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Voice Based Mail System for Visually Impaired Using AI/ML

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ABSTRACT: In today's digital world, communication tools are essential for maintaining both social and professional connections. While these technologies continue to evolve, they often remain inaccessible to individuals with visual or physical impairments. This project proposes a voice-driven email system tailored specifically for visually impaired and illiterate users, eliminating the need for keyboard usage or prior technical training.

The system functions solely on voice input and output, utilizing speech recognition to understand user commands and text-to-speech for system responses. Users can perform standard email operations through intuitive spoken instructions and minimal physical interaction, creating a user-friendly and inclusive communication experience.

Keywords : Voice Recognition, Text-to-Speech, Email System, Visually Impaired, AI and ML, Facial Authentication, NLP.

I. INTRODUCTION

This system aims to simplify communication for individuals who are blind or visually impaired by using advanced voice technologies such as Speech-to-Text (STT) and Text-to-Speech (TTS). By replacing the need for visual cues or keyboard inputs, users can send and receive emails using spoken commands and audio prompts.

Acting as a voice-activated email assistant, the system is particularly beneficial in regions like India, where many individuals face challenges due to visual disabilities or illiteracy. It allows users to interact with digital content independently, thereby enhancing their ability to connect with others and participate more fully in the digital world.

System Overview

The proposed system is designed to help visually impaired individuals use email services using voice interaction alone. By replacing traditional graphical interfaces with speech recognition and audio feedback, the system promotes accessibility and independence in digital communication. Users can perform all email-related tasks hands-free, making it ideal for those with visual limitations.

1.1 Components

- Voice Input Module: Captures spoken commands through a microphone and processes them using Google's Speech Recognition API to convert voice to text.
- Email Management Module: Handles login, inbox viewing, composing, and sending emails. It interprets user instructions through Natural Language Processing (NLP) to determine the intended action.
- Text-to-Speech Module: Converts system responses and received messages into spoken output using the pyttsx3 engine, enabling users to interact without visual support.

1.2 Functional Workflow

The stepwise functioning of the system is as follows:

- > 1.The user launches the application and completes voice-based login.
- > 2.The system provides voice prompts such as "Compose Email", "Read Inbox", or "Check Unread Messages".
- ▶ 3.The selected module is activated based on the user's spoken command.
- ▶ 4. While composing emails, users dictate messages which are confirmed via voice before sending.
- ▶ 5.The system retrieves new emails and reads them aloud to the user.
- 1.3 Technologies Used

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The system is built with the following core technologies:

- > Python: Used to implement the system's logic and control structure.
- ➢ Google Speech Recognition API: Converts audio input into textual commands.
- > Pyttsx3: Offers offline support for text-to-speech conversion.
- ▶ smtplib and imaplib: Facilitate email sending and receiving using standard email protocols.
- > NLP Techniques: Help in interpreting user commands more effectively.

II. SYSTEM ARCHITECTURE AND FUNCTIONALITY

2.1 Speech-Based Email Operations

The system allows users to carry out email tasks entirely through spoken language. Commands for composing, reading, or deleting emails are processed by a speech recognition engine, while system guidance and feedback are delivered using audio responses. This hands-free approach ensures that users can independently manage their emails without relying on a screen or keyboard.

2.2 Facial Authentication Module

To strengthen security, the system uses OpenCV and Haar Cascade classifiers for real-time facial recognition. Once a user's face is validated through the webcam, a voice confirmation is requested to complete the login. This dual-factor authentication—face and voice—adds an extra layer of protection while maintaining ease of use.

2.3 Registration and Training Process

User registration is conducted entirely through speech. Personal details are captured by voice, and facial data is collected via the webcam. This information is trained and stored to enable future logins. This process simplifies onboarding for visually impaired users.

2.4 Graphical Interface Integration

Although the core interaction is voice-driven, a simple graphical interface is included for testing and support purposes. It features accessible design elements like animations and video backgrounds to accommodate sighted users or developers during testing.

III. COMMUNICATION INTERFACE

User Communication Interfaces

These interfaces allow blind users to interact with the email system.

Voice-Based Communication

- 1. Speech-to-Text (STT): Converts speech into text for composing messages.
- 2. Text-to-Speech (TTS): Reads out emails and menu options.
- 3. Voice Commands: Used to navigate the system, such as "Read inbox" or "Send email".

Braille Interface

- 1. Braille Displays: Translate text into tactile Braille.
- 2. Braille Keyboards: Allow email typing via Braille input.

IV. SYSTEM DESIGN

The system begins with facial authentication. Once access is granted, the user gives voice commands to perform actions like composing emails or reading inbox messages. The system uses speech processing and NLP to interpret the command and provides spoken feedback accordingly.



FIGURE 1: SYSTEM ARCHITECTURE

V. EQUATIONS

VI. RESULT

87539.

native': [{'confidence': 0.88687539, 'transcript': 'Geeta'}], ': True} s:Geeta

ition.AudioData object at 0x000001C47840CC70

{'confidence': 0.72492373, 'transcript': 'one'},
{'transcript': '1'}],

'transcript': 'Geeta'}],

cript': 'singhade'}],

Read Text And O/p as a voice

FIGURE 2: OUTPUT 1

Haar Cascade Feature Calculation: $f = \sum(x,y) \in R1 I(x,y) - \sum(x,y) \in R2 I(x,y)$

Accuracy of Voice Command Recognition:

f = Haar feature value I(x,y) = Pixel intensity

Accuracy (%) = (Correct Commands / Total Commands) \times 100

R1 and R2 = Specified regions in the image

ernative': [{' al': True} e is:singhade

talk izing... 2: lternative': [

final': True} id is:one

Where:

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FIGURE 3: OUTPUT 2

🗏 附 Gmail	Q, incent	× 莊	⊙ 🕸 Ⅲ
Ø Compose			tare < >
Index Index	(no subject) getathoget/328prail.com Use Managements* Mir Bobe (*, Rpp) (* forward)		O C
Sending request			Activate Windows Go to Settings to activate Windows.

FIGURE 4: OUTPUT 3

VII. CONCLUSION AND FUTURE WORK

This voice-based mail system improves accessibility for visually impaired users by enabling full email functionality through voice interaction. By eliminating the need for visual elements, it offers a user-friendly and inclusive communication tool that enhances independence.

REFERENCES

[1] Prakash, S., Agarwal, K., Agarwal, G., & Singh, S. (n.d.). Voice Based Email System for the Visually Challenged. The study highlights improved accessibility and independence for visually impaired users by enabling voice-based email interactions.

[2] Kumar, S., Yogitha, & Aishwarya, R. B. (n.d.). Voice Email Based on SMTP for Physically Handicapped. This paper discusses a system enabling email operations via voice commands, enhancing accessibility and global appeal.
[3] Kumar, S., Malik, S., & Sharma, S. (n.d.). Voice-Based E-Mail System for Visually Challenged People. The system boosts accessibility for users with visual impairments by simplifying email operations.

[4] Tiwari, P. A., Zodewar, P., Nimkar, H. P., Rokde, T., Wanjari, P. G., & Samarth, U. (n.d.). A Review on Voicebased E-Mail System for Blind. The paper discusses voice-based email systems with potential for integration into smartphones and support for multiple languages.

[5] Baptista, N., Prior, E., & Correia, M. E. (n.d.). Telephone Interface for the Email Service. This work introduces an IVR system for email access via telephone, enhancing accessibility through features like automatic language detection



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