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Email System for Blind using Voice and Face through AI

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Abstract Abstract- Email is a widely used tool in academic, professional, and personal communication, but traditional systems rely heavily on visual interfaces, making them challenging for visually impaired users. This paper proposes an AI-based email system that enables accessible interaction through voice commands and biometric authentication. Speech recognition converts spoken instructions into actions, while text-to-speech reads incoming emails aloud. Face recognition provides secure, password-free login. By combining these technologies, the system reduces reliance on visual navigation, simplifies email management, and empowers visually impaired users to communicate independently. Experimental evaluation shows improved usability and enhanced digital accessibility.

Keywords— Artificial Intelligence, Voice Recognition, Face Recognition, Assistive Technology, Email Automation, Accessibility.

I. INTRODUCTION

Email is an essential form of digital communication used in education, business, and daily activities. However, most email platforms rely on visual interfaces, which makes them difficult for visually impaired individuals to use. Traditional systems often require visual navigation, keyboard input, and complex menus. Although screen readers and other accessibility tools exist, they may still be difficult to operate and may not always provide a convenient experience for blind users.

The Face Recognition Based Email System for Blind Users aims to improve accessibility by integrating facial recognition and voice interaction. Facial recognition is used to authenticate users without requiring passwords, while speech technologies enable users to control the system using voice commands and receive audio feedback. By combining face recognition, speech processing, and email communication in a Python-based system, the platform offers a more accessible and user-friendly email solution for visually impaired peoples.

II. LITERATURE REVIEW

Recent research has increasingly focused on integrating artificial intelligence and voice technologies to improve digital communication accessibility for visually impaired individuals. Such systems typically leverage speech processing and natural language understanding to eliminate reliance on graphical user interfaces [1], [2].

Narayanee et al. developed a voice-enabled email system that uses speech recognition and synthesis to allow visually impaired users to compose and retrieve emails through spoken commands [1]. Their implementation demonstrated that combining natural language processing with voice interfaces helps overcome visual barriers in email interaction. However, the system did not include biometric methods for secure user verification, which can be critical for privacy and security in assistive communications [1]

Agnihotri and Kaur proposed an AI-assisted email platform that enables blind users to interact with email services using spoken instructions [2]. The model employs automated conversion of speech to text and text to speech, facilitating hands-free email operations. While this solution improves interaction usability, it lacks advanced user authentication mechanisms like biometric verification and multi-factor authentication [2].

A more recent study by Pattenshatti et al. described a smart email system that incorporates structured voice prompts and audio feedback to assist visually impaired users in basic email tasks such as composing, reading, and managing messages [3]. Their focus on interactive voice response enhances ease of use, but the system stops short of integrating identity verification based on user traits such as facial features or voice signatures [3].

Ahir et al. presented a voice-based email system aimed at physically disabled people that uses AI algorithms for speech processing [4]. The study highlights improvements in speed and convenience during email composition and retrieval but also does not address the challenge of secure access control for individual users [4].

Alekhya et al. introduced an email automation framework that supports voice commands and standard email protocols for sending and receiving messages [5]. Although their system confirmed the potential of voice-driven communication engines for visually impaired users, it did not emphasize secure authentication processes or adaptive learning to interpret diverse speech patterns [5].

III. PROPOSED SYSTEM

The proposed system provides an accessible email platform for visually impaired users by combining face recognition, speech processing, and email technologies. Users are first authenticated through facial recognition, where a webcam captures their face and compares it with stored images using a deep learning model. Once verified, the system grants secure access to the email interface without requiring passwords.

After authentication, users can manage emails through voice commands. Speech recognition converts spoken instructions into text for actions like reading, composing, or sending emails, while text-to-speech reads email content and system notifications aloud. The backend handles email communication via standard protocols, and local storage manages user data and temporary files. This design ensures a secure, efficient, and user-friendly email experience for visually impaired individuals.

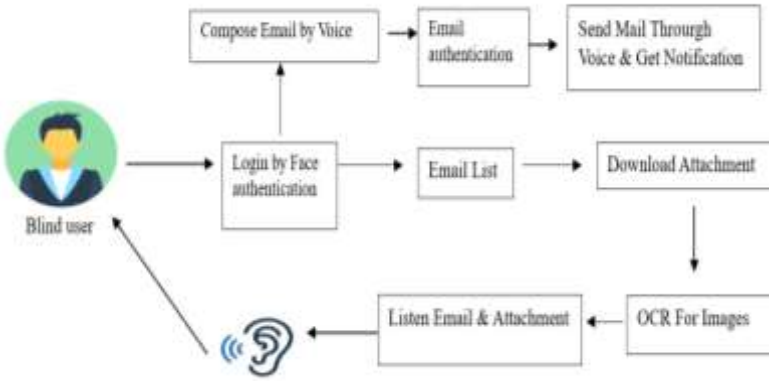

Fig. Block diagram of Email System for Blinds

IV. SYSTEM ARCHITECTURE

The system architecture of the Face Recognition Based Email System for Blind Users integrates biometric authentication, voice interaction, and email services into one platform. The process starts with a webcam capturing the user's face, which is analyzed by a face recognition module. The captured image is compared with stored images in the dataset to verify the user's identity. If a match is found, the user is granted access to the email interface, eliminating the need to enter passwords. After authentication, the system allows users to interact through voice commands. Speech recognition converts spoken instructions into text to perform tasks such as reading, composing, and sending emails. Email communication is handled using standard protocols, while a text-to-speech module converts email content into audio so the user can listen to messages. Local storage is used to maintain user data and temporary files, making the system secure, accessible, and easy for visually impaired users to use.

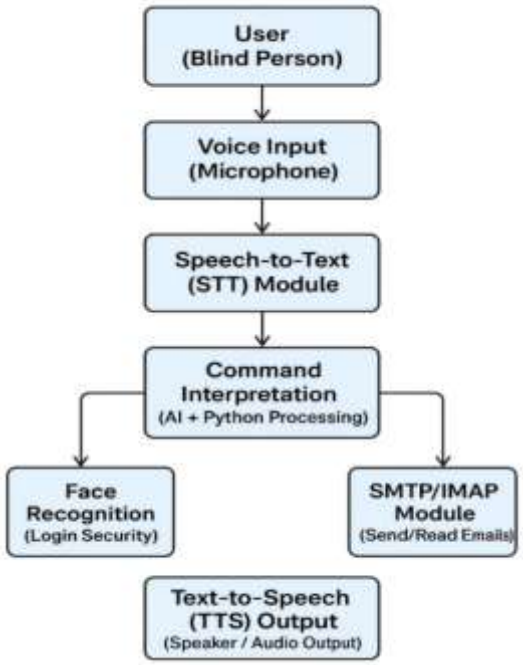

Fig.System Architecture of Email system for Blind

Table : Technology Stack Used in Email system for Blind

Layer	Technology / Toolset
Frontend	Tkinter (Python GUI)
Backend	Python (SMTP/IMAP Email Handling)
Authentication	Face Recognition (DeepFace)
Database	Local File Storage / SQLite (for user/email metadata)
File Storage	Local Storage / Email Attachments
AI Processing	Speech Recognition (Speech-to-Text), Text-to-Speech (gTTS)
Tools	Python 3.8, Spyder IDE, OpenCV, Pyglet

V. METHODOLOGY

The system begins by launchingtheapplication. The camera is activated to perform face recognition authentication. Once the user is successfully authenticated, the voice command interface becomes active.The user can speak commands such as 'compose email', 'read email', or 'send email'. The system processes the command and performs the corresponding action. Received emails are converted into speech using text-to-speech technology so the user can listen to the content

VI. IMPLEMENTATION

The proposed system is developed in Pythonusing various libraries that support artificial intelligence, computer vision, and voice-based interaction. Its main goal is to help visually impaired users access email services through voice commands and biometric authentication.

A. Face Recognition Authentication

User authentication is performed using facial recognition. A webcam captures live images, which are processed using the OpenCV library. The DeepFace framework compares the

captured face with images stored in a dataset directory. The system verifies the user only after detecting the same face multiple times consecutively, which improves accuracy and reduces the risk of incorrect identification. Once the face is successfully verified, access to the email interface is granted.

B. Voice Interaction and Audio Feedback

To assist visually impaired users, the system provides voice responses. The gTTS (Google Text-to-Speech) library converts system messages into speech. After successful authentication, a welcome message is generated and saved temporarily as an MP3 file. The Pyglet media player plays the audio, and the file is automatically deleted afterward to maintain efficiency.

C. Graphical Interface and Application Control:

The graphical interface is built using Python's Tkinter library. After authentication, the main
window opens and provides options for composing, reading, sending, and deleting emails. Multithreading is used to allow the interface and background processes to run simultaneously without slowing down the system.

D. Email Communication Process

Email communication is handled using standard protocols. SMTP is used to send emails, while IMAP retrieves messages from the email server. These protocols allow users to perform email operations through voice commands efficiently.

VII. RESULTS AND DISCUSSION

The system was tested to evaluate its performance in assisting visually impaired users with email communication. The face recognition module accurately verified registered users from the dataset, and multiple verification attempts helped improve authentication accuracy.
The voice feedback feature provided clear audio responses, allowing users to interact with the system without visual assistance. Users were able to read, compose, and send emails using voice commands, demonstrating that the system

offers an accessible email solution for visually impaired individuals.

VIII. CONCLUSION

The AI-based voice and face recognition email system provides an accessible communication platform for visually impaired users. By integrating speech recognition, text-to-speech, and biometric authentication, the system enables users to manage emails independently without visual interaction. This research demonstrates how artificial intelligence can be used to improve digital accessibility and create inclusive technology solutions for individuals with disabilities

XIII. FUTURE SCOPE

Future improvements may include:

1. Support for multiple languages can be added to improve accessibility for users from different regions.
2. A mobile version of the system can be developed for smartphones and tablets.
3. Advanced natural language processing techniques can be implemented to improve voice command understanding.
4. The system can be extended to support email attachments and file sharing through voice commands.
5. Image recognition technology may be integrated to describe visual content within email attachments for visually impaired users

IX. REFERENCES

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