IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 12, May 2023

Robust and Novel Virtual Assistance using Python

Dr.Aarti Dandavate, Akashy Ambekar[2], Tejas Kale[3], Pratap Awachar[4], Rahul Paithane[5]
Department of Computer Engineering
Savitri Phule University, Kharadi, Pune, Maharashtra, India
Dhole Patil College of Engineering, Pune, India

Abstract: *This project aims to develop a virtual assistant using Python. The virtual assistant is designed to perform various tasks such as setting alarms, playing music, providing weather updates, answering general knowledge questions, and scheduling appointments. The project uses speech recognition and natural language processing techniques to enable the user to interact with the virtual assistant through voice commands. The virtual assistant also uses machine learning algorithms to learn and adapt to the user's preferences over time. The project leverages various Python libraries, including speech_recognition, pyttsx3, pyowm, and pandas, to implement the various functionalities of the virtual assistant. Overall, the project demonstrates the potential of Python and machine learning in developing intelligent and interactive applications.*

Keywords: Virtual assistant, Python, speech recognition, natural language processing, machine learning, voice commands, speech_recognition, pyttsx3, pyowm, pandas, interactive applications, intelligent applications, scheduling appointments, setting alarms, playing music, weather updates, general knowledge questions.

I. INTRODUCTION

The basic idea behind this project is to create a simple stand-alone application that helps less tech savvy [Doesn't have the deep computer Knowledge] people in the world to use the computer without feeling ignorant or computer illiterate. Computers have become a very important devices and as well as less expensive over time. The application works same like Siri/ Google Assistant etc. But the application deals with the computer itself mainly.

There are some predefined commands in the system and user can also add new commands. System can notify the user about new emails, weather, location, etc. User can see IP addresses, MAC address and Wireless network passwords, etc. System tasks like shutdown, lock system, sleep etc. arealso executed on command. Note writing can also be done using this system. The system has a Interface which is able to take inputs and give outputs. There are various separate modules for each task like time,search etc. The Interface calls these modules for the given commands and so on. Same tasks can be achieved using this software.

modules for each task like time, search etc. The Interface calls these modules for the given commands and so on. Same tasks can beachieved using this software.

This project is based on Windows application development and provide personal assistant using voice recognition operation. This program includes the functions and services of: mail sending, , eventhandler, location services, music player service, checking weather, Google searching engine, Wikipedia searching engine, camera and Bluetooth headset support . As it integrates most of the desktop servicesfor daily use, it could be useful for getting a more convenient life and it will be helpful for those people who have disabilities for manual operations. This is also part of the reason why it has been chosen as thediploma project. This project is originated from a popular application from Apple called "Siri".

This application was released on the date when the iPhone4S was published. This application is very interesting, easy going and convenient, with wide real world usage and large developing potential. This application is notlimited by different generations and occupations, and can be applied to many industries that we have in the real world. But it is not available for windows , to overcome this problem we have introduced a"Virtual Assistant" for your personal computer. For instance, the voice assistance is very useful for personal assistants, direction guides or driving, helps among the disabled community, and so on.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 12, May 2023

This is a short description about "Siri" from Wikipedia to illustrate the voice product: "Siri" an intelligent personal assistant and knowledge navigator which works as an application for Apple's iOS.The application uses a natural language user interface to answer questions, make recommendations, a perform actions by delegating requests to a set of web services. Apple claims that the software adapts tothe user's individual preferences over time and personalizes results, and performing tasks such as finding recommendations for nearby restaurants or getting directions

The system also has the feature of interacting with the user, which facilitates user and show its artificial intelligence. Also, it has functionalities like opening and closing every software to help user inmost possible ways. There are several modules for each task like search, time etc. These predefined modules are called by the interface when specified in commands. The system can perform almost all thetasks that require the use of keyboard and/or mouse which is the main goal of the system that will facilitate the disabled people.

II. PROBLEM STATEMENT

The main problem this project aims to address is the need for a convenient and personalized way of performing various tasks using voice commands. Traditional methods of performing tasks, such as scheduling appointments, setting alarms, and playing music, often require users to manually input information through different interfaces, which can be time-consuming and tedious.

The main problem this project aims to address is the need for a convenient and personalized way of performing various tasks using voice commands. Traditional methods of performing tasks, such as scheduling appointments, setting alarms, and playing music, often require users to manually input information through different interfaces, which can be time-consuming and tedious. Additionally, users may have different preferences and needs that may not be easily accommodated by existing software..

Therefore, the project aims to address the problem of inefficient and impersonal task performance by providing a more convenient and personalized way of performing tasks using voice commands through a virtual assistant developed using Python.

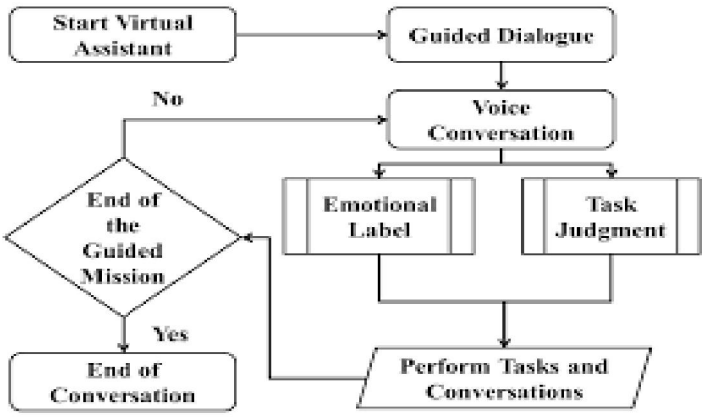
2.1 Process and System Architecture

The virtual assistant using Python can be developed using the following process and system architecture:

- Data collection: The first step in developing a virtual assistant is to collect the necessary data that the system will use to perform its tasks. This data can include information such as weather updates, news headlines, and appointment schedules, among others.
- Speech recognition: Once the data is collected, the virtual assistant can use speech recognition technology to interpret the user's voice commands. The speech recognition module can be implemented using libraries such as Speech Recognition, which converts the user's speech into text.
- Natural language processing: After interpreting the user's speech, the virtual assistant can use natural language processing (NLP) to analyze the text and understand the user's intent. NLP techniques can include entity recognition, sentiment analysis, and topic modeling, among others. The NLTK library can be used for implementing NLP algorithms.
- Task execution: Once the user's intent is determined, the virtual assistant can execute the appropriate task. For example, if the user asks for the weather, the system can use a library such as pyowm to retrieve weather information and respond to the user.
- Personalization: To make the virtual assistant more personalized, the system can use machine learning algorithms to learn the user's preferences and adapt its responses accordingly. This can include recommending music playlists or suggesting nearby restaurants based on the user's past behavior.
- System architecture: The virtual assistant can be developed using a client-server architecture, where the client is a user interface that accepts voice commands and the server is the backend that performs the necessary tasks. The server can be hosted on a cloud platform such as AWS or Google Cloud to ensure scalability and reliability.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 12, May 2023

2.2 Flow Chart



2.3 UML

The project is based on the theories related to various aspects of software engineering principles and software development model; Python programming skills and API's and network communication technologies.

The API's and the web service in this project are put on the wolfram alpha API; developers will never be required to write more code. The API will handle the execution. Hence, API is an important concept and theory guide the development.

Wolfram Alpha API: The Wolfram Alpha Web service API provides a web-based API allowing the computational and presentation capabilities of Wolfram Alpha to be integrated into web, mobile, desktop, and enterprise applications. Wolfram Alpha is an API which can compute expert-level answers using Wolfram's algorithms, knowledgebase and AI technology. It is made possible by the Wolfram Language. This article tells how to create a simple assistant application in Python which can answer simple questions like the ones listed below.

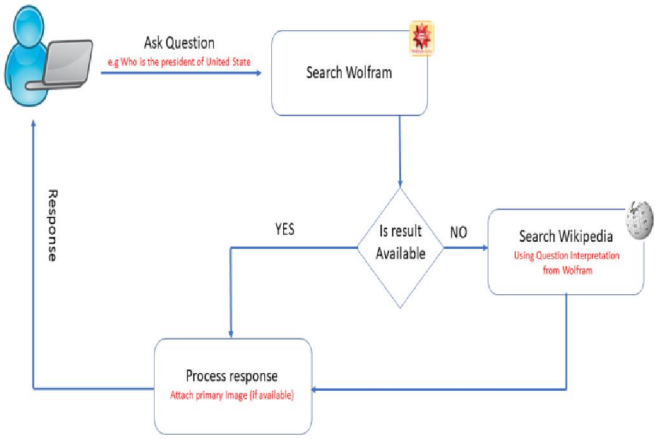


Figure 1

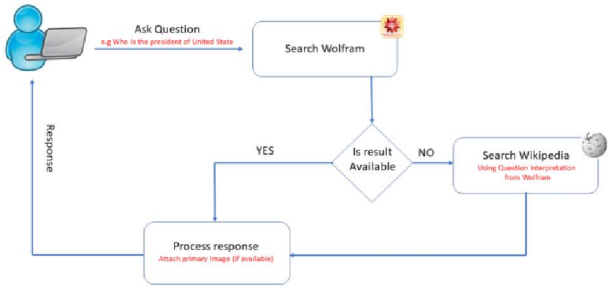
User's input will be passed to Wolfram Alpha for processing. if a result is obtained, the result will be returned to the user. If no result i.

2.4 Algorithm

- Natural Language Processing (NLP) Algorithms: These algorithms are used to help the virtual assistant understand and interpret user inputs. NLP algorithms can include techniques such as tokenization, part-of-speech tagging, named entity recognition, and sentiment analysis
- Search Algorithms: Search algorithms can be used to help the virtual assistant find information or resources relevant to the user's query. Examples of search algorithms include keyword-based search, semantic search, and graph-based search.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 12, May 2023

- Recommendation Algorithms: Recommendation algorithms can be used to suggest products, services, or content that might be of interest to the user based on their previous behavior or preferences. These algorithms can include techniques such as collaborative filtering, content- based filtering, and hybrid recommendation systems.



III. RESULT –OUTCOMES

The programs start with the voice recognition, by implementing the Recognition Listener, it will capture the text every time the speaker speaks to it, (see Figure 7), and Figure 7 shows the User Interface of our Software, also there are some text shown “listening…” “Recognizing”, The Virtual assistant will start only when user say “hey/hi/hello Junior”, as keyword ‘junior’ detected it will start and ask for password here see figure 7, there is query said by user “the password is unique’, as keyword ‘unique’ detected The program will starts its all functionalities.

The figure 8 shows some functionalities of our software like mathematical calculation, time related operation, google searching and most important Wi-Fi password feature. In the figure 8 there is query said by user “Python Programming Wikipedia”, as keyword ‘Wikipedia’ detected the program will go to server for ‘Python Programming’ and return to user on the interface as well as in speech format.

Wikipedia searching engine, the search engine enable the user to search anything on Wikipedia. The result is given back on the web browser with the searched content on Wikipedia.

“Android Wikipedia”, the keyword ‘Wikipedia’ is detected, and the program will return the result by searching ‘Android’ on Wikipedia.

IP address service, the IP address service is especially designed for Programmers Other than any IT person , Using this service user can find hostname and IP address of the PC “find IP address”, as keyword ‘IP address’ is detected the program will find and display IP address of system.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 12, May 2023

MAC address finding service, same as IP address service "find system address", as keyword 'system address' is detected the program will find and display MAC address of system.
Wireless Network Passwords Finding Service, Wi-Fi Password service is used to find saved wireless network passwords "find wireless network passwords", as keyword 'wireless network passwords' is detected the program will find and display saved Wi-Fi passwords.

Advantages

- Interactive
- One Click Setup
- Supports Multiple Inputs
- Platform Independent / Future
- Reduce Human Efforts

IV. CONCLUSIONS

The Project development and implementation:
As it has been previous stated, the program is mainly concerns with the windows based software development, Python programming, different APIs for Google products, API for mathematicaloperations and etc. The program is developed by three developers and follows the Incremental model and extreme programming model. During the six month development, the students did the same cycle in each phase of analyze requirements, construct design, implement the solutions in pair programming mode and test the result. The development is carried out as its primary planning which guide the work process of how to work with the program, how much time should the each of the student spent in every week,the rescores needed for developing and how to handle the problems while it came up. The project waseefficiently completed under the development model and the resources we found in early time were really useful when implementing the program.
Project usage & prospect, potential:
The project is very useful and owns a large potential use in different industries. Although the program primary concerns more about how to do the virtual assistant on windows based system usingthe voice, the concept of speech recognition can be applied in different industries as in many situations it will be more convenient, save a lot of time and helpful especially for those who have difficulty inworking with manual operations. Thus, the concept is only for programming the windows based Application For the program itself, it is a collection of 15-20 functions that are frequently used on a windowsPC. The user can enjoy different services within this platform. Therefore, it is easy to use with simple operation compared with the traditional working strategies which the user should well know how to workwith the desktop system. In addition, the program which works using the voice is helpful for those who prefer voice operation and those who have difficulty /disability with the manual operations. The primary objective ofthe program is to provide services using the voice, and it enables more people who can enjoy this program.

REFERENCES

[1]. S Subhash; Prajwal N Srivatsa; S Siddesh; AUllas; B Santhos. Artificial Intelligence-based Voice Assistant,IEEE, 2020. https://ieeexplore.ieee.org/document/9210344/
[2]. EV Polyakov, MS Mazhanov, AY Voskov, LS Kachalova, MV and SV Polyakov,"Investigation and development of the intelligent voice assistant for the IOT using machinelearning", Moscow workshop on electronic technologies, 2018. https://ieeexplore.ieee.org/document/9210344
[3]. VetonKepuska and Gamal Bohota, "Next generation of virtual assistant (MicrosoftCortana Apple Siri Amazon Alexa and Google Home)", IEEE conference, 2018. https://ieeexplore.ieee.org/document/9210344
[4]. Laura BURbach, Patrick Halbach, Nils Plettenberg, Johannes Nakyama, MatrinaZiefleand Andre Calero Valdez, "Ok google Hey Siri Alexa. Acceptance relevant of virtual voiceassistants", International communication conference IEEE, 2019 https://www.ijraset.com/best-journal/voice-assistant-zia-using-hdg-algorithm

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 12, May 2023

[5]. X. Lei, G. Tu, A. X. Liu, C. Li and T. Xie, "The insecurity of home digital voice assistants- amazon alexa as a case study", CoRR, vol. abs/1712.03327, 2017. https://arxiv.org/pdf/1712.03327.pdf

[6]. J. Gratch, N. Wang, J. Gerten, E. Fast and R. Duffy, "Creating rapport with virtual agents"in Intelligent Virtual Agents, Berlin, Heidelberg:Springer Berlin Heidelberg, pp. 125-138,2017 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8515230/

[7]. B. Weiss, I. Wechsung, C. Kühnel and S. Möller, "Evaluating embodied conversationalagents in multimodal interfaces", Computational Cognitive Science, vol. 1, pp. 6, Aug2015.

[8]. https://computationalcognitivescience.springeropen.com/articles/10.1186/s40469-015-0006-9

[9]. Y. Matsuyama, A. Bhardwaj, R. Zhao, O. Romeo, S. Akoju and J. Cassell, "Socially-awareanimated intelligent personal assistant agent", Proceedings of the 17th Annual Meeting ofthe Special Interest Group on Discourse and Dialogue, pp. 224-227, 2016. https://www.academia.edu/42192603/A_Survey_on_Virtual_Personal_Assistant

[10]. M. Schroeder, E. Bevacqua, R. Cowie, F. Eyben, H. Gunes, D. Heylen, et al., "Buildingautonomous sensitive artificial listeners", IEEE transactions on affective computing, vol.3, pp. 165-183, 2018. https://canvas.mit.edu/files/809540

[11]. Hannun, C. Case, J. Casper, B. Catanzaro, G. Diamos, E. Elsen, et al., "Deep speech:Scaling up end-to-end speech recognition", CoRR, vol. abs/1412.5567, 2014. https://arxiv.org/abs/1412.5567

[12]. M. Schröder and J. Trouvain, "The german text-to-speech synthesis system mary: A toolfor research development and teaching", International Journal of Speech Technology, vol. https://link.springer.com/article/10.1023/A:1025708916924

[13]. D. Huggins-Daines, M. Kumar, A. Chan, A. W. Black, M. Ravishankar and A. I. Rudnicky,"Pocketsphinx: A free real-time continuous speech recognition system for hand-helddevices", 2006 IEEE International Conference on Acoustics Speech and Signal ProcessingProceedings, vol. 1, May 2018 https://ieeexplore.ieee.org/document/1659988

[14]. Think Python Book, Allen Downey https://greenteapress.com/wp/think-python/

[15]. A Python Book Author: Dave Kuhlman https://www.davekuhlman.org/python_book_01.pdf