

Original Article

Gypsy: AI-Powered Virtual Assistant for Windows OS

Madushan V.P.T¹, Gunasekara S.V.S¹, Fernando B¹

¹Department of Information Technology, CINEC Campus
t.madushan.1997@gmail.com

ABSTRACT

The proposed virtual assistant software, powered by AI, is specifically crafted for users operating Windows computers to enhance the efficiency and safety of their tasks with minimal input. This innovative design allows users to swiftly and effortlessly accomplish various everyday computer-based activities. Examples include streamlined online ordering, accessing desktop and web applications, conducting web searches, setting reminders, obtaining live directions, reading notes, checking weather forecasts, translating words, performing mathematical calculations, setting alarms, receiving the latest news, and sending emails and WhatsApp messages, among other functionalities. Furthermore, the project incorporates the ability to recognize both voice and text input commands. Users can interact with the system through voice commands captured by the computer's microphone, which are then converted into text output. This conversion facilitates the system in comprehending the input and executing the requested task. The tool is seamlessly integrated with the Internet and the Windows operating system, ensuring the delivery of the desired functions and results in response to user queries.

Index Terms- *Artificial Intelligence, Natural Language Processing, Speech Recognition, Context-aware Computing, Deep Learning, Virtual Assistant*

INTRODUCTION

There is a growing utilization of Artificial Intelligence (AI) technology that mimics human engagement with machines. This technology enables interaction with systems through various means, including voice, communication, and body or facial expressions. It facilitates smoother and

more effortless completion of tasks when humans engage with computers, telephones, and other electronic devices. The modern concept of virtual assistant software is based on the same AI technology. It learns to engage with people by becoming their personalized Assistant by studying their activities, routines, and behaviors. Famous examples of virtual assistant software in the modern era of technology include Google Assistant, Microsoft Cortana, Amazon Alexa, and Apple Siri. They facilitate using it, including web browsing, phone calls, opening programs, setting reminders, etc.

I. RELATED WORK

A. *Initial Research on Software Implementations Made for the Virtual Assistants*

Abishek Narayanan's exploration of "Virtual Personal Assistant" delves into the foundational techniques employed by context-aware computing using MFCC and NLP. To enhance spoken word accuracy, the programme integrates neural network-based speech recognition with machine learning-based lip movement detection. The four components that make up this system are voice input, detection, deduction, execution, and output [1]. Using machine learning and artificial intelligence, [2] discussed in "Virtual Personal Assistant with Facial Recognition Login System." The key objective is to provide a secure two-phase login process. In the first stage, a simple username and password login is utilized, and in the second, user-specific facial detection logic is applied. Also, it offers real-time weather updates, news, a to-do list, a search, and some entertaining movie trailers.

[3] An effort has been made to develop an intelligent voice-driven virtual personal assistant utilizing Python. This assistant empowers users to retrieve information, control devices through voice

commands, and execute desktop operations. The key components include the speech recognition module, the Python backend, API calls, and context extraction. Additionally, it encompasses features such as to-do lists, calendar events, file management, and email organization.

Manasa Sri Vardhan Kottamasu and C. K. Gomathy detailed the process of constructing a Python-based voice-enabled personal assistant for PCs. The system makes use of APIs for a variety of tasks, including calculations and retrieving news quotations from websites. Moreover, users can interact with the API to obtain specific outputs and send requests. This personal assistant enables users to pose questions in a conversational manner, with capabilities such as opening apps, reading news, taking notes, and performing Google searches. [4].

[5] the proposal introduces the "Voice Assistant" tool developed with Python, artificial intelligence, and natural language processing speech recognition techniques. The model employs three distinct working modes: supervised learning, unsupervised learning, and reinforcement learning. Integrating of natural language processing, machine learning, and deep learning concepts plays a crucial role in accomplishing various tasks. Moreover, this assistant boasts functionalities such as sending emails, web searches, setting alarms, providing weather updates, and replaying YouTube videos.

B. Commercial Research on Software Implementations Made for the Virtual Assistant

This is a list of the top five widely used and well-known apps that are similar to one another:

Google Assistant - Google introduced this widely-used AI-driven virtual assistant software in 2016. Users commonly interact with the Google Assistant through natural speech. The Assistant can facilitate changes to the hardware settings of the user's device, provide answers to hardware-related queries, display information from the user's Google account, and offer additional functionalities. This tool predominantly operates with Cloud APIs developed by Google. This study explores the utilization of Google Cloud APIs, including the Speech-to-text API, Translation API, Geolocation API, Weather

API, and more. Mobile and smart home devices are where it is mainly available. Accessibility is one of Google's strengths. You may use it in your car, phone, speaker, watch, laptop, or TV. It can link to regularly used products or applications like Netflix, YouTube, and Spotify [6].

Apple Siri - For virtual assistants that leverage AI technology, it is yet another excellent research tool. Voice queries, gesture-based control, focus-tracking, and a user interface in natural language are all used to direct requests to different Internet services can provide answers, make recommendations, and complete tasks. Advanced machine learning methods, such as compressed neural networks and long-term memory, are used by the voice recognition system [6].

Microsoft Cortana- Microsoft developed this well-known virtual assistant application in 2014. The name Cortana is derived from a video game character from Microsoft's Halo. For tasks like setting reminders and responding to user inquiries, it makes use of the Bing search engine. The Cortana tool keeps track of semantic search information using Satori to capture natural processing abilities. This study briefly describes the operation of the virtualAssistant program on the Microsoft operating system [6].

Amazon's Alexa - Amazon has done an excellent job in developing Alexa. This virtual assistant can connect our whole lives to some devices. Alexa is particularly popular in home automation systems since it can connect a massive number of devices such as lights, televisions, and many other electrical appliances. It can also check the weather, news, and connect you to the latest music on the market. It can also perform shopping and order a cab for a user based on voice commands.

Samsung's Bixby - Bixby is a one-of-a-kind virtual assistant. It has all of the typical characteristics of a virtual assistant. However one of Bixby's most remarkable features is that it can recognize landmarks and other visuals simply by photographing them. You may also aim your camera towards an object to see other price alternatives. The Google Assistant also provides translations of many languages. It can also suggest

restaurants and companies in the area and help you manage your schedule.

METHODOLOGY

This section outlines the methodological approach to developing a virtual assistant software endowed with artificial intelligence (AI) capabilities. The project's intent is to overcome prevalent limitations of existing AI applications within the Windows Operating System, aiming to deliver a solution that approaches the ideal of 100% user satisfaction.

Utilizing Python as the core programming language, the software is architected to integrate seamlessly into the Windows environment. It leverages natural language processing (NLP) techniques for interpreting user commands, recognizing speech, and rendering decisions based on key elements identified within the user interaction. Speech-to-text and text-to-speech conversions are executed using the Google speech recognition API, supplemented by relevant Python libraries. A context-aware computing approach is paramount, enabling precise discernment of user input, both spoken and typed, and the correction of mispronunciations.

The construction of the system's functionalities is dependent on the utilization of Python libraries, modules, and APIs that facilitate AI processes, including chatbot operations. The system's distinctiveness is further enhanced by the integration of deep learning and machine learning technologies, which contribute to the generation of dynamic responses to user queries. The incorporation of a neural network, a sophisticated deep learning algorithm, lies at the heart of this dynamic response generation mechanism. The responses are structured within a JSON dataset, designed as a training model, and are interfaced with the main module to provide relevant responses.

The user interface of the virtual assistant is crafted through the tkinter GUI toolkit, which translates complex backend operations into a navigable front-end experience, emphasizing chatbot interaction. This virtual assistant is crafted to eliminate redundancy in command entry, enabling users to

engage with the software efficiently through multitasking.

The "Gypsy" system distinguishes itself from other market offerings through a broad suite of functionalities, particularly excelling in processing online orders—a capability it exhibits through integration with renowned e-commerce platforms for order placement via voice or text commands. The versatility of "Gypsy" is manifested in its ability to support a variety of tasks:

- Information retrieval with or without a web browser
- Email and WhatsApp messaging services
- Weather forecasting and real-time news updates
- Directional guidance using mapping services
- Execution of mathematical computations
- Alarm setting and system information display
- Desktop management, including wallpaper changes and power options
- Application launching and text translation
- Creation of task lists and shopping lists
- Capturing of screenshots and webcam selfies
- Providing entertainment via jokes, music, and video streaming

Critically, the "Gypsy" system assures comprehensive data security. It ensures that only data supplied during the initial registration is conserved, and no subsequent user activity data is stored, thereby affirming its commitment to user privacy and data integrity.

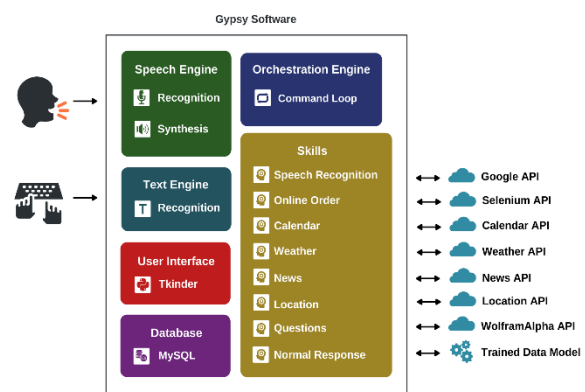


Figure 1: Main Components of the Gypsy Software

RESULT AND ANALYSIS

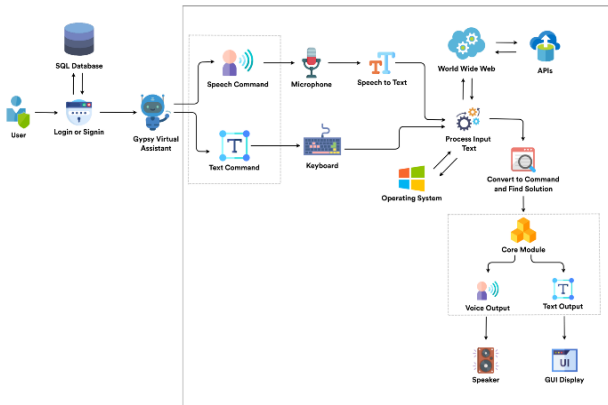


Figure 2: System Architecture Diagram

The initial step for users is the installation of the application on a Windows-based computer. Following installation, users encounter the welcome screen, which presents options for account creation or existing account login, where one is required to provide personal details such as a username, email, and password.

and system resources. The resultant outputs are then relayed back to the user via the chosen command modality. This interaction continues uninterrupted until the user opts to log out or close the application.

A case in point is application or webpage launching: upon receiving the command "open" followed by the name of the application or a recognized website, the system accurately discerns and initiates the requested program.

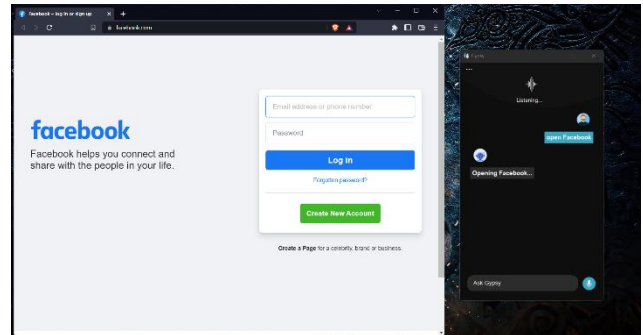


Figure 4: Launching Application or Website

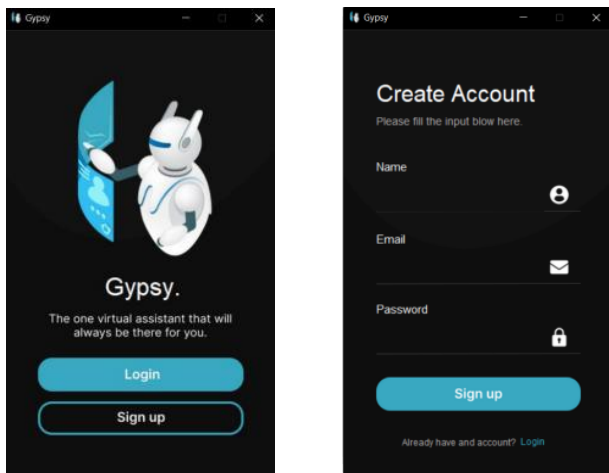


Figure 3: Welcome Screen and Sign up Screen

Upon login, the user's credentials are verified against the MySQL database. Successful validation grants access to the system, while failure results in a prompt for re-entry of details. Within the system, it remains in a standby state until the receipt of a voice or text command. These commands are then processed—voice commands are converted into text, while text commands are channeled directly through the keyboard to the system settings.

Similarly, when tasked with a mathematical calculation through voice or text input, the system identifies the operation type and returns the precise result.

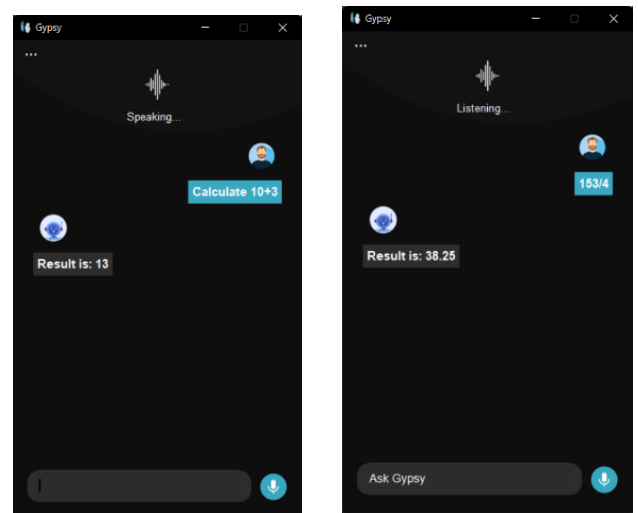


Figure 5: Calculation through text or voice command

During operation, the system interfaces with the Internet and the operating system to access APIs

In another scenario, when prompted with "news," the system inquires whether the user seeks local or international updates, subsequently displaying news accordingly

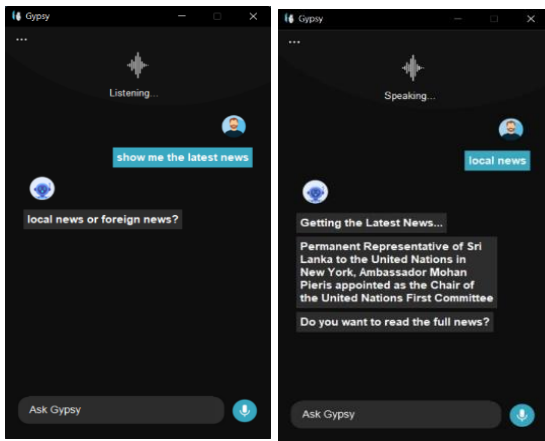


Figure 6: Showing latest local and foreign news

The study concludes with a comparative table showcasing functionalities across various virtual assistants, including the "Gypsy" project. This table underscores the "Gypsy" project's comprehensive capabilities in areas such as chatbot integration, web searching, emailing, messaging, navigation, translation, weather forecasting, predictive responses, and online order processing.

The encompassing functionality of the "Gypsy" project positions it with a considerably wider scope of operations when contrasted with other virtual assistants in the market.

Functions	Chatbot	Open Apps	Web Search	Send Email	Send Whatsapp message	Get Direction	Translate	Weather Forecast	Response using a Trained Predictive Dataset	Online Order Items
Research Projects										
Google Assistant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Apple Siri	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Microsoft Cortana	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Virtual Personal Assistant	No	Yes	Yes	Yes	No	No	No	Yes	No	No
Smart Voice-Based Virtual Personal Assistants	No	Yes	Yes	No	No	Yes	No	Yes	No	No
Voice-Enabled Personal Assistant for PC	No	No	Yes	No	No	Yes	No	Yes	No	No
Voice Assistant using python and AI	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No
"Gypsy" Project	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Figure 7: Comparison between similar projects

CONCLUSION

Developed using the Python programming language, this system incorporates advanced technologies such as artificial intelligence, natural language processing, speech recognition, context-aware computing, deep learning, and more. The proposed system offers numerous advantages to users, including features like online ordering, access to desktop and web applications, web searches, reminder creation, live directions, note reading, weather forecasts, language translation, mathematical calculations, alarm setting, news updates, and messaging via emails and WhatsApp. It stands out for its superior efficiency compared to other virtual assistant software in the market. By utilizing this voice- and text-enabled virtual assistant, users can achieve more effective and time-saving computer interactions. The system delivers an engaging user experience without any associated costs, eliminating the need for typing and allowing users to operate their computer solely through voice commands.

RECOMMENDATIONS

As a future development process of this project, It is also intended to find Sinhala language terms and build the complete system through this method. As a result, even someone with limited understanding of the English language can use this virtual assistant software in their native tongue. The main problem in the future will be to design this system can communicate with associated hardware devices through WiFi or Bluetooth. Furthermore, it is intended to develop an AI-based virtual assistant software with comparable functionality that can be easily installed by Android phone users. As a result, people may acquire the assistance of a virtual assistant using only their smartphone.

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