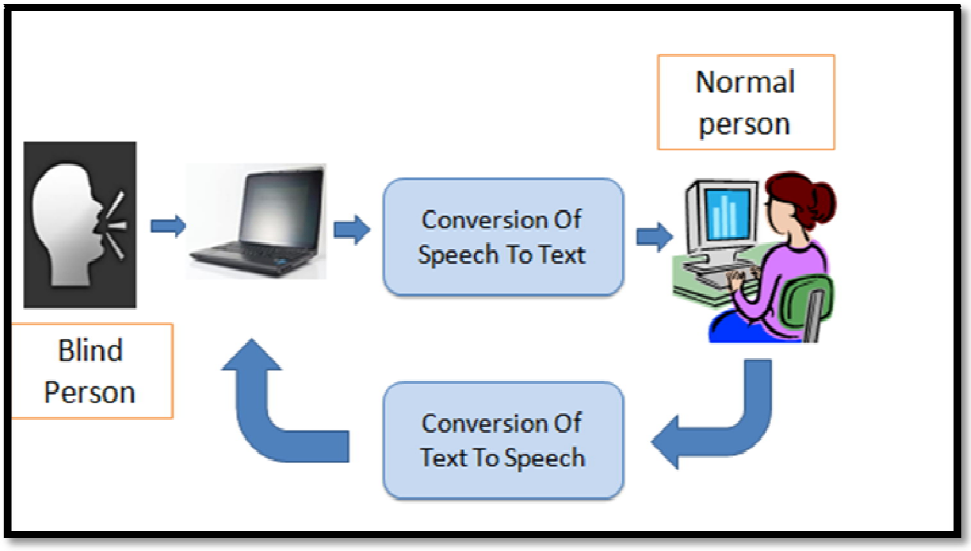

Fig. 1: Working of Voice based e-mail system.

3.1 . Algorithm For Text To Speech Conversion :

The actual process carried out for text to speech conversion is elaborated below:

1.Text Analysis and Detection: The Text Analysis part is pre-processing part which analyze the input text i.e. n and organize into manageable list of words(n1,n2,n3,……,n). Text detection localize the text areas from any kind of printed documents.

( )= 1, 2, 3… .... (1)

2.Text Normalization and Linearization: Text Normalization is the transformation of text to pronounceable form whereas linearization is the process of giving a hyper text link to give the user a quick overview of the page.

3.Phonetic Analysis: After text normalization, phonetic analysis converts the orthographical symbols into phonological ones using a phonetic alphabet (p1,p2,p3,……,pn). This is basically known as "grapheme-to-phoneme" conversion. For Example, the word "bat" is composed of three phones

p1 - /b/
p2 - /ae/
p3 - /t/

4. Prosodic Modeling and Intonation: The concept of prosody is the combination of rhythm stress pattern and intonation in a speech. It describes the speaker's emotion.

5. Acoustic Processing: Finally using the prosody the speech is spoken according to voice characteristics of the person.

3.2 Algorithm For Speech To Text Conversion:

1.Extratction: The input audio waveform from a microphone is converted into a sequence of fixed size acoustic vectors 1:T = y1,....,yT .... (2) in a process called feature extraction.

2. Decomposition: Each spoken word w is decomposed into a sequence of Kw basic sounds called base phones. This sequence is called its pronunciation

$(w)1{:}Kw{=}q1{,}\ldots\ldots{,}qKw$ .... (3)

3. Multiple Pronunciations: To allow for the possibility of multiple pronunciations, the likelihood p(Y|w) can be computed over multiple pronunciations.
$(Y|w){=}\Sigma Qp(Y|Q)P(Q|w)$ .... (4)

Where the summation is over all valid pronunciation sequences for w,Q is a particular sequence of pronunciations,
$(Q|w){=}\Pi\ Lt{=}1P(q(wl)|wl)$ .... (5)
Here q(wl) is valid pronunciation for each word wl.
4. Phonetic Analysis: Reverse process of that explained in section 3.1 is carried out.
5. Decode (text corpora): The language model is typically an N-gram model in which the probability of each word is conditioned only on its N−1 predecessors.
6. Text as output: The N-gram parameters are estimated by counting N-tuples in appropriate text corpora. The decoder operates by searching through all possible word sequences using pruning to remove unlikely hypotheses thereby keeping the search tractable. When the end of the utterance is reached, the most likely word sequence is output.
This paper uses mailing done through **SMTP server**. SMTP is an internet standard for electronic mail transmission. By default it uses TCP port 6. SMTP send is generally used to send messages from mail client to mail server.
Configuration of SMTP server is necessary to set up mail clients so that it will look after delivery of emails.

IV. USER INTERFACE

"The system is implemented in Java. The Javamail API is used which consists of com.sun.mail.smtp package which acts as a SMTP protocol and driver to access SMTP server".

4.1 Inbox

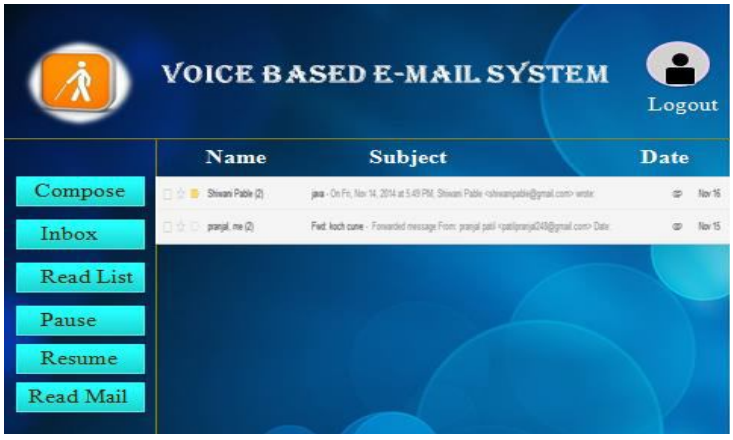

Fig (2): Inbox Page

This is the inbox module in which arrived mails are displayed .System starts to read email id of the arrived mails in the inbox then system ask to user whether the user want to listen voice message or not. And if user say yes then that mail will be read by the system.
There are various voice commands used as keywords like read list, pause, resume and read mail to effectively interact with the system.

4.2 Compose

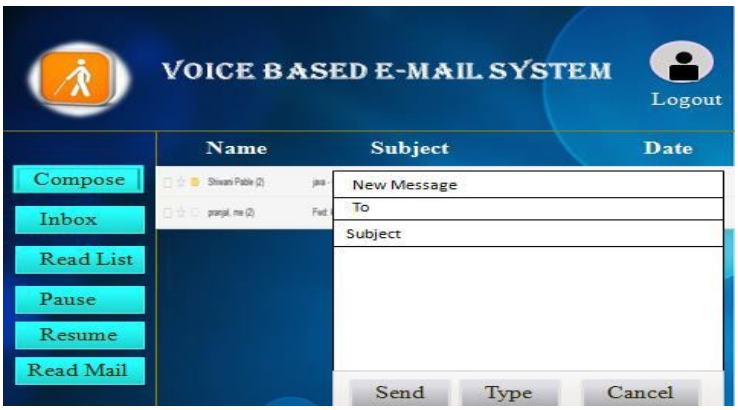

Fig (3): Compose Page

If user will speak compose keyword then compose window will open in that user can give receivers email id, subject of the mail and content of the mail. Then he has to say send keyword and the mail will be sent. However, while providing voice input to the system, there may be pronunciation problem.

CONCLUSION

Web based application is the magic of today's world, but making it handy over with the same use remotely, has brought revolution in the mailing System. This paper explains to extensively cover the concept of web based communication system. The proposed system is really very useful for blinds and handicapped people to easily access mails and thus reduce reliance of those people on the normal people.

Real time composition of textual mail through audio input is done. Keywords are used to trigger mail related operations. Voice mailing made it possible for people to instantly pass detail information from one party to another without directly speaking to them.

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