

Voice Based Email System for People with Visual Impairment

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ABSTRACT: One of the most essential privileges for daily life is access to the internet. Everyone uses the internet for facts and information. Communication has gotten much easier in today's society as a result of the integration of communication technologies with the internet. Visually impaired persons, on the other hand, find it extremely difficult to use this technology because it requires visual perception. Despite the fact that many new advancements have been implemented to assist them in using computers more effectively, no naive user who is visually challenged can use this technology as effectively as a normal naive user because, unlike normal users, they require some practice in using the available technologies. This study discusses the structural design of a voice-mail system that may be utilized by a blind person to readily retrieve E-mails. This strategy allows them to communicate easily and generates a lot of stronger and independent workers. The system will not allow the user to utilise the keyboard or keypad, instead relying solely on clicks, swipes, and motions, as well as speech to text conversion. The involvement of research is assisting blind people in sending and receiving voice-based mail messages in their native language via a mobile phone. This framework will be beneficial to people who have other limitations in addition to being visually impaired.

Keywords: Blind Peoples, Text to Speech, Voice Interactive System, Gestures, Speech Recognition

I. INTRODUCTION

We can argue that every business can be carried out [1] with high precision and efficiency for a long period of time because technology is advancing extremely quickly, day by day, that is the complete life of the people, that light. With the advancement of technology, the existing linkages in the areas have reached a new level. Computers, smart phones [2,] and tablets, as well as internet technologies, are becoming increasingly affordable and accessible to the general public. As a result, they are no longer just technologies, but have become an integral part of our everyday life. The people that live in this virtual environment come from all walks of life [3], each with their own set of wants and a variety of options to choose from. The Internet has made communication so simple in our era that anyone can readily converse [4], and distance is only a marginal distribution of communication. We must consider Internet communication; the first thought that springs to mind is talking with them via email. The mail is regarded the most dependable means to transmit [5] vital information and an email, and it is used all over the world, but an individual must be able to see in order to have access to the Internet. Given that about 295 million individuals globally are projected to be visually impaired, it is vital to make internet communication tools accessible to them as well. Millions of blind and visually challenged people can't see the screen [6], so if your keyboard

doesn't have internet connectivity, you might have to.

As a result, we've devised this project in which we'll create a voice-based email system that will allow visually impaired persons who aren't familiar with computers to utilize email without difficulty. This system's users would not need to know any basic information about keyboard shortcuts or where the keys are placed. All features are based on simple mouse click actions, making this system incredibly simple to use for any sort of user. Furthermore, the user will not have to remember which mouse click operation he or she must conduct in order to access a specific service because the system would prompt them as to which click will supply them with which operations. This technology intends to provide an email system that will allow even visually challenged people to use [8] communication services. The system is entirely based on interactive voice [2] response, making it extremely user-friendly and productive. The main advantage of this programme is that it eliminates the need for a keyboard; instead, the user will have to rely solely on voice and touchpad to react. As a result, we developed a voice-based email system for blind individuals, which will greatly assist visually [9] impaired and illiterate people in sending emails.

II. RELATED WORK

We present a full analysis of the literature on the existing technical challenges in this part. The goal of this paper [10] is to create a search engine that only allows voice-based Man-Machine interaction. The introduction of a revolutionary Voice-based Search Engine and Web-page Reader that allows users to command and operate the web browser using their voice. Existing Search Engines receive text requests from users and reply by obtaining relevant documents from the server and displaying them in text format. The authors of paper [11] proposed an email system that is simple to use for visually challenged people. TTS (Text-to-Speech) module, STT (Speech-to-text) module, and Mail Programming Module (Compose, Inbox, and Sent Mail) module make up the system design. Speech-to-text is performed in this system using Artificial Intelligence (AI) via an API involving neural network models given by Google Cloud Speech-to-text to developers. Furthermore, it converts passwords or other credentials into hash functions using various Hashing Algorithms (MD5, SHA) [12], resulting in stronger security than previous systems. The internet has become one of the most important aspects of modern life. Every human being uses the internet to gain access to

knowledge and information [13]. However, blind persons have difficulty reading these text materials, as well as using any internet-based service. The evolution of computer-based accessible technologies has provided many opportunities for the visually impaired all over the world. It's a blind-friendly software architecture that integrates email and MMS messaging features into the operating system [14]. Voice instructions and a mouse can be used to create a graphical user interface design, but the keyboard is required. RSS feeds are also used in conjunction with email to deliver a list of headlines, as well as notifications of new products and services. In addition, we have developed an application for you. Other apps, in addition to email, can be accessed with a voice command. The research project focuses on the development [15] and implementation of a speech recognition device for visually impaired people utilizing the Raspberry Pi.

The number of blind people is rapidly increasing, so the research's main goal is to develop a simple, inexpensive, user-friendly, and compact device that allows visually impaired people to use multimedia applications of operating systems such as text, music player, and dialing system by integrating a GSM module. All of the aforementioned features are included on a low-cost Raspberry Pi board. At the period, [16], one of the e-systems that is easily accessible to the blind is proposed.

You can use the Viterbi method, as well as the voice-to-text and text-to-speech converters. The computational rule that works with the technology does not determine it to be the most acceptable word; yet, as soon as the user says it, it is spoken as your guessed word for a particular word. The user creates an account on the site that they are visiting for the first time. This system will mitigate some of the present system's drawbacks. Sorry, but the Viterbi algorithm's efficiency in reducing the number of errors will increase, requiring more space.

A solution for the blind and illiterate to better their interaction with the email system is proposed in [17]. This technique eliminates the need for screen readers and Braille keyboards while using IVR technology. Speech-to-text and text-to-speech conversions were utilised there. Voice instructions are also employed for a variety of different tasks. Your identity, email address, and password can all be used to register. This is the ability to use the function that instructs PHP to send an email. This is the email library from which you can send an email. The IMAP server is used to retrieve the user's email. To find email collection

boxes, the Lash-Morris-Pratt algorithm is employed. As a result, the system's environment is clean, and each phase is voice-controlled by a feedback mechanism. In contrast to the pre-existing email system, the document [18] suggests a system that is based on a system with a voice command. In essence, the entire system is predicated on turning numbers to words. Once activated, the system will prompt the user to voice commands in order to access the appropriate services. It is vital to declare that this command will work if the user wishes to access the appropriate services. This software makes advantage of the IMAP protocol (Internet Message Access Protocol). This is a standard Internet protocol for sending emails from a mail server over TCP / IP [19]. From the start of the year, the major form of activity, the screen, will be the first screen displayed. The device will begin to hear your voice commands after the user presses a single button on this screen.

III. EXISTING PROBLEM

Globally, there are about 3.9 billion email users. This year, the number of email users surpassed 3.9 billion [20], indicating that email is now used by more than half of the world's population. The number of email users is expected to reach 4 billion by 2020. As a result, emails are the most often used mode of communication. Visually impaired people are unable to use the most common postal services that we use on a daily basis. This is due to the fact that they do not provide any means for a person in front of the screen to hear the content. They can't tell where to click to complete the essential procedures because they can't see what's already on the screen.

Even if it is user friendly, using a computer for the first time is not as convenient for a visually impaired person as it is for a typical user. Despite the fact that there are numerous screen readers available, these individuals nonetheless experience some minor challenges. Screen readers read whatever is on the screen, and to conduct certain activities, the user must use keyboard shortcuts because the screen reader cannot track the location

of the mouse [21]. This entails two things, first the user cannot use the mouse pointer since it is inconvenient if the location of the pointer cannot be traced, and second, the user should be familiar with the keyboard and know where each key is situated.

IV. REQUIREMENT

The input/output in this software is in the form of forms, speech, and gestures. The data is saved in tables in a database, which is where the storage process takes place. The computation is done via queries, APIs, and procedures that are designed to take as little time as possible. The user will initially register with the system so that he or she can log in later, similar to how a naive person would do with an existing gmail account. After successfully registering and logging in, the user will be sent to the main menu, which includes operations like as compose, inbox, and trash. After selecting a specific operation, the user will finish the operation by performing the related activities. Finally, the API will conduct tasks by connecting to Google's email account. The data flow diagram depicts the flow of a set of data in accordance with a specific information system paradigm. It's used to sketch out a data system's design and structure without providing processing time alternatives in order, such as yes or no choices in traditional flow chat time.

4.1 Use Case

A use case is a description of how project users will complete tasks [22]. A use case is a description of a series of interactions between a user and a project that does not include the user interface depicted in figure 1. A use case is made up of two parts, the steps a user will take to complete a certain project assignment; and how the project should react to a user's activities. A use case begins with a user's aim and ends with the achievement of that goal. A use case diagram depicts the relationship between actor and use case graphically. A user or another system that will interact with the system you're modeling is represented by an actor in a use case.

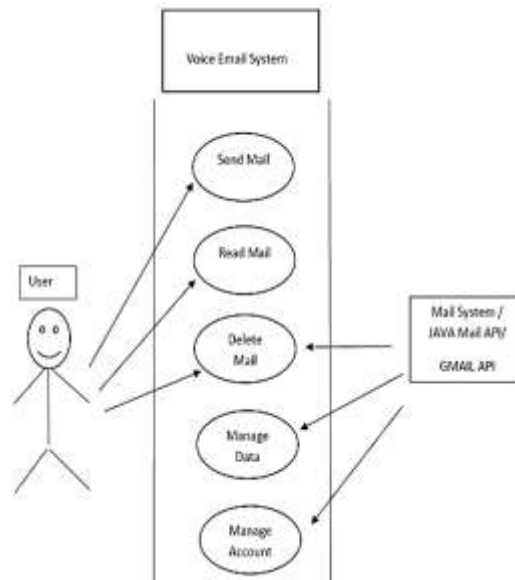


Figure 1 The Use Case

V. PROPOSED METHODOLOGY

Because using this technology necessitates visual perception, it is extremely difficult for visually impaired persons to use it. However, not everyone has access to the internet. This is due to the fact that in order to access the internet, you must understand what is displayed on the screen. It's pointless if it's not visible. As a result, the internet is entirely worthless for the visually challenged and illiterate. The Java Mail API is a framework for developing mail and messaging applications that is platform and protocol agnostic. The JavaMail API is a collection of abstract classes that define the items that make up a mail system. It is a standard extension that allows you to read, compose, and send electronic communications. System components and interfaces are provided by Java Mail, which are used to provide an interface to a messaging system. Java Mail includes various classes that implement RFC822 and MIME Internet communications standards [24], despite the fact that this specification does not specify any specific implementation. These classes are included in the

Java Mail package of classes. The most common method for receiving email on the Internet is POP. It specifies that each user has only one mailbox. This protocol is defined by RFC 1939. It is an advanced protocol for receiving messages. It provides support for multiple mailbox for each user, in addition to, mailbox can be shared by multiple users. It is defined in RFC 2060.

It isn't a protocol for sending and receiving emails. Rather, it specifies the content of what is transferred, such as message format, attachments, and so on. RFC 822, RFC 2045, RFC 2046, and RFC 2047 are only a few of the documents that apply here. You normally don't have to bother about these formats if you utilise the Java Mail API. These formats, on the other hand, do exist and are utilised by your programmes. Third-party service providers offer a variety of protocols. Network News Transfer Protocol (NNTP) [25], Secure Multipurpose Internet Mail Extensions (S/MIME), and others are among them. The architecture of Java Mail is illustrated in the following diagram.

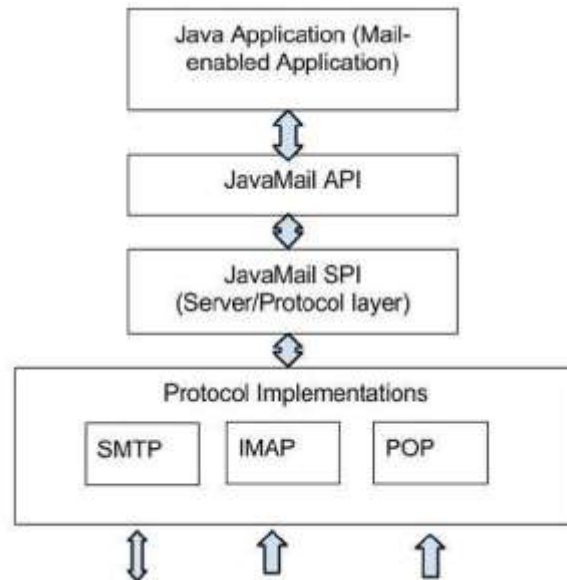


Figure 2The Architecture of Java Mail

The Document Object Model (DOM) is an API that allows you to navigate a document as if it were a tree of node objects representing its contents. A parser can construct a DOM document, or users can manually create one (with limitations).

Implementations provide their own programming language-specific bindings for data types in DOM nodes, which are abstract. Because the complete document must be imported into memory and built as a tree of objects before access is allowed, DOM implementations are memory expensive. Android Studio is an IntelliJ IDEA-based Android programming environment. Android Studio provides integrated Android developer tools for programming and debugging, similar to Eclipse with the ADT Plugin [27]. A sophisticated code editor, capable of advanced code completion, refactoring, and code analysis, lies at the heart of Android Studio. Blue Stacks is a technology business based in the United States that makes the BlueStacks App Player and other cloud-based cross-platform apps. The BlueStacks App Player is a programme that lets you run Android apps on PCs running Microsoft Windows or Apple's MacOS. This is owing to the burgeoning app world for smartphone users, which is expanding on a

daily basis. It's no secret that Android, Google's operating system, is the most popular mobile platform. There are other platforms that compete with Android, such as iOS and Windows. However, nothing beats Android in terms of worldwide compatibility. It is now the world's most compatible platform. Another aspect contributing to the success of the Android operating system is the fact that the majority of the apps made for it are free to download.

VI. RESULTS AND DISCUSSION

A login page consists of a Login form where the user can enter his or her credentials to log into the Mail system. Figure 3 shows a registration form, which is a series of fields into which a user will enter data and submit to a mail system. There are a variety of reasons why you might want someone to complete a registration form. The customers [28] sign up for subscriptions, services, or other programmes or plans using registration forms. We can see an example of our app's registration screen, where the user enters information such as his Gmail account and password.

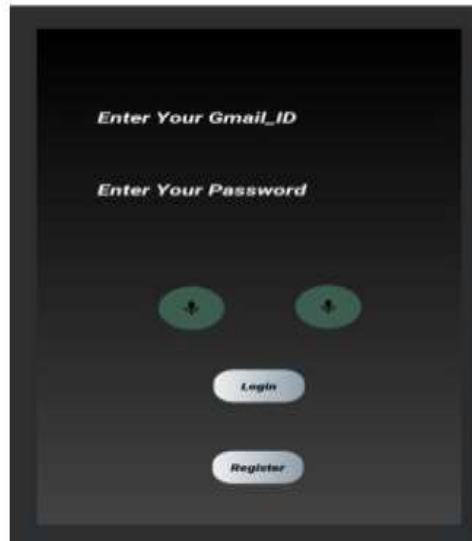


Figure 3The Registration Form



Figure 4The Menu Page

HereThe user will choose which task he or she wants to complete, as indicated in figure 4.This is the screen where the user specifies which user he or she wishes to send email to, as seen in figure 5.The goal of this project is to improve society.

This project intends to assist visually impaired persons in participating in the rising digital India by using the internet [29] and to make

their lives easier. Furthermore, the project's success will push developers to create something more beneficial for visually challenged or illiterate people, who, like everyone else, deserve an equal footing in society[30].This e-mail system can be used by any user of any age group with ease of access.



Figure 5 The Compose Page

VII. CONCLUSION

In this study, we suggest a solution that will assist visually challenged people in easily accessing email services. This approach will assist blind persons in overcoming some of the challenges they previously had in accessing emails. We've done away with keyboard shortcuts in favour of screen readers, which will help reduce the cognitive strain of knowing keyboard shortcuts. Furthermore, any naive user who is unfamiliar with the location of keys on the keyboard need not be concerned, as keyboard usage is no longer required. To obtain the services supplied, the user simply needs to follow the directions provided by the IVR and make appropriate mouse clicks. Aside from that, the user may be required to provide information via voice inputs when required. It has been estimated that India is home to over 70% of the world's total blind population. This paper describes the voice mail architecture used by blind individuals to simply and efficiently use E-mail and multimedia functionalities of the operating system. This architecture will help lessen the cognitive load that blind people must bear when remembering and typing characters on a keyboard. It also aids the crippled and illiterate.

VIII. FUTURE SCOPE

E-mailing isn't a significant difficulty for those who can see, but it's a major concern for those who don't have the gift of sight because it intersects with so many job obligations. This voice-

based email system is useful for blind individuals since it allows them to comprehend where they are. For example, whenever the cursor travels over the Register icon on the page, it will sound like "Register Button." There are a plethora of screen readers to choose from. People, on the other hand, have to recall mouse clicks. Rather, because the mouse cursor will read out where he or she is, this project will alleviate the difficulty. This method places a greater emphasis on user friendliness for all types of users, including typical people, visually impaired people, and illiterates. It can be expanded to read certain emails. Marking emails as read or unread, as well as all of the other features that comes standard with the Gmail service.

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