

# Voice - Based Virtual Personal Assistant Using Artificial Intelligence in Python

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**Abstract** – Communication and technology have a long history, yet they are continually evolving and growing. Technology advances at such a rapid pace that almost everyone now has an AI (Artificial Intelligence) personal assistant. The majority of us have Google Assistant, Siri, Alexa, or Bixby on our phones. Voice-based personal assistants are becoming increasingly popular, and they are assisting us in making our lives easier. The goal of this project is to create an intelligent voice-based assistant that can organise and maintain information. It includes email management, calendar events, knowing the weather forecast, reading news feed, inquiring about the details of a movie, searching people's Instagram profiles, downloading people's Instagram profile picture, downloading YouTube videos, downloading Google images, enabling PDF tasks such as merging, watermarking, and encrypting PDFs, finding the definition of an unknown word, and reading a book. The goal was to create a "Intelligent Personal Voice Assistant using Python" that allows users to operate devices with their voice (speech), retrieve information, and conduct tasks on their desktop.

**Keywords-** *Voice Assistants, Personal assistant, Speech Recognition, Artificial Intelligence, Python.*

**Abbreviation:** AI-Artificial Intelligence, IPA-Intelligent Personal Assistants, NLP- Natural Language Processing, TTS-Text-to-Speech, VUI-Voice User Interface, IOT Internet of Things.

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## I- INTRODUCTION

Intelligent Voice Personal Assistant (IVPA) is software designed to help users with simple tasks by presenting information in natural language. Most voice assistants use online resources to answer questions about the weather, sports scores, driving directions, and other information-based queries. They also provide services such as calendar and meeting reminders, and many offer essential services such as health monitoring and alerts through special applications. Typically, Intelligent Personal Assistants will respond to questions and carry out operations utilising a natural language user interface and voice commands. Siri, Google Assistant, Alexa, and

Cortana are examples of well-known assistants. Virtual Assistants are primarily accessed via smartphones. However, the goal of this project is to create a simple virtual assistant that can be used on both desktops and laptops. By 2020, it is anticipated that 3.5 billion voice assistants would be utilised in smart devices all over the world. The use of a voice assistant is becoming more prevalent among consumers. The capabilities of voice assistants are so good that by 2023, demand for voice assistants would outnumber the world's population by roughly 8 billion. After hearing a wake-up word or instruction, a voice assistant comes in compact packaging and can execute a number of tasks and actions. They can turn on the lights, play music, and

answer any questions you may have. They can also place an order for you. It is a digital assistant that employs voice recognition, natural language processing, and speech synthesis to assist users via phones and smart devices such as Alexa speakers, as well as voice recognition apps such as Siri. It's nearly impossible to explain or call any technology that makes our lives easier and wiser by a single name.

There are several terms for agents who can execute activities or provide services for a person, and they are nearly interchangeable but not quite. They differ mostly in terms of how we connect with the technology, the app, or both. Some basic definitions, similarities, and distinctions are as follows:

**Intelligent Personal Assistants (IPA):** This form of software can help users with fundamental activities by speaking to them in natural language. Intelligent personal assistants [1], [5] are also capable of searching the internet for an answer to a user's query. It may send a text or make a voice call, either of which will cause an action to be taken.

**Automated Personal Assistant [7]:** The term "automated" refers to a task that is completed by it. The personal assistants employ AI and deep learning to do automated tasks based on the user's experience and behaviour with the IPA.

**Smart Assistant:** It usually refers to physical devices that can deliver a variety of advanced features and services by using smart speakers that listen for a wake-up phrase and then become active and conduct certain activities. Smart assistant gadgets include Amazon Echo, Google Home, and Apple Home-Pod.

**Chatbot:** Its purpose is to communicate, deliver information, and perform tasks for users using text as a medium. Chatbots [8] can mimic a human user's conversation. Most banking businesses now employ them in customer support or account management to answer simple queries, and don't worry, it can also link you with an online person if the bot is unable to settle your concern.

**Voice Assistant:** Our voice is the input key here. It's a digital assistant that employs voice recognition, speech synthesis, natural language processing (NLP), and artificial intelligence (AI) to deliver incredible service via an application exam. Siri, Google, OK. Cortana, for example.

Prior to beginning work on the project, it is critical to have a thorough understanding of the existing Paper on Voice-Based Virtual Personal Assistant Using Artificial

Intelligence in Python. The book, journals, theses, and the internet are the primary sources of information. To begin the thesis, the first stage is to review research papers that have already been published by other scholars, as well as papers that are linked to this work. It is easier to complete this task with the help of a literature review.

## II- LITERATURE SURVEY

The literature survey studies are listed as below:-

[1] "Intelligent Personal Assistant"

Published by Aditya Sinha, GargiGarg, Gourav Rajwani, ShimonaTayal.

The goal of this study is to create a personal assistant that will make it easier for blind individuals to use computers and complete tasks. They're doing it utilising the Java programming language and java libraries like Sphinx 4 and MaryTTS. Sphinx 4 is a Java-based speech recognition library that recognises voice as an input.

Whereas MaryTTS is a Text-to-Speech engine use to read a text with natural sounding voices.

[2] "Smart Voice Based Virtual Personal Assistants with Artificial Intelligence"

Published by Ankit Pandey, Vaibhav Vashist, Prateek Tiwari, Sunil Sikka, Priyanka Makkar.

They set out in this work to create an intelligent personal voice assistant using Python modules and Google Speech Recognition APIs for speech recognition and voice response interpretation. For development, Python 3.7 or higher is utilised, together with Spyder IDE, Visual Studio Code, or PyCharm. Speech input is converted to text using Google's speech recognition algorithm. While Python receives the voice recognition module's output and determines if the command or speech output is an API Call, Context Extraction, or System Call.

[3] "RASPBERRY PI BASED PERSONAL VOICE ASSISTANT USING PYTHON"

Published by P Srinivas, T Sai Teja, CH Bhavana, R Likhith, K Sathish Kumar.

The authors have demonstrated the implementation of a voice user interface (VUI) as a personal voice assistant that can perform a variety of tasks for the user, including setting an alarm, daily reminders, weather reports, reading news feed, playing a song from a playlist, asking about movie details, looking up the definition of an unknown word, reading an article from Wikipedia, and more.

[8] The study demonstrates how the existing AI technique might be improved, is insufficient, and proposes a new theory of machine intelligence that sheds light on the future of intelligent systems.

The hardware model for the system is constructed in such a way that the raspberry pi serves as the central component to which other peripherals (such as a microphone, speaker, picamera, PIR sensor, buzzer, and so on) are connected. The system works on the principle of speech recognition: speech is fed into the microphone as an input, which is then parsed and converted to text, where the system looks for desired key words to deliver to the appropriate output, and the textual output is then converted to speech (text-to-speech) and delivered through the speakers.

The system provides great hands-free user experience to the user and can be beneficial to a visually challenged person as well as a normal human being to connect to the world only through the voice.

### III - PROBLEM STATEMENT

Despite the fact that we are a digitally sophisticated society, many people still perform their work manually. Our project teaches students that utilising a virtual assistant allows them to complete various activities in less time, allowing them to relax, spend time with family or friends, or even complete other activities or jobs. These initiatives are particularly valuable for blind persons who are unable to make input on their own on laptops or computers, as they can assist them in comfortable interacting with the systems.

It is particularly excellent for elderly individuals or persons with a very busy schedule because they only need to talk and their activity will be completed in seconds, allowing them to operate without using their hands. They don't have to touch a screen or type anything since they don't have to.

### IV - AIM AND OBJECTIVE

- The aim of our project is to design software that uses speech as an input to complete a series of activities on a computer system.
- It will reduce the effort required to type on a keyboard or click on a mouse.

### V- PROPOSED APPROACH

The Flowchart (Figure 1) of project is depicted below, in this way our project is performing all the tasks. First, it

initializes all modules i.e.( importing libraries) & then it takes input command as voice. The speech recognition module identifies the speech & executes the tasks.

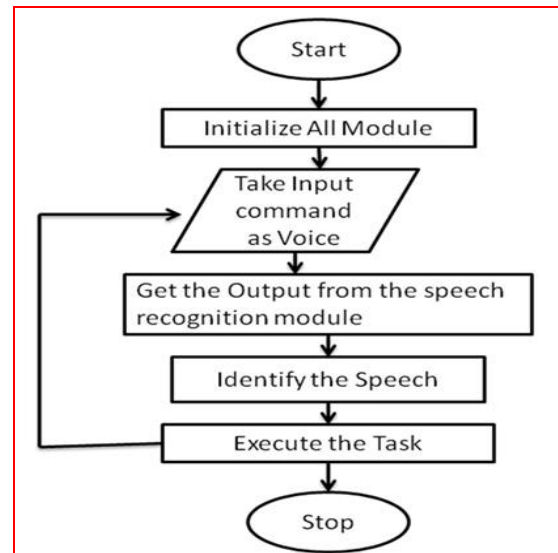


Figure 1: Proposed Flow

### VI - PROPOSED ARCHITECTURE

The project aim is to build a personal voice assistant that will make easy for users to use computer with voice command and make task easier. To implement intelligent personal voice assistant (Figure 2), python libraries and Google Speech Recognition API's are used for speech recognition module and to interpret voice response. Python 3.7 or above, Spyder IDE or Visual studio code or PyCharm, is used for development.

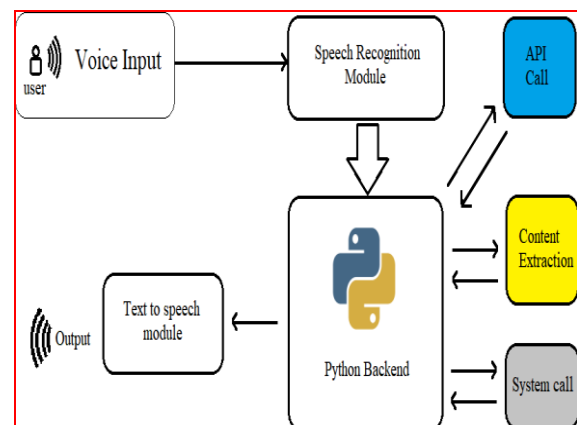


Figure 2: Component of the proposed voice assistants

- Speech Recognition Module:** The technique converts speech to text using Google's speech recognition algorithm. This module does voice

recognition using the Speech Recognition 3.8.1 library, which has support for a variety of engines and APIs, both online and offline.

- b. **Python Backend:** It receives the output from the voice recognition module, determines if the command or speech output is an API Call, Context Extraction, or System Call, and then delivers the output back to the python backend to provide the user with the needed output.
- c. **API Calls:** API Calls allow two programmes to communicate with one another. API acts as a messenger, delivering requests to the provider who made the request and then returning the result..
- d. **Context Extraction:** Context Extraction is the process of extracting structured information from unstructured, semi-structured, or both machine-readable documents automatically or robotically. The majority of the time, this task entails using natural language processing to process human language texts (NLP).
- e. **System Calls:** A system call is a programmatic way through which a computer programme (function) invokes a service from the kernel of the operating system on which it is running. It comprises hardware-related assistants and services such as accessing the hard disc drive, creating and running new processes, and dealing with kernel functions like as process scheduling. It serves as a vital link between a process and the operating system.
- f. **Text-To-Speech:** The ability of computers to read text is referred to as a text-to-speech (TTS) engine. The engine turns written text into a phonemic representation, which it then turns to a waveform, which can subsequently be output as sound.

Figure 3 depicts the help for automated greetings to users when recording data and time on special occasions such as good morning, good evening, and so on.

```
def speak(audio):
    engine.say(audio)
    engine.runAndWait()

def wishMe():
    hour = int(datetime.datetime.now().hour)
    if hour>=0 and hour<12:
        speak("Good Morning!")
    elif hour>=12 and hour<18:
        speak("Good Afternoon!")
    else:
        speak("Good Evening!")
    speak("Sir How may I help you")
```

Figure 3: Module for Wishing the User According to Date & Time.

The interpreter module for speech to text is depicted in Figure 4.

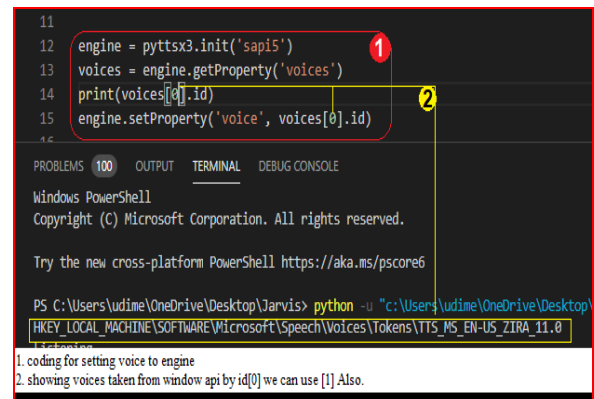


Figure 4: Module for Interpret Voice Response & Text to Speech.

## VII - RESULT AND DISCUSSION

Figure 5 depicts the Virtual Assistant using the Microphone to listen to the user. Figure 6 depicts Virtual Assistant waiting for a command from the user. So that it can detect the user's voice and carry out the user's order.

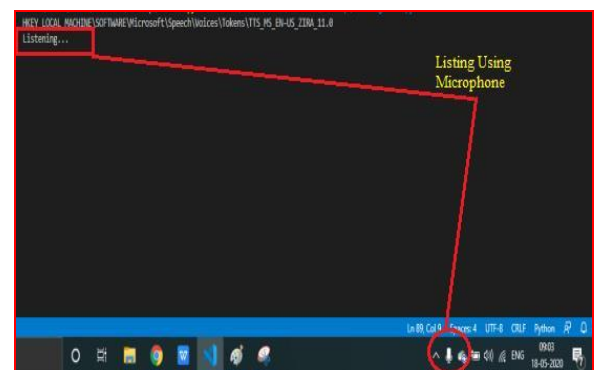


Figure 5: Listening the User's Command Using Microphone

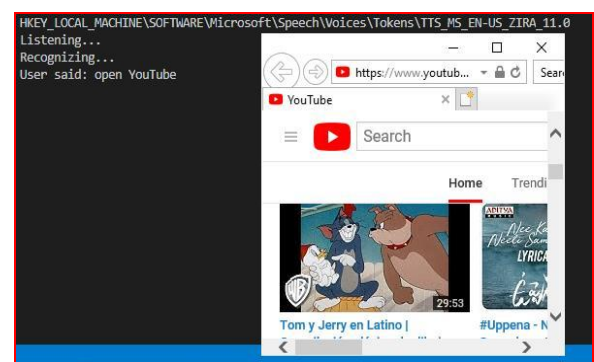


Figure 6: Working-Activating Microphone & Open YouTube

## VII - SUMMARY

The personal voice assistant system provided is a very basic system with only a few features; however, further and advanced functions may be added as part of this project's future work. The concept and execution of an Intelligent Personal Voice Assistance are presented in this project. It is not only meant to respond to human commands, but also to deliver responses to the user depending on the inquiry or words said by the user, such as opening tasks and operations. The most popular personal voice assistants are Siri, Google Assistant, and Cortana. This personal voice assistant is extremely dependable and provides the user with a hands-free experience. Knowing the weather forecast, reading the news stream, inquiring about the contents of a movie, and so on are some instances.

The evolution of personal voice-based virtual assistants in recent years has been fascinating. In the future, this Intelligent Voice Assistant has a tremendous and endless potential. It may also be feasible to build a world based entirely on VUI (User Interface) technology.

## VIII - CONCLUSION

Basically, it was all about the Python Voice-based Virtual Personal Assistant, which takes commands from the user's voice and performs the task without any effort.

This project is constructed utilising open source software modules that can be updated in the future. This project's modular design makes it more flexible and easier to integrate more modules and features without disrupting the current system's functionality.

## FUTURE SCOPE

Interacting with a computer system will be increasingly useful for blind individuals in the future. If voice assistants are combined with IoT, we will be able to run appliances based on our orders in the future. This project will be able to interface with gadgets for a Connected Home in the near future, utilising IoT, voice command, and computer vision. In addition, more features will be added in the future to make the process easier.

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