# Voice based Email System for the Visually Impaired

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# Contents


- Overview
- What is IVR?
- How does IVR work?
- Application of IVR
- Design
- Implementation
- Conclusion
- References

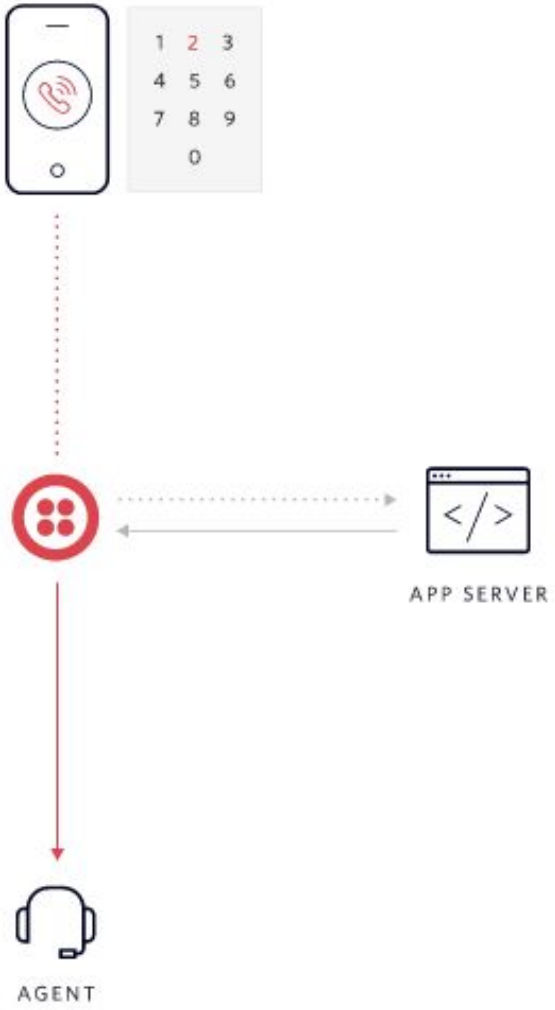
# Overview

- Most systems emphasize more on user friendliness of normal users, but not that of  all types of people including normal people visually impaired people as well as the illiterate.
- The complete system is based on IVR - interactive voice response.

- The computer prompts the user to perform specific operations.
- All operations based on mouse click events.
- The action performed by a type of click is specified by the IVR.

# What is IVR?

- IVR – Interactive Voice Response
- Allows callers to navigate a phone system before talking to a human operator
- IVR systems are an example of **computer-telephone integration (CTI)**
- The most common way for a phone to communicate with a computer is through the tones generated by each key on the telephone keypad, known as **dual-tone multi-frequency (DTMF)** signals



# How does IVR work?

- Each number key on a telephone emits two simultaneous tones: one low-frequency and one high-frequency.
- Special hardware - **telephony board** or **telephony card** - required to understand the DTMF signals produced by a phone.
- The IVR software allows you to pre-record greetings and menu options that a caller can select using his telephone keypad.
- Responses: TTS or pre-recorded responses.

# Applications of IVR

- Mobile Purchases
- Banking services
- Customer Care
- Travel Information

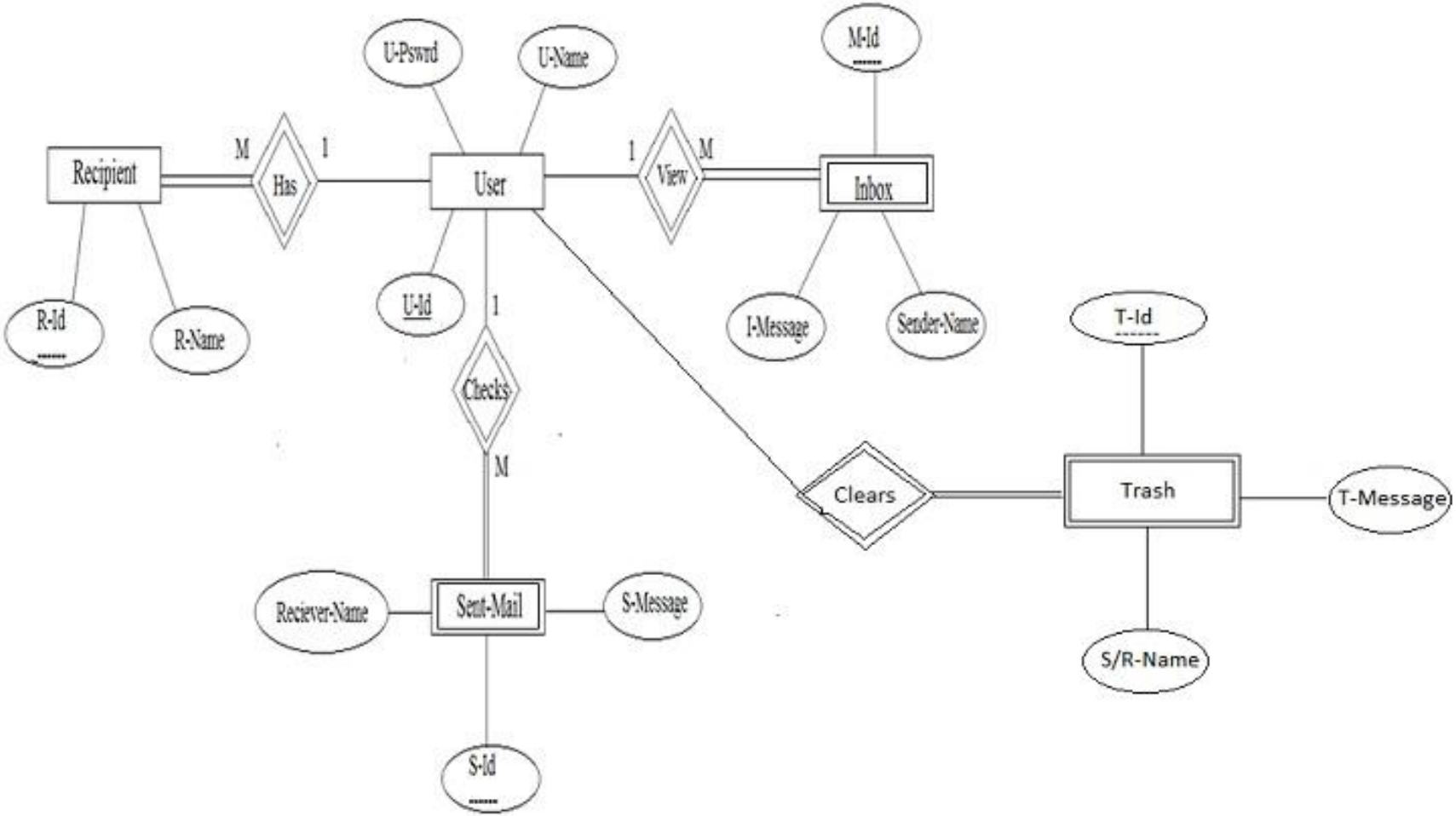
# Design

# UI Design

- The user interface is designed using Adobe Dreamweaver CS3.
- The complete website focuses more on efficiency in understanding the IVR rather than the look and feel of the system.

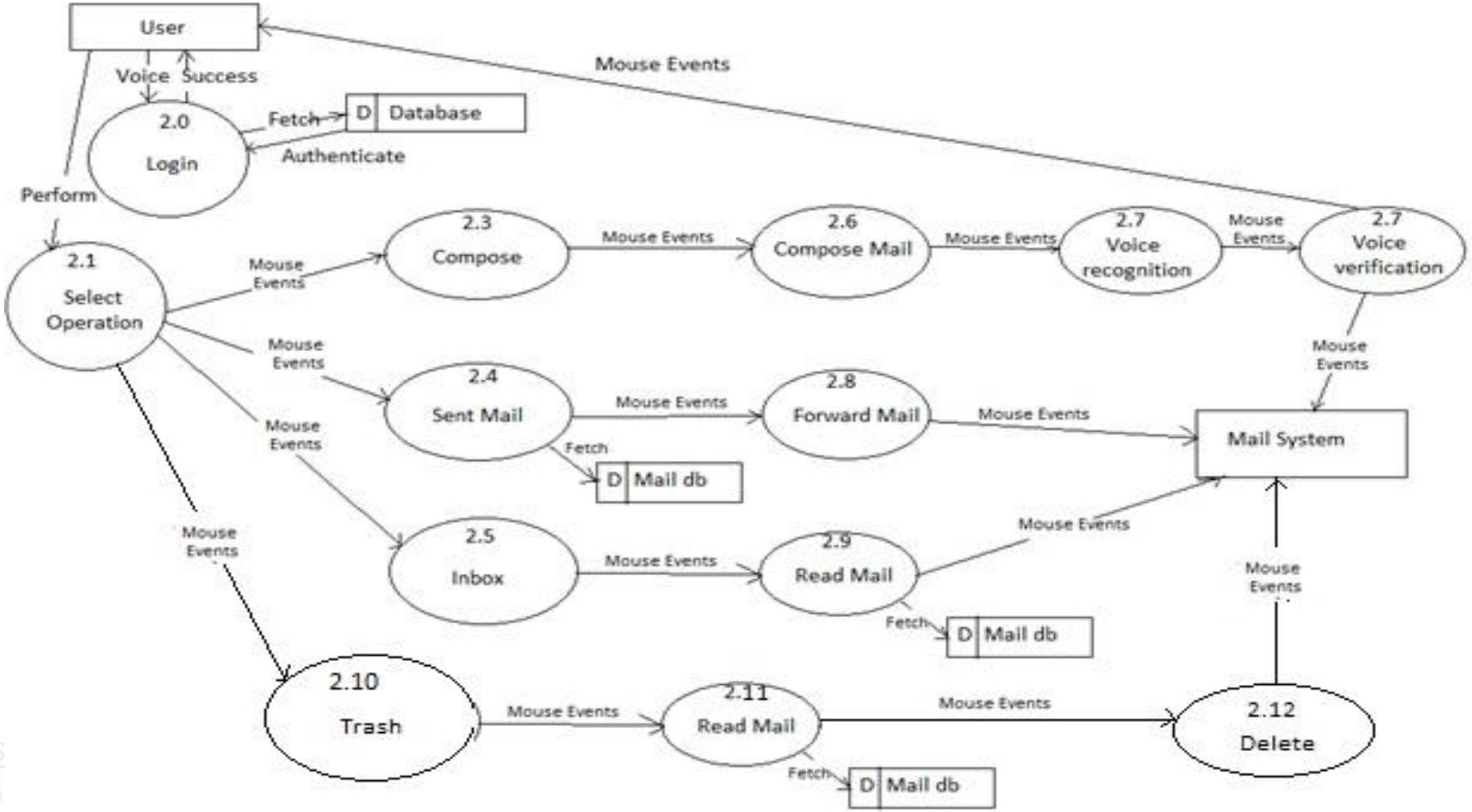
# Database Design

- A database is maintained for user validation and storing user emails.
- There are a total of five tables.
- The E-R diagram of our complete system is depicted in Fig 1.
- The Inbox, Sent-Mail and Trash schemas will store all mails of the respective service that belongs to that particular user.


U-Pswrd
U-Name
M-Id
Recipient
M
Has
1
User
1
View
M
Inbox
R-Id
R-Name
U-Id
1
I-Message
Sender-Name
T-Id
Checks
M
Clears
Trash
T-Message
Reciever-Name
Sent-Mail
S-Message
S/R-Name
S-Id

# System Design

- Fig. 2 depicts the complete system design.
- It is the level-2 data flow diagram which gives complete detailed flow of events in the system.
- All operations are performed by mouse click events only.
- At some places, voice input is required.


User
Voice
Success
Mouse Events
2.0
Login
Fetch
D
Database
Authenticate
Perform
2.1
Select Operation
Mouse Events
2.3
Compose
Mouse Events
2.6
Compose Mail
Mouse Events
2.7
Voice recognition
Mouse Events
2.7
Voice verification
Mouse Events
Mouse Events
2.4
Sent Mail
Mouse Events
2.8
Forward Mail
Mouse Events
Mail System
Fetch
D
Mail db
Mouse Events
Mouse Events
2.5
Inbox
Mouse Events
2.9
Read Mail
Mouse Events
Mouse Events
Fetch
D
Mail db
2.10
Trash
Mouse Events
2.11
Read Mail
Mouse Events
2.12
Delete
Fetch
D
Mail db

# Implementation

# User Registration/Login


- New users **register** with username and password.
- Necessary information about the user is prompted during registration.
- Username and password accepted as speech input, and validated.
- An option to **reset password** if the user forgets password.

# Home Page

User redirected to the home page upon successful login.

Options available for the user:

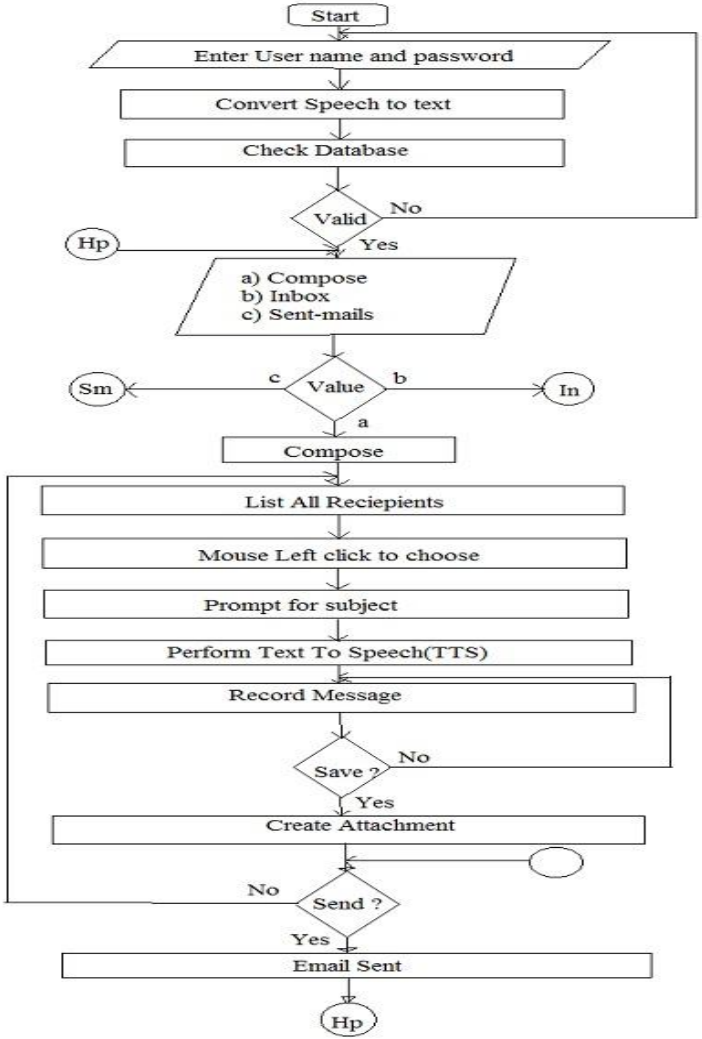
1. Inbox
2. Compose
3. Sent Mail
4. Trash

Double click is reserved for logout.

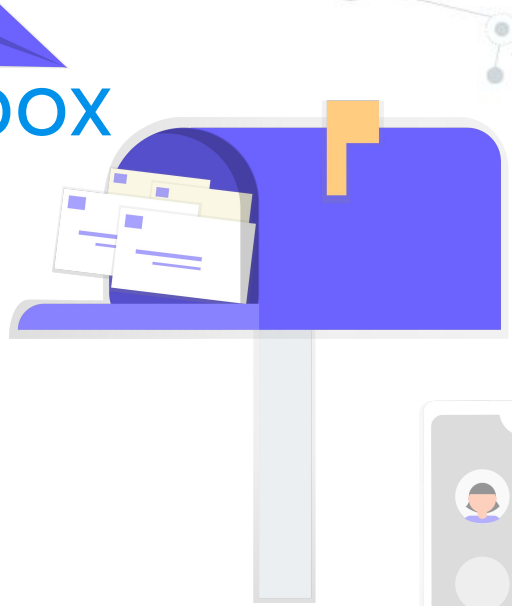
The mouse click operation that needs to be performed is prompted by the IVR.

# Compose Email

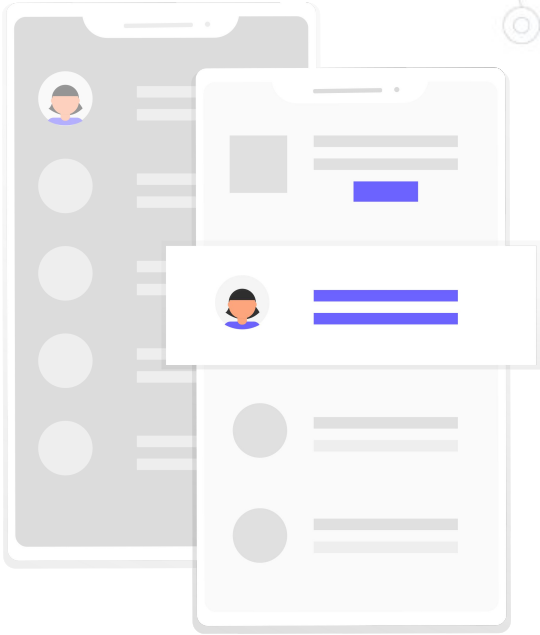
- User records a message that needs to be sent.
- The voice message goes in the form of an attachment.
- Once the message is recorded, the user hears an audio playback to verify the recording.
- The message is then sent to the intended recipient.
- The receiver downloads the attachment and plays the audio message.

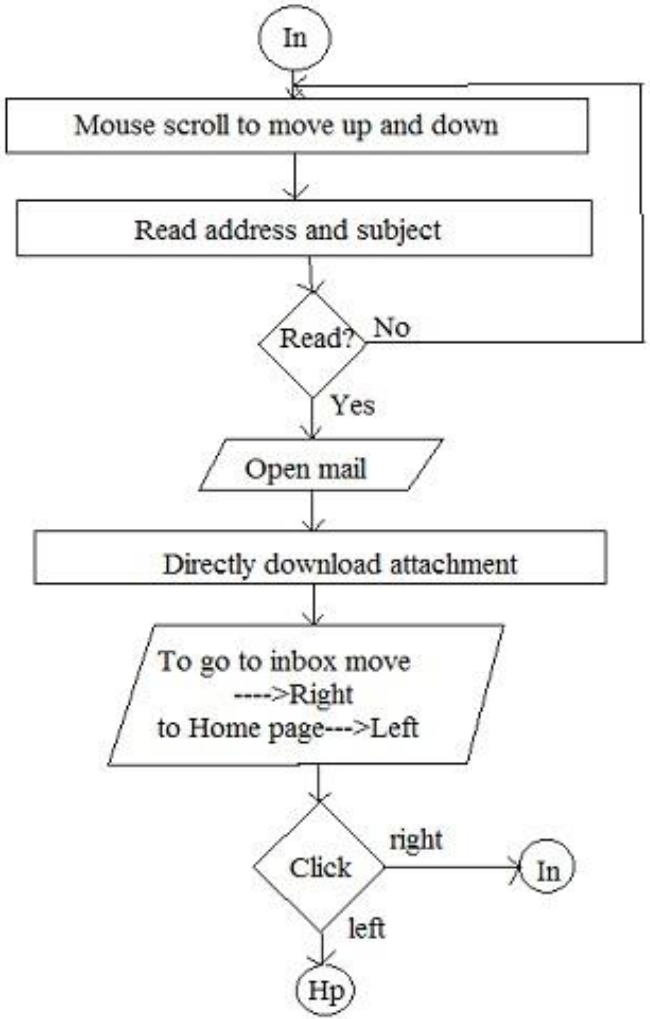

Start
Enter User name and password
Convert Speech to text
Check Database
Valid
No
Hp
Yes
a) Compose
b) Inbox
c) Sent-mails
Sm
c
Value
b
In
a
Compose
List All Reciepients
Mouse Left click to choose
Prompt for subject
Perform Text To Speech(TTS)
Record Message
Save ?
No
Yes
Create Attachment
No
Send ?
Yes
Email Sent
Hp

# Inbox



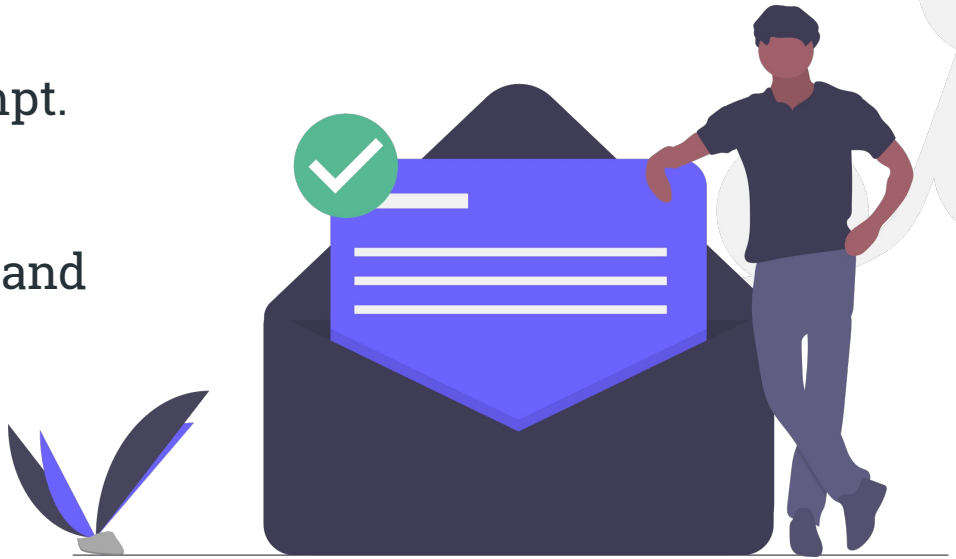
- View all emails received by the user.
- Listen to mails by performing the click operation specified by the prompt.
- Each time a mail is selected, the user will be informed about its sender and the subject.
- User can decide whether the mail needs to be read or not, or whether it should be deleted.
- Deleted mails saved in Trash.




In
Mouse scroll to move up and down
Read address and subject
Read?
No
Yes
Open mail
Directly download attachment
To go to inbox move
---->Right
to Home page--->Left
Click
right
In
left
Hp

# Sent Mails

- Keeps track of the mails sent by the user.
- In order to access the sent mails user will need to perform the actions provided by the prompt.
- When the control lands on particular mail, the user is prompted about the receiver and the subject of the mail.



# Trash

- Keeps track of all the emails deleted by the user.
- Mails can be deleted from the inbox or sent mail.
- The message can be restored if the user wishes to.

## Advantages:

- User doesn't have to use the keyboard.
- User need not worry about the mouse pointer location.
- Accessible to all types of users – visually impaired, literate, illiterate.

## Disadvantages:

- Doesn't fully eliminate the need to use the keyboard.
- Not too interactive because it's based on IVR.
- Increased latency.
- Emails are sent in the form of audio attachments; not text.

# Conclusion

- As technology improves each day, it is in our own hands to decide how to use it. .
- Voice based systems enable the visually impaired to use tech that they were unable to, while providing the rest with a means of convenience.

# References


1. “Voice-based Email System for the Blind” by T.Shabana, A.Anam, A.Rafiya, K.Aisha
2. https://en.wikipedia.org/wiki/Interactive_voice_response
3. https://www.twilio.com/learn/voice-and-video/how-ivr-works
4. https://electronics.howstuffworks.com/interactive-voice-response1.htm