Virtual Assistant For The Visually Blind People

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Abstract— In this research work, we address the critical challenges faced by visually impaired individuals by proposing a virtual assistant to assist them in their daily lives. This innovative system incorporates speech recognition and navigation capabilities, as well as data retrieval functionalities. Users can interact with the assistant using natural English voice commands, enabling access to real-time information. Through the utilization of Python's versatility and extensive libraries, our objective is to enhance the independence and overall quality of life for visually impaired individuals by providing them with a dependable and accessible virtual companion. The project, titled "Virtual Assistance for Visually Impaired Individuals in Python," seeks to develop software that strengthens the visually impaired community by offering a virtual assistant capable of aiding them in various daily tasks. This system leverages the power of Python and various technologies to facilitate connectivity to the digital world, including website access, thereby improving their quality of life and communication abilities.

Keywords— Visually blind people; Voice commands; Voice access website; blind people; voice emails; virtual world;

I. INTRODUCTION

The progress in the field artificial intelligence and machine learning has given hike to various virtual assistants such as Siri in MAC os, Google Assistant, MS Cortona, etc., Even if there are advancements there is very limited implementation for the blind people. The aim of this project is to help the blind people in various day to day activities such as –email access, using Wikipedia, knowing time, information whether, and allowing them to give input through voice and communicating with the others with the help of email sending.

The "Virtual Assistant for Visually Blind People" is an exciting and modern Python project designed to improve the daily lives of people with visual limitations. This project supports the power of modern technology, including speech recognition, NLP natural language processing, and machine learning, to create a virtual assistant that provides assistance for the visually impaired community.

This project aims to bridge the accessibility breach by developing a relevant virtual assistant that can help users with tasks such as reading text, hearing music, navigating menus options, and providing information on a wide range of topics using Wikipedia. In a world of technology, the "Virtual Assistant for Visually blind people" represents a evolving Python project with a great social impact. Visual limitations, should not be a obstacle to accessing information, interacting with any system, and achieving kind of independence. This unique virtual assistant project is a symbol of the principle of inclusive, designed to help individuals with visual blindness and offer them new opportunities for automation and accessibility.

Living with visual blindness can be an awful journey, as it often involving navigating a mainly visual world through alternative way. Tasks that many take for unquestionable, such as reading text, writing emails, or data retrieval using Wikipedia, can be a critical challenge for those who have limited or no sight. The Virtual Assistant for Visually Blind People seeks to provide a technologically advance solution that assists, informs, and empowers users in numerous aspects of their daily lives.

Figure. 1: Virtual Assistant Concept

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II. LITERATURE SURVEY

A research work by **Vinayak Iyer titled** as 'virtual Assistant For The Visually Impaired'expresses that an application has been developed that operates through voice commands provided by the user. Upon starting up the computer, users engage with a main menu displaying various web modules, each designed for specific tasks. These modules possess both Text-to-Speech (TTS) and Speech-to-Text (STT) capabilities. A confirmation beep is emitted each time the system recognizes speech input. Additionally, the system repeats any voice commands for confirmation. The application offers three modules: Google, Email, and Wikipedia. **[1]** In an academic paper authored by Md. Rakibuz Sultan, an application dubbed ABYS (Always By Your Side) was crafted specifically to aid visually impaired individuals. ABYS functions by receiving verbal instructions via a microphone, which are subsequently processed by a Speech Recognition Engine (SRE) to transform spoken language into text. The resulting text output is then channeled to a Core Processing Module (CPM), which acts as the central component of the project, parsing the input and triggering the appropriate module for execution. Ultimately, the synthesized speech synthesizer is utilized to present the output.**[2]**. In a work published by the author A. Karthik, the project involves the utilization of a digital camera to capture and interpret textual information or messages. Employing a one-dimensional signal system, the image is scanned both vertically and horizontally to locate the appropriate area for Optical Character Recognition (OCR) processing. Once the text is recognized, it undergoes conversion into audio format for presentation. **[3].** in an article authored by Prince Bose, their project employs speech recognition to transform spoken words into written text. This text is then forwarded to a central processor, which assesses the command's characteristics and invokes the appropriate script accordingly. **[4].** A work proposed by **Isshita Borkar, Prof. Asma Shaikh**, titled as 'Virtual Assistant for the Blind' aims to develop a device, called SMART GLASSES, that serves as a personal assistant for visually impaired individuals by utilizing object recognition, image processing, and text-to-speech conversion technologies. The device uses the You Only Look Once (YOLO) algorithm for object detection and synthesizes voice announcements to provide information about objects at a specific distance. The system combines various technologies to reduce the challenges faced by blind people in self- navigation and object recognition. **[5].** An article published titled as 'Intelligent Assistance System for Visually Impaired/Blind People (ISVB)' proposes an Intelligent Assistance System for Visually Impaired People (ISVB) consisting of a smart cap, a 3D-printed intelligent cane, and a mobile application. The system utilizes a Raspberry Pi and camera module for obstacle detection, multiple sensors and a Bluetooth module for analyzing the surrounding environment, and provides virtual navigation for visually impaired individuals **[6].** IEEE paper titled as 'Speech-Based Virtual Travel Assistant for Visually Impaired' by **N. Sripriya, S. Poornima, S. Mohanavalli** proposes the development of a speech-based virtual travel assistant to aid visually-impaired individuals and enhance tourism experiences. Utilizing speech recognition, synthesis, and natural language techniques, the bot acts as a virtual tour guide, offering information about places and aiding users in exploration. With efficient dialogue management and user interaction, the bot aims to provide a seamless and accessible travel experience while reducing reliance on textual interfaces. **[7].** IEEE paper titled as 'Smart Assistant for Visually Impaired People' by **Jahnavi Sidda, Kalyani Manda** aimed to develop a wearable framework to aid visually impaired individuals in daily tasks by detecting obstacles and classifying scenes. Utilizing ESP32 Micro-controller, Camera, and sensors mounted on a stick, the system tracks the user's live location and provides guidance by detecting obstacles. The proposed framework offers a modest, secure, and versatile solution to enhance the independence and safety of visually Impaired individuals in their daily routines **[8].** An article titled as 'Guardian - Smart Assistant Tool for Visually Impaired People' presents a tool consisting of a pair of spectacles with an inbuilt camera that is integrated with a mobile application to aid the visually impaired community. The tool uses an inbuilt camera to capture images of text, objects, or people, which are then detected, analyzed & recognized. The tool converts the captured information into speech using Google TTS engine and provides the output to the user through headphones. The tool utilizes Tesseract OCR, YOLO algorithm, and TensorFlow models for different features. This tool aims to mitigate the frustration faced by visually impaired individuals in performing daily activities without assistance from another person. **[9].** A work by **Amal C. Saji** titled as A Virtual Assistant for the Visually Impaired states that a voice-enabled virtual assistant system to assist visually impaired individuals in finding objects within a room, combining technologies such as Object Detection, Natural Language Processing, and Cloud Computing**[10].**

III. SYSTEM OVERVIEW AND DESIGN

Every time when the application is run the user is asked with all the available services. User will give the command with the help of voice. The system detects the command and user will be navigated to that particular module. Again user is asked what to do which user will give the command. For email module the user is logged in to his account with the help of credentials and user is navigated to email module and once said logout the user logs out from email module and redirected to the home page

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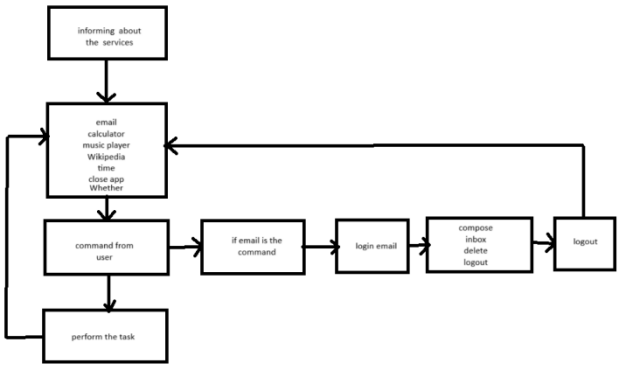

Figure 2: System Architecture

IV. METHODOLOGY

Method 1: Informing About All The Services

Design and implement a page that notifies the user about the application by informing what services are provided.

Method 2: Designing Email Login System:

Develop a module allowing users to login into their email account with the help of their credentials.

Method 3: Data Processing and Analysis:

Design methods for accepting the user input, processing on the collected data, and voice- based menu access and tasks. Integrate tools or APIs for the applications that support the project.

Method 4: User Interface Development:

Create the Simple User Interface for the project which should be easily understood to any user.

Method 5: Design App Closing Facility

Integrate the functionality to close the app based on the input voice command.

Method 6: Design Time Module

Integrate the functionality to tell the user the current time based while accessing any module.

V. RESULTS

The development and implementation of project "Virtual Assistant for Visually Blind People" project have generated several satisfying results. These results represent the success of the project's goals and functionalities. Here are some key results:

Speech Recognition and Natural Language Processing (NLP):

• The virtual assistant successfully recognizes user speech and converts it into text which is given as input to the system.

• NLP algorithms analyze user commands, and respond accordingly.

Text-to-Speech (TTS) integration:

• The TTS system converts digital text into human like speech which, reads various types of content.

Voice Commands and Accessibility:

• The virtual assistant gives a user-friendly voice command interface, making it easy to use.

• It can be deployed on various devices, including smartphones and wearable technology or as a website.

Real time information access:

• The virtual assistant offers a users with real time data access with the help of Wikipedia and timings.

Figure 3: GUI for Email Service

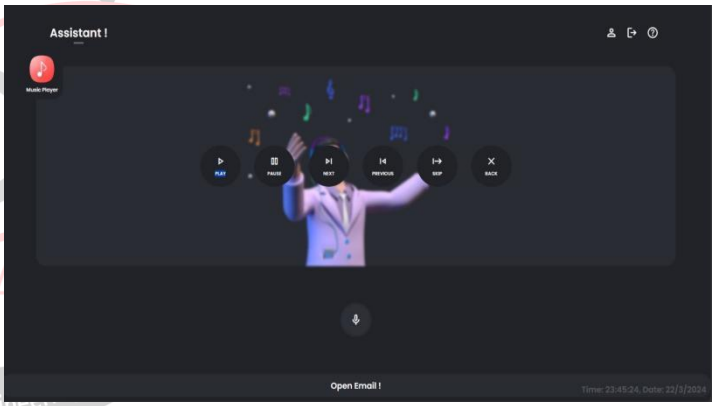

Figure 4 : Music Player Service

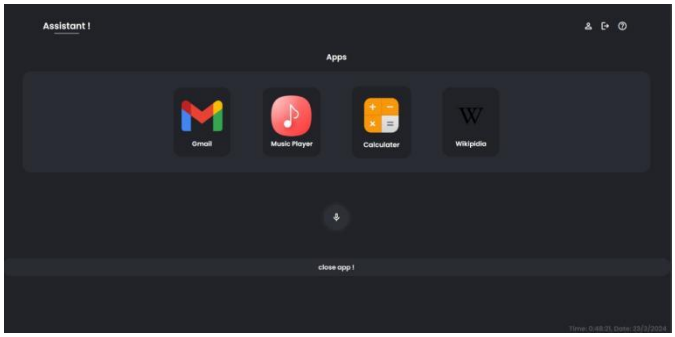

Figure 5: GUI For Email Service

VI. APPLICATION

The Virtual Assistant for visually blind people serves as a vital support system for those with visual limitations, enabling them to access email across various browsers, as the project is browser independent. Through speech interaction,

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users can navigate the internet and browse websites using voice commands. The software speaks the contents of their email inbox, enhancing accessibility. This feature not only is beneficial for visually blind people but also simplifies internet usage for others, facilitating email reading and reducing human errors. Essentially, this project empowers visually blind people to access email effortlessly, similar to non-blind individuals, but through voice commands, thus saving time and effort. Additionally, users can utilize voice commands to access Wikipedia, a music player, weather forecasting tools, and perform calculations.

The **Advantage** of using this assistant for the blind people is that they can now interact with the digital world. There is no need to ask for the information to others. They can access emails, Wikipedia can listen music on their own.

VII. CONCLUSION

This paper presents a modular solution aimed at enhancing web-based accessibility for individuals with blindness. The virtual assistant is designed to be operating system independent. Through speech-to-text and text-to-speech interfaces, users can effortlessly communicate with the system. The paper outlines the system's design, with the methodology for the email module currently in the implementation phase. The virtual assistant offers a simplified means for blind individuals to access various website services. It eliminates the need for users to remember complex keyboard commands or be dependent on screen readers. This assistant serves as an effective method for interacting with websites.

VIII. FUTURE ENHANCEMENT

Presently, the application solely responds to commands in the English language. However, there is potential for future enhancements by introducing various language options. Additionally, the project has the capability to integrate numerous web modules such as Facebook, YouTube, and others. Moreover, to facilitate the operation of the application, an OK assistant-like module can be integrated.

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