UNIVERSTY OF CALCUTTA

- **PROJECT DOCUMENTATION & REPORT ON –**

VOICE ASSISTANT

SUBMITTED BY

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SHREE AGRASAIN COLLEGE

UNDER THE GUIDANCE OF

PROF. KUMARJIT MONDOL

B.Sc. Computer Science SEM VI
Year - 2022-2023

CU Roll No: 193434-21-0003

• Certificate

This is to certify that the project entitled "VOICE ASSISTANT" is undertaken at SHREE AGRASAIN COLLEGE by MAYANK SHARMA in partial fulfillment of B.Sc. Computer Science Honours (Semester VI) with the help of my partner DEV KRISHNA ROY. Examination had not been submitted for any other examination and does not form part of any other course undergone by the candidate. It is further certified that he has completed all required phases of project.

Signature of Internal Guide

Signature of External Examiner

Date:-

HOD/In -Charge/Coordinator

• Acknowledgement

In completing this project report on project titled **VOICE ASSISTANT**, I had to take the help and guideline of a few respected people, who deserve my greatest gratitude.

The completion of this project report gives me much Pleasure. I would like to show my gratitude to **Prof. Kumarjit Mondol** for giving me a good guideline for project throughout numerous consultations. I would also like to expand my deepest gratitude to all those who have directly and indirectly guided us in writing this project report. I also like to thank **my partner Dev Krishna Roy** who helped in different phases of the project.

Many people, especially my classmates and friends themselves, have made valuable comments and suggestions on this proposal which gave me inspiration to improve my project. Here I thank all the people for their help directly and indirectly to complete this project report.

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• Table of Contents

• VOICE ASSISTANT

1. INTRODUCTION

In today's era almost all tasks are digitalized. We have Smartphone in hands and it is nothing less than having world at your finger tips. These days we aren't even using fingers. We just speak of the task and it is done. There exist systems where we can say Text Dad, "I'll be late today." And the text is sent. That is the task of a Virtual Assistant. It also supports specialized task such as booking a flight, or finding cheapest book online from various e-commerce sites and then providing an interface to book an order are helping automate search, discovery and online order operations.

Virtual Assistants are software programs that help you ease your day to day tasks, such as showing weather report, creating reminders, making shopping lists etc. They can take commands via text (online chat bots) or by voice. Voice based intelligent assistants need an invoking word or wake word to activate the listener, followed by the command. For my project the wake word is JIA. We have so many virtual assistants, such as Apple's Siri, Amazon's Alexa and Microsoft's Cortana. For this project, wake word was chosen JIA.

This system is designed to be used efficiently on desktops. Personal assistant software improves user productivity by managing routine tasks of the user and by providing information from online sources to the user. JIA is effortless to use. Call the wake word 'JIA' followed by the command. And within seconds, it gets executed.

Voice searches have dominated over text search. Web searches conducted via mobile devices have only just overtaken those carried out using a computer and the analysts are already predicting that 50% of searches will be via voice by 2020.Virtual assistants are turning out to be smarter than ever. Allow your intelligent assistant to make email work for you. Detect intent, pick out important information, automate processes, and deliver personalized responses.

This project was started on the premise that there is sufficient amount of openly available data and information on the web that can be utilized to build a virtual assistant that has access to making intelligent decisions for routine user activities

1.1 BACKGROUND

There already exist a number of desktop virtual assistants. A few examples of current virtual assistants available in market are discussed in this section along with the tasks they can provide and their drawbacks.

SIRI from Apple

SIRI is personal assistant software that interfaces with the user thru voice interface, recognizes commands and acts on them. It learns to adapt to user's speech and thus improves voice recognition over time. It also tries to converse with the user when it does not identify the user request.

It integrates with calendar, contacts and music library applications on the device and also integrates with GPS and camera on the device. It uses location, temporal, social and task based contexts, to personalize the agent behavior specifically to the user at a given point of time.

Supported Tasks

- Call someone from my contacts list
- Launch an application on my iPhone
- Send a text message to someone
- Set up a meeting on my calendar for 9amtomorrow
- Set an alarm for 5am tomorrowmorning
- Play a specific song in my iTuneslibrary
- Enter a new note

Drawback

SIRI does not maintain a knowledge database of its own and its understanding comes from the information captured in domain models and data models.

ReQall

ReQall is personal assistant software that runs on smartphones running Apple iOS or Google Android operating system. It helps user to recall notes as well as tasks within a location and time context. It records user inputs and converts them into commands, and monitors current stack of user tasks to proactively suggest actions while considering any changes in the environment. It also presents information based on the context of the user, as well as filter information to the user based on its learned understanding of the priority of that information.

Supported Tasks

- Reminders
- Email
- Calendar, GoogleCalendar
- Outlook
- Evernote
- Facebook,LinkedIn
- NewsFeeds

Drawback

Will take some time to put all of the to-do items in – you could spend more time putting the entries in than actually doing the revision

1.2 OBJECTIVES

Main objective of building personal assistant software (a virtual assistant) is using semantic data sources available on the web, user generated content and providing knowledge from knowledge databases. The main purpose of an intelligent virtual assistant is to answer questions that users may have. This may be done in a business environment, for example, on the business website, with a chat interface. On the mobile platform, the intelligent virtual assistant is available as a call-button operated service where a voice asks the user "What can I do for you?" and then responds to verbal input.

Virtual assistants can tremendously save you time. We spend hours in online research and then making the report in our terms of understanding. JIA can do that for you. Provide a topic for research and continue with your tasks while JIA does the research. Another difficult task is to remember test dates, birthdates or anniversaries. It comes with a surprise when you enter the class and realize it is class test today. Just tell JIA in advance about your tests and she reminds you well in advance so you can prepare for the test.

One of the main advantages of voice searches is their rapidity. In fact, voice is reputed to be four times faster than a written search: whereas we can write about 40 words per minute, we are capable of speaking around 150 during the same period of time15. In this respect, the ability of personal assistants to accurately recognize spoken words is a prerequisite for them to be adopted by consumers.

1.3 PURPOSE, SCOPE AND APPILCABILITY

- **Purpose**

Purpose of virtual assistant is to being capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audio books, and providing weather, traffic, sports, and other real-time information, such as news. Virtual assistants enable users to speak natural language voice commands in order to operate the device and its apps.

There is an increased overall awareness and a higher level of comfort demonstrated specifically by millennial consumers. In this ever-evolving digital world where speed, efficiency, and convenience are constantly being optimized, it's clear that we are moving towards less screen interaction.

- **Scope**

Voice assistants will continue to offer more *individualized* experiences as they get better at differentiating between voices. However, it's not just developers that need to address the complexity of developing for voice as brands also need to understand the capabilities of each device and integration and if it makes sense for their specific brand. They will also need to focus on maintaining a user experience that is consistent within the coming years as complexity becomes more of a concern. This is because the visual interface with voice assistants is missing. Users simply cannot see or touch a voice interface.

- **Applicability**

The mass adoption of artificial intelligence in users' everyday lives is also fueling the shift towards voice. The number of IoT devices such as smart thermostats and speakers are giving voice assistants more utility in a connected user's life. Smart speakers are the number one way we are seeing voice being used. Many industry experts even predict that nearly every application will integrate voice technology in some way in the next 5 years.

The use of virtual assistants can also enhance the system of IoT (Internet of Things). Twenty years from now, Microsoft and its competitors will be offering personal digital assistants that will offer the services of a full-time employee to every people around the globe

2. SURVEY OF TECHNOLOGY

Python

Python is an OOPs (Object Oriented Programming) based, high level, interpreted programming language. It is a robust, highly useful language focused on rapid application development (RAD). Python helps in easy writing and execution of codes. Python can implement the same logic with as much as $1/5^{th}$ code as compared to other OOPs languages.

Python provides a huge list of benefits to all. The usage of Python is such that it cannot be limited to only one activity. Its growing popularity has allowed it to enter into some of the most popular and complex processes like Artificial Intelligence (AI), Machine Learning (ML), natural language processing, data science etc. Python has a lot of libraries for every need of this project. For JIA, libraries used are speech recognition to recognize voice, Pyttsx for text to speech, selenium for web automation etc.

Python is reasonably efficient. Efficiency is usually not a problem for small examples. If your Python code is not efficient enough, a general procedure to improve it is to find out what is taking most the time, and implement just that part more efficiently in some lower-level language. This will result in much less programming and more efficient code (because you will have more time to optimize) than writing everything in a low-level language.

Pyttsx

Pyttsx stands for Python Text to Speech. It is a cross-platform Python wrapper for text-to-speech synthesis. It is a Python package supporting common text-to-speech engines on Mac OS X, Windows, and Linux. It works for both Python2.x and 3.x versions. Its main advantage is that it works offline.

Speech Recognition

This is a library for performing speech recognition, with support for several engines and APIs, online and offline. It supports APIs like Google Cloud Speech API, IBM Speech to Text, Microsoft Bing Voice Recognition etc.

Wikipedia

Wikipedia is a Python library that makes it easy to access and parse data from Wikipedia. Search Wikipedia, get article summaries, get data like links and images from a page, and more. Wikipedia wraps the MediaWiki API so you can focus on using Wikipedia data, not getting it.

Wolframalpha

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 and perform basic to intermediate mathematical operations.

Webbrowser

In Python, webbrowser module is a convenient web browser controller. It provides a high-level interface that allows displaying Web-based documents to users.

webbrowser can also be used as a CLI tool. It accepts a URL as the argument with the following optional parameters: -n opens the URL in a new browser window, if possible, and -t opens the URL in a new browser tab.

Pyjokes

Python supports creation of random jokes using one of its libraries. Let us explore it a little more, **Pyjokes** is a python library that is used to create one-line jokes for programmers. Informally, it can also be referred as a fun python library which is pretty simple to use. You can just install it and use it to get programming related jokes in your program.

Pywhatkit

Python offers numerous inbuilt libraries to ease our work. Among them pywhatkit is a Python library for sending WhatsApp messages at a certain time, it has several other features too.

Following are some features of pywhatkit module:

1. Send WhatsApp messages.
2. Play a YouTube video.
3. Perform a Google Search.
4. Get information on a particular topic.

The pywhatkit module can also be used for converting text into handwritten text images.

VS Code (Code Editor)

Visual Studio Code is a streamlined code editor with support for development operations like debugging, task running, and version control. It aims to provide just the tools a developer needs for a quick code-build-debug cycle and leaves more complex workflows to fuller featured IDEs, such as Visual Studio IDE. Here, VS Code has been preferred as a developing environment and code editor for its nice interface and presence of very useful extensions and shortcuts.

3. REQUIREMENT AND ANALYSIS

System Analysis is about complete understanding of existing systems and finding where the existing system fails. The solution is determined to resolve issues in the proposed system. It defines the system. The system is divided into smaller parts. Their functions and inter relation of these modules are studied in system analysis. The complete analysis is followed below.

3.1 PROBLEM DEFINITION

Usually, user needs to manually manage multiple sets of applications to complete one task. For example, a user trying to make a travel plan needs to check for airport codes for nearby airports and then check travel sites for tickets between combinations of airports to reach the destination. There is need of a system that can manage tasks effortlessly.

We already have multiple virtual assistants. But we hardly use it. There are number of people who have issues in voice recognition. These systems can understand English phrases but they fail to recognize in our accent. Our way of pronunciation is way distinct from theirs. Also, they are easy to use on mobile devices than desktop systems. There is need of a virtual assistant that can understand English in Indian accent and work on desktop system.

When a virtual assistant is not able to answer questions accurately, it's because it lacks the proper context or doesn't understand the intent of the question. Its ability to answer questions relevantly only happens with rigorous optimization, involving both humans and machine learning. Continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviors. They require large amount of information to be fed in order for it to work efficiently.

Virtual assistant should be able to model complex task dependencies and use these models to recommend optimized plans for the user. It needs to be tested for finding optimum paths when a task has multiple sub-tasks and each sub-task can have its own sub-tasks. In such a case there can be multiple solutions to paths, and then it should be able to consider user preferences, other active tasks, and priorities in order to recommend a particular plan.

3.2 REQUIREMENT SPECIFICATION

Personal assistant software is required to act as an interface into the digital world by understanding user requests or commands and then translating into actions or recommendations based on agent's understanding of the world.

JIA focuses on relieving the user of entering text input and using voice as primary means of user input. Agent then applies voice recognition algorithms to this input and records the input. It then use this input to call one of the personal information management applications such as task list or calendar to record a new entry or to search about it on search engines like Google, Bing or Yahoo etc. Focus is on capturing the user input through voice, recognizing the input and then executing the tasks if the agent understands the task. Software takes this input in natural language, and so makes it easier for the user to input what he or she desires to be done.

Voice recognition software enables hands free use of the applications, lets users to query or command the agent through voice interface. This helps users to have access to the agent while performing other tasks and thus enhances value of the system itself. JIA also have ubiquitous connectivity through Wi-Fi or LAN connection, enabling distributed applications that can leverage other APIs exposed on the web without a need to store them locally.

Virtual assistants must provide a wide variety of services. These include:

- Providing information such as weather, facts from e.g. Wikipedia etc.
- Set an alarm or make to-do lists and shopping lists.
- Remind you of birthdays and meetings.
- Play music from streaming services such as Saavn and Gaana.
- Play videos, TV shows or movies on televisions, streaming from e.g. Netflix or Hotstar.
- Book tickets for shows, travel and movies

• Feasibility Study

Feasibility study can help you determine whether or not you should proceed with your project. It is essential to evaluate cost and benefit. It is essential to evaluate cost and benefit of the proposed system. Five types of feasibility study are taken into consideration.

1. **Technical feasibility:** It includes finding out technologies for the project, both hardware and software. For virtual assistant, user must have microphone to convey their message and a speaker to listen when system speaks. These are very cheap now a days and everyone generally possess them. Besides, system needs internet connection. While using JIA, make sure you have a steady internet connection. It is also not an issue in this era where almost every home or office has Wi-Fi.
2. **Operational feasibility:** It is the ease and simplicity of operation of proposed system. System does not require any special skill set for users to operate it. In fact, it is designed to be used by almost everyone. Kids who still don't know to write can read out problems for system and get answers.
3. **Economical feasibility:** Here, we find the total cost and benefit of the proposed system over current system. For this project, the main cost is documentation cost. User also would have to pay for microphone and speakers. Again, they are cheap and available. As far as maintenance is concerned, JIA won't cost too much.
4. **Organizational feasibility:** This shows the management and organizational structure of the project. This project is not built by a team. The management tasks are all to be carried out by a single person. That won't create any management issues and will increase the feasibility of the project.
5. **Cultural feasibility:** It deals with compatibility of the project with cultural environment. Virtual assistant is built in accordance with the general culture. The project is named JIA so as to represent Indian culture without undermining local beliefs.

This project is technically feasible with no external hardware requirements. Also it is simple in operation and does not cost training or repairs. Overall feasibility study of the project reveals that the goals of the proposed system are achievable. Decision is taken to proceed with the project.

3.3 HARDWARE AND SOFTWARE REQUIREMENTS

The software is designed to be light-weighted so that it doesn't be a burden on the machine running it. This system is being build keeping in mind the generally available hardware and software compatibility. Here are the minimum hardware and software requirement for virtual assistant.

Hardware:

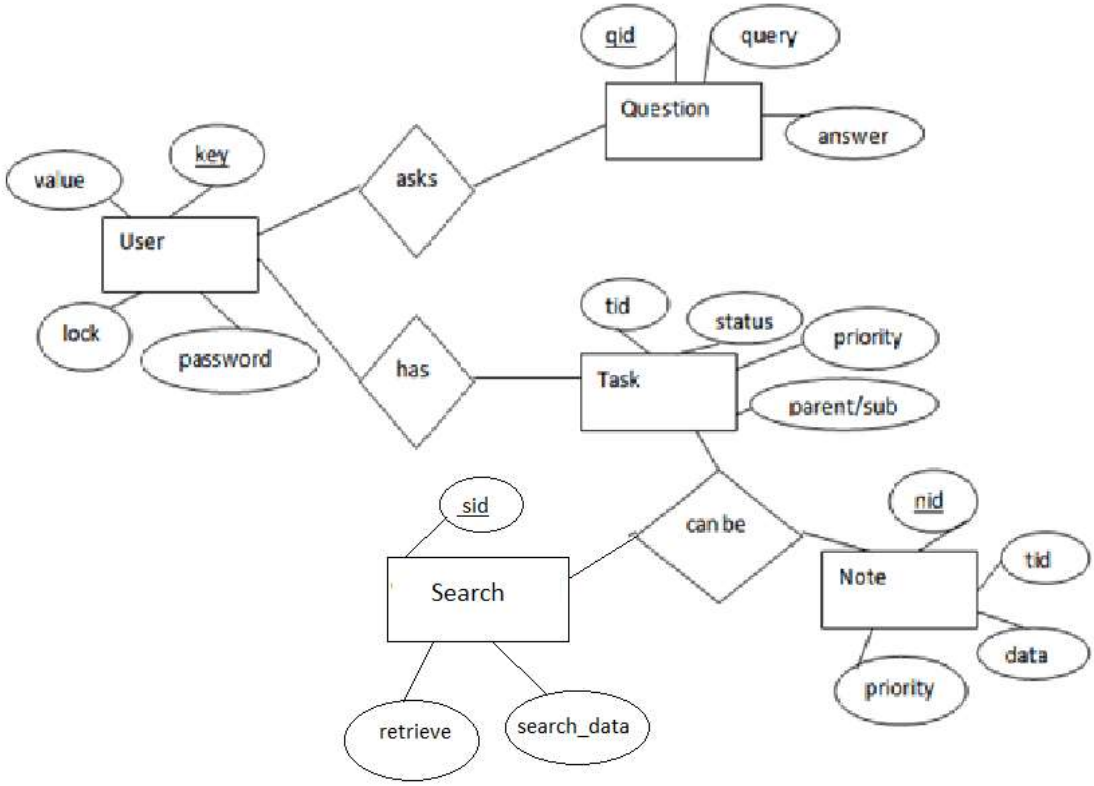
- Pentium-pro processor or later.
- RAM 512MB or more.

Software:

- Windows 7(32-bit) or above.
- Python 2.7 or later
- Chrome Driver

4. SYSTEM DESIGN

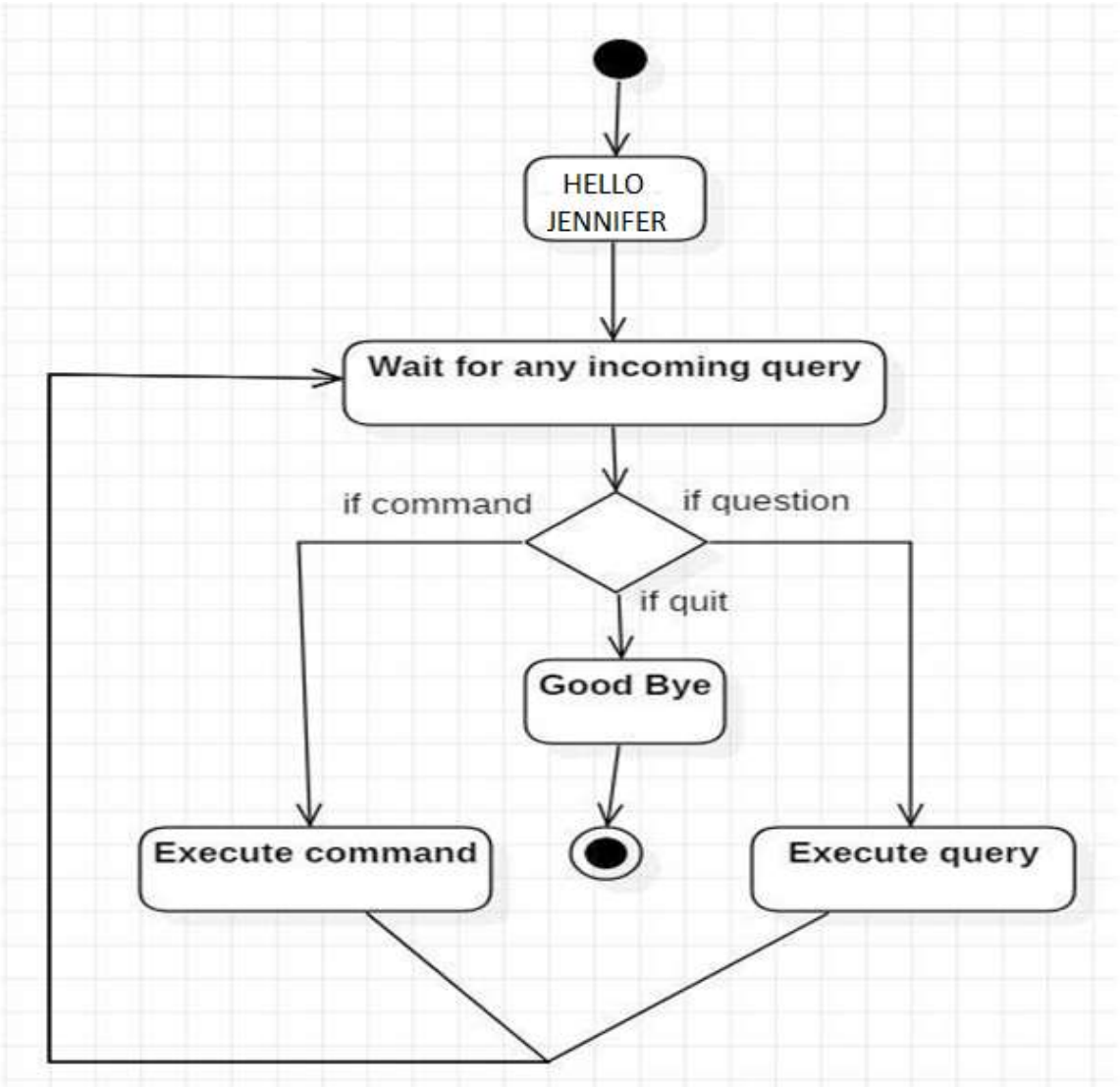
4.1 ER (Entity Relationship) DIAGRAM



The above diagram shows entities and their relationship for a virtual assistant system. We have a user of a system who can have their keys and values. It can be used to store any information about the user. Say, for key “name” value can be “Jim”. For some keys user might like to keep secure. There he can enable lock and set a password (voice clip).

Single user can ask multiple questions. Each question will be given ID to get recognized along with the query and its corresponding answer. User can also be having n number of tasks. These should have their own unique id and status i.e. their current state. A task should also have a priority value and its category whether it is a parent task or child task of an older task.

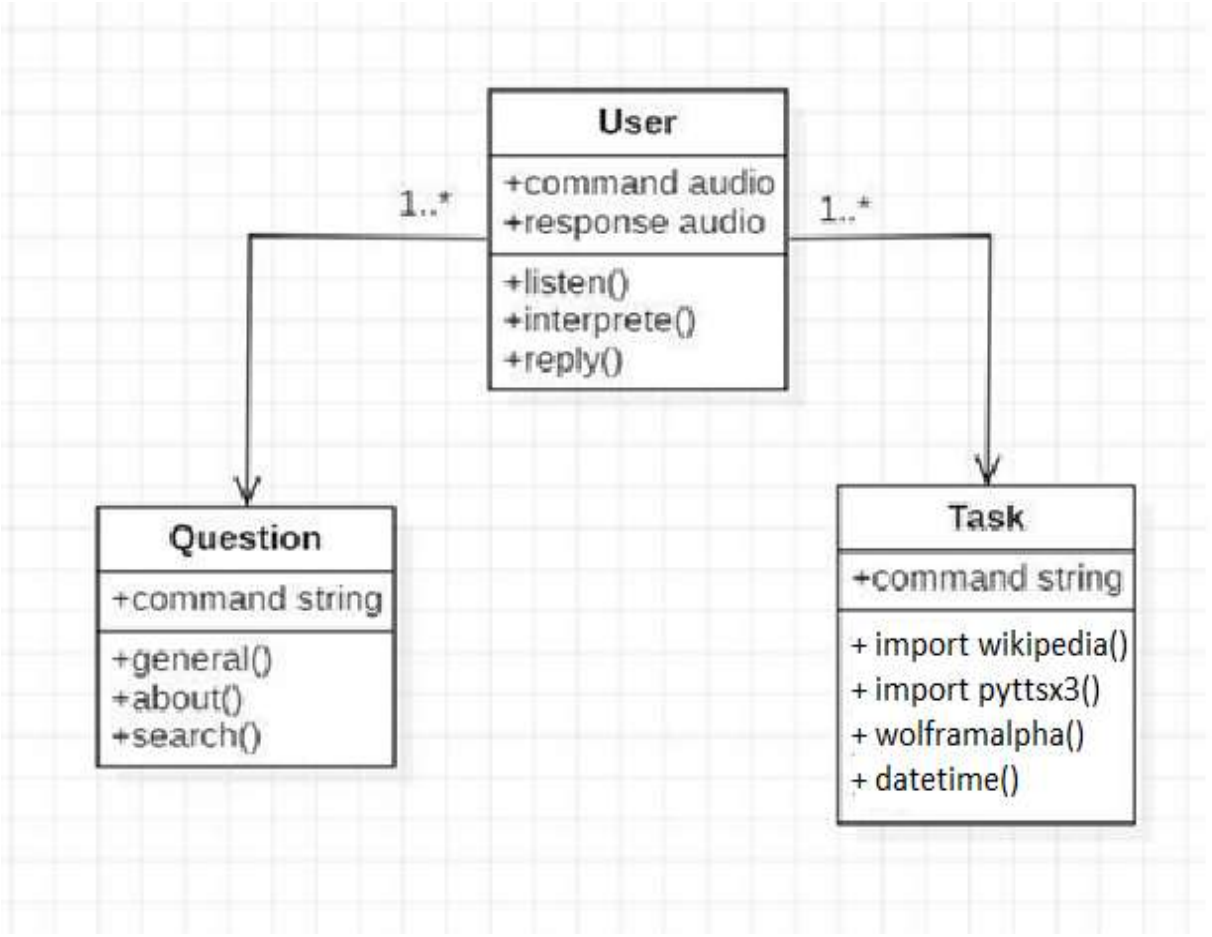
4.2 ACTIVITY DIAGRAM OF OUR VOICE ASSISTANT "JENNIFER"



Initially, the system is in idle mode. As it receives any wake up cal it begins execution.

The received command is identified whether it is a questionnaire or a task to be performed. Specific action is taken accordingly. After the Question is being answered or the task is being performed, the system waits for another command. This loop continues unless it receives quit command. At that moment, it goes back to sleep.

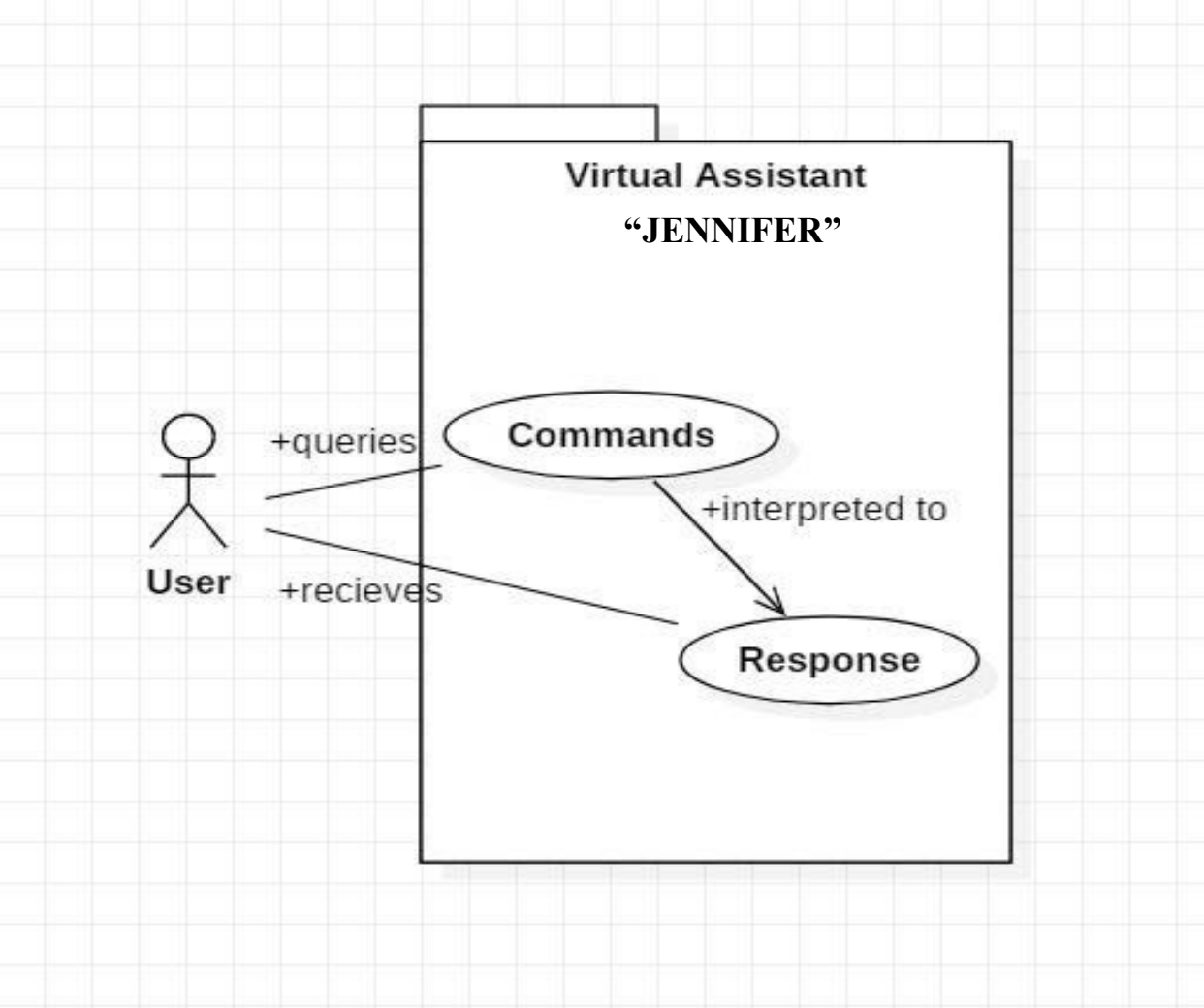
4.3 CLASS DIAGRAM OF OUR VOICE ASSISTANT "JENNIFER"



The class user has 2 attributes command that it sends in audio and the response it receives which is also audio. It performs function to listen the user command. Interpret it and then reply or sends back response accordingly. Question class has the command in string form as it is interpreted by interpret class. It sends it to general or about or search function based on its identification.

The task class also has interpreted command in string format. It has various functions like reminder, note, mimic, research and reader.

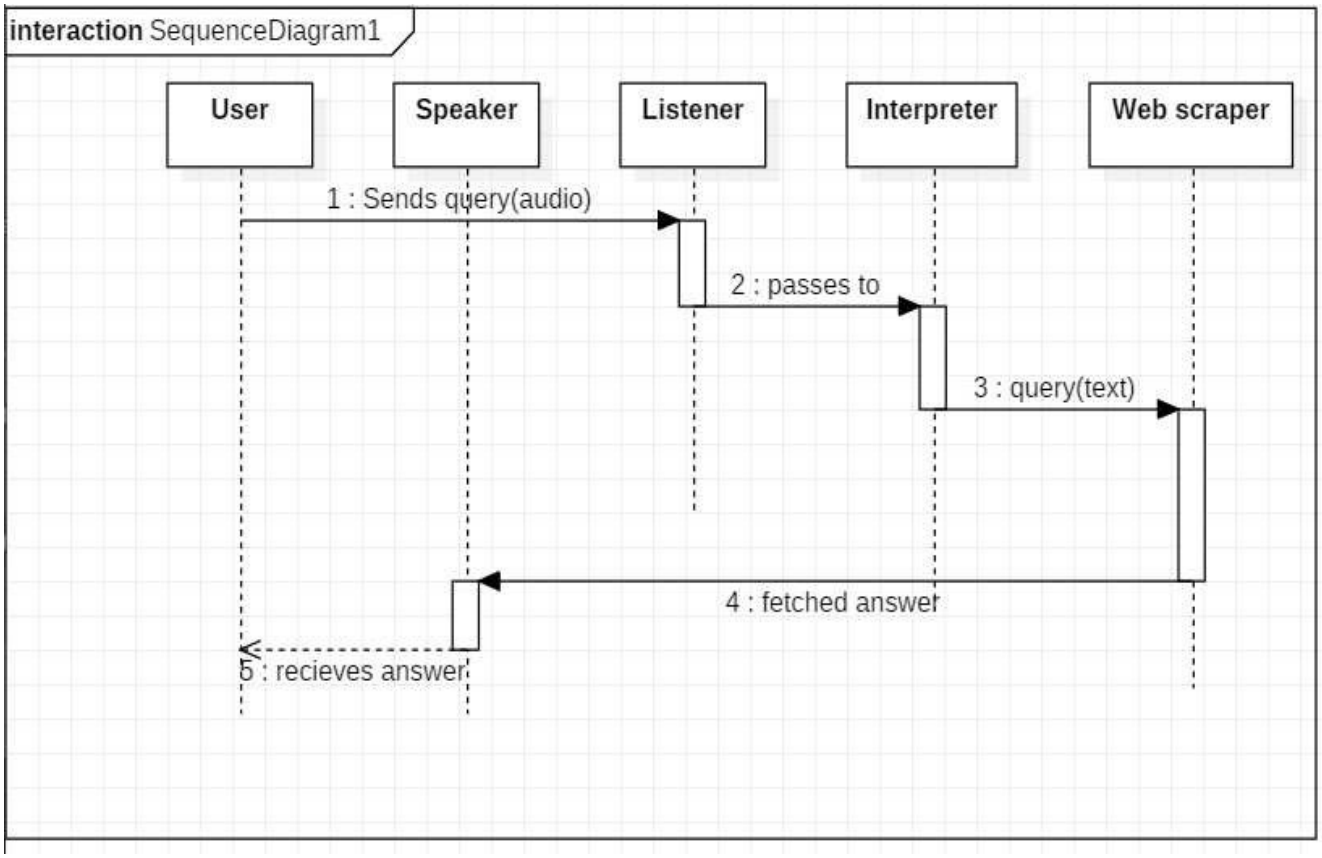
4.4 USE CASE DIAGRAM OF VOICE ASSISTANT "JENNIFER"



In this project there is only one user. The user queries command to the system. System then interprets it and fetches answer. The response is sent back to the user.

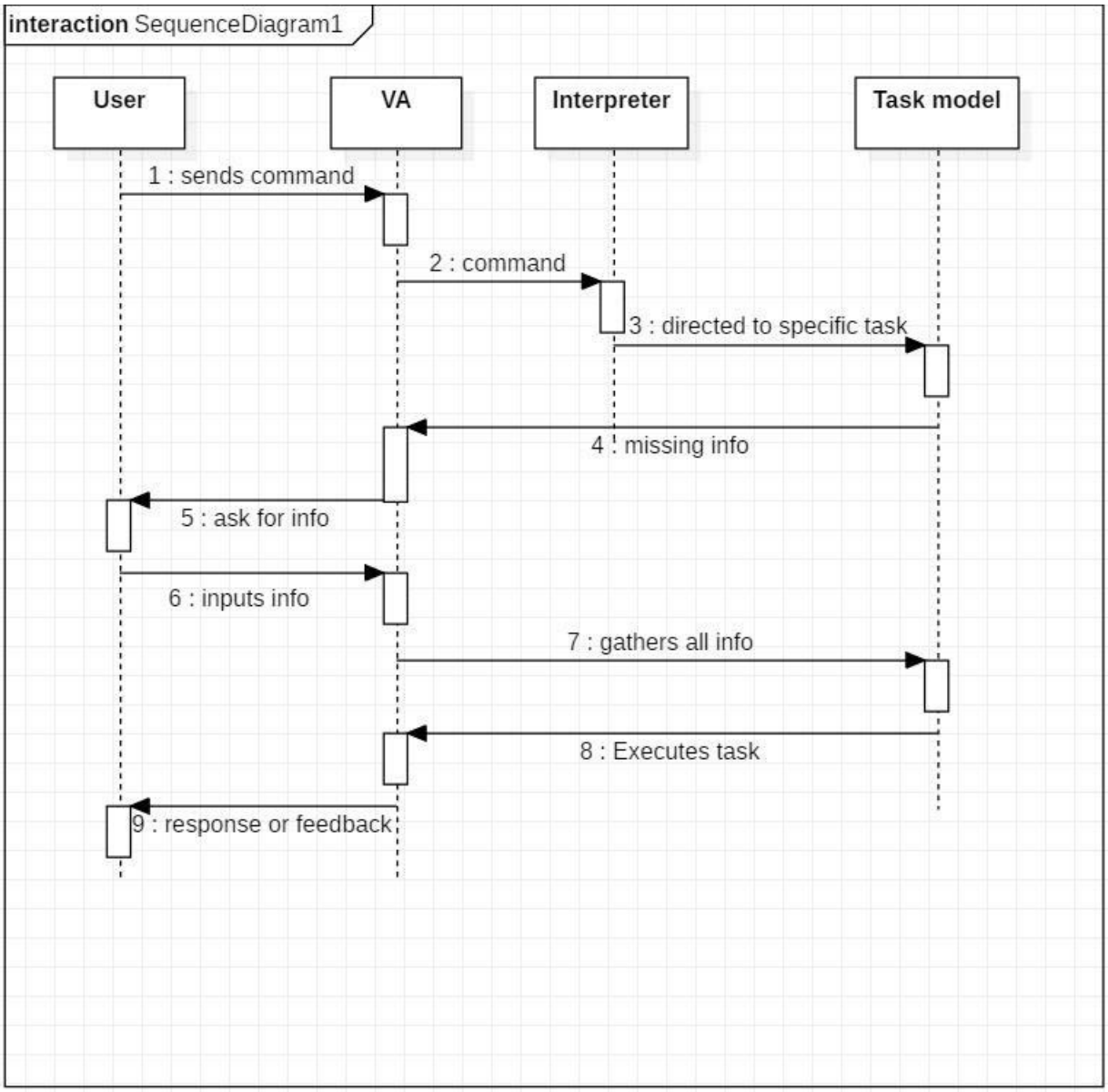
4.5 SEQUENCE DIAGRAM OF THE TASKS TO PERFROM

4.5.1 Sequence diagram for Query-Response



The above sequence diagram shows how an answer asked by the user is being fetched from internet. The audio query is interpreted and sent to Web scraper. The web scraper searches and finds the answer. It is then sent back to speaker, where it speaks the answer to user.

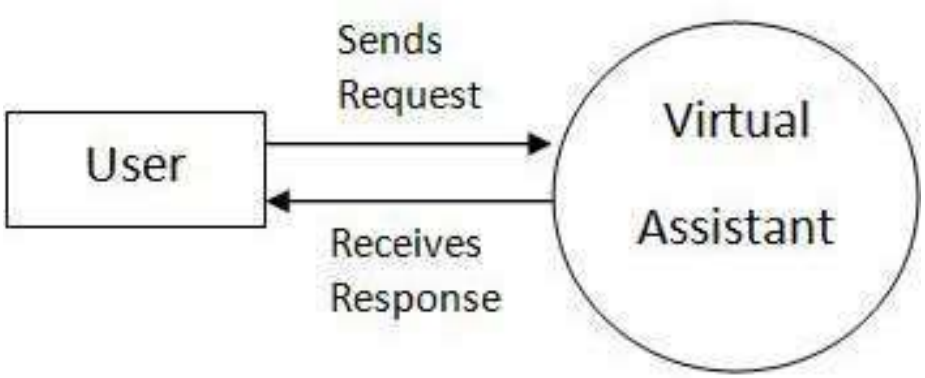
4.5.2 Sequence Diagram for Task Execution



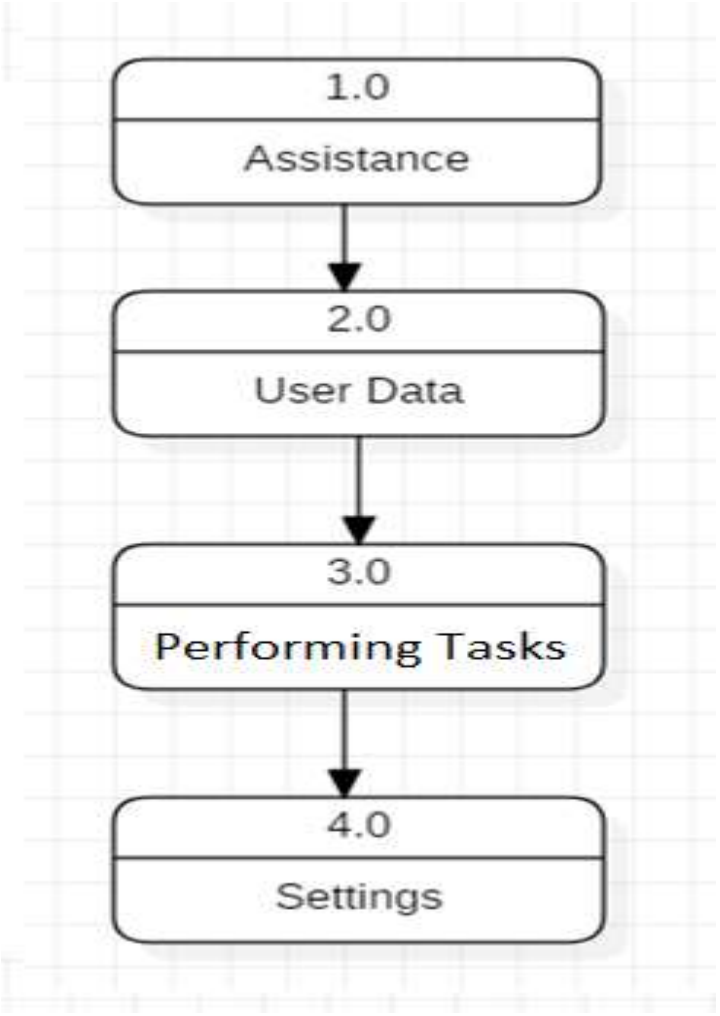
The user sends command to virtual assistant in audio form. The command is passed to the interpreter. It identifies what the user has asked and directs it to task executer. If the task is missing some info, the virtual assistant asks user back about it. The received information is sent back to task and it is accomplished. After execution feedback is sent back to user.

4.6 DATA FLOW DIAGRAM (D.F.D)

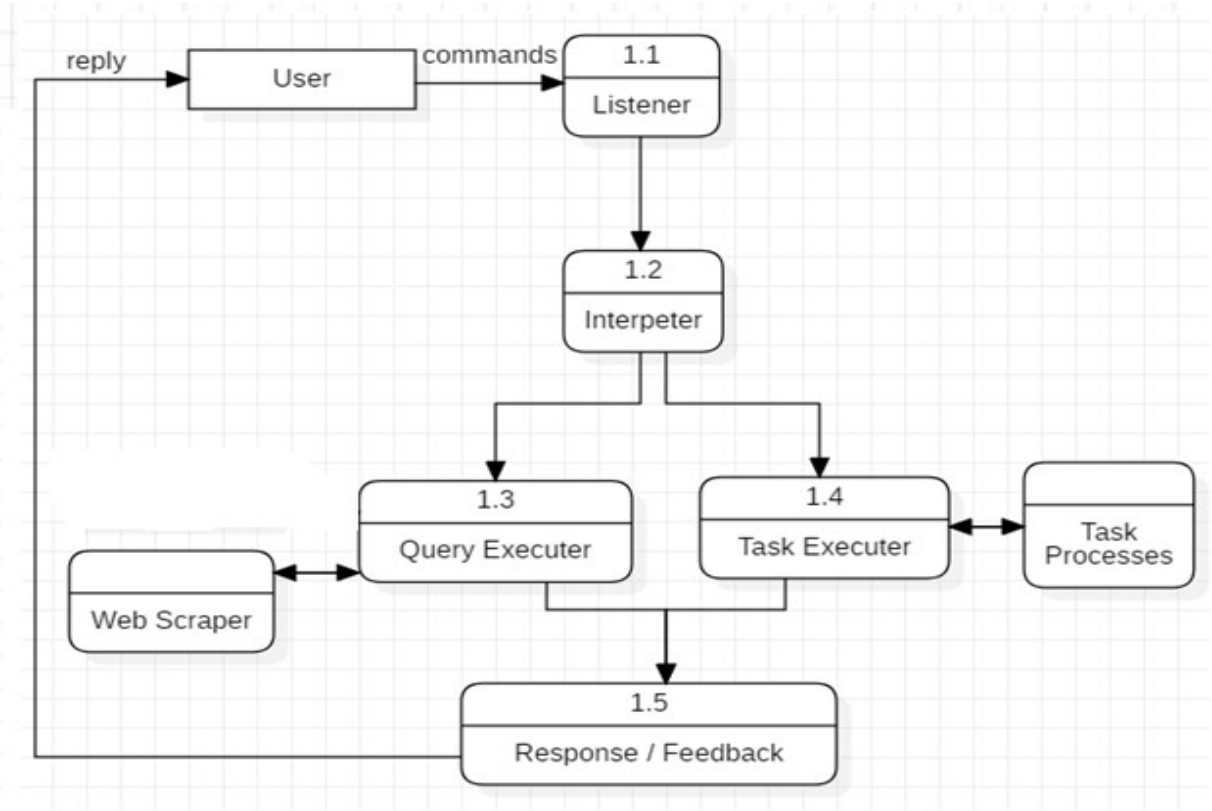
4.6.1 DFD Level 0 (Context Level Diagram)



4.6.2 DFD Level 1

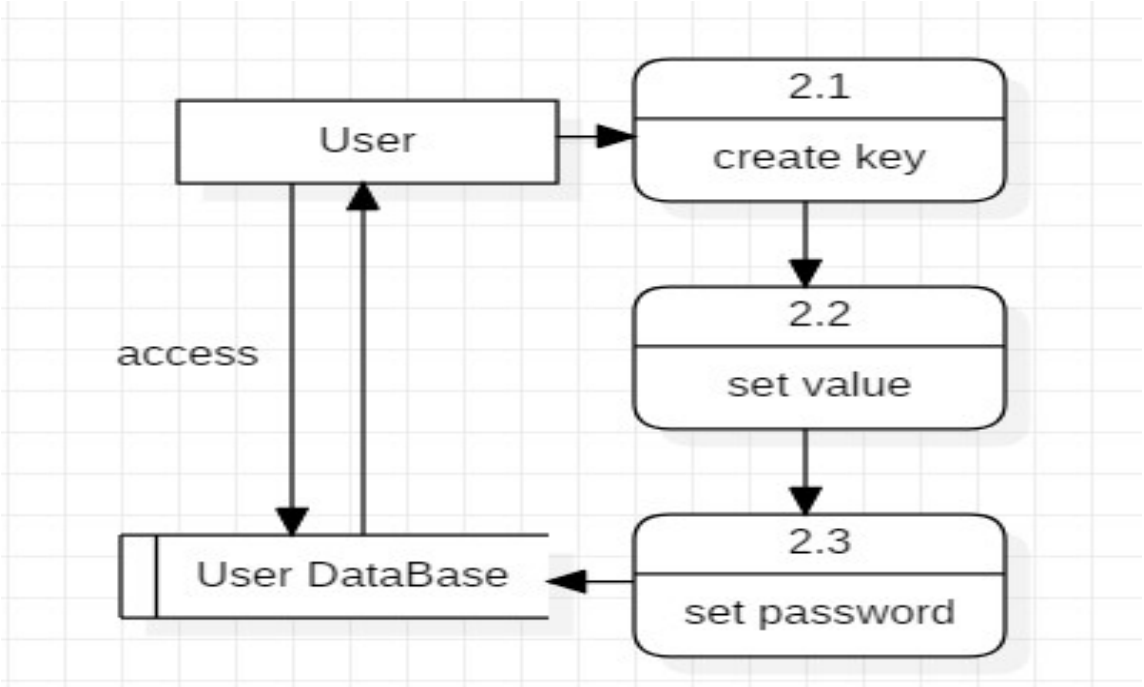


4.6.3 DFD Level 2

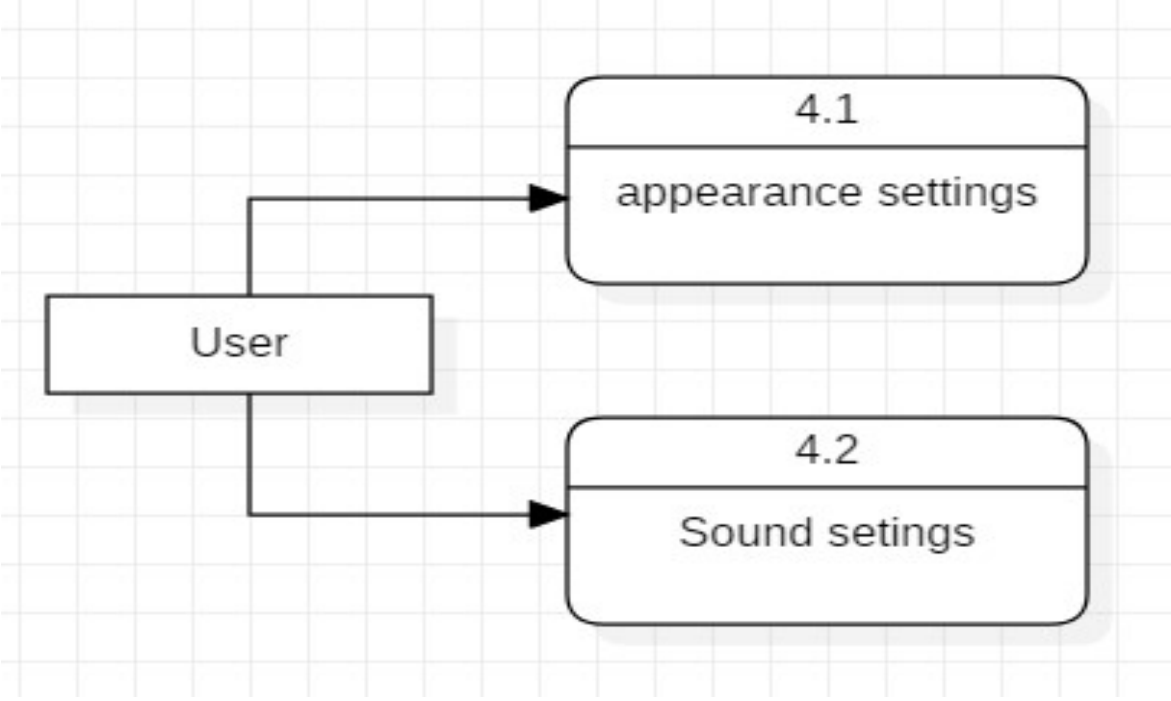


Complete Data Flow in our Assistant "Jennifer"

Managing User Data

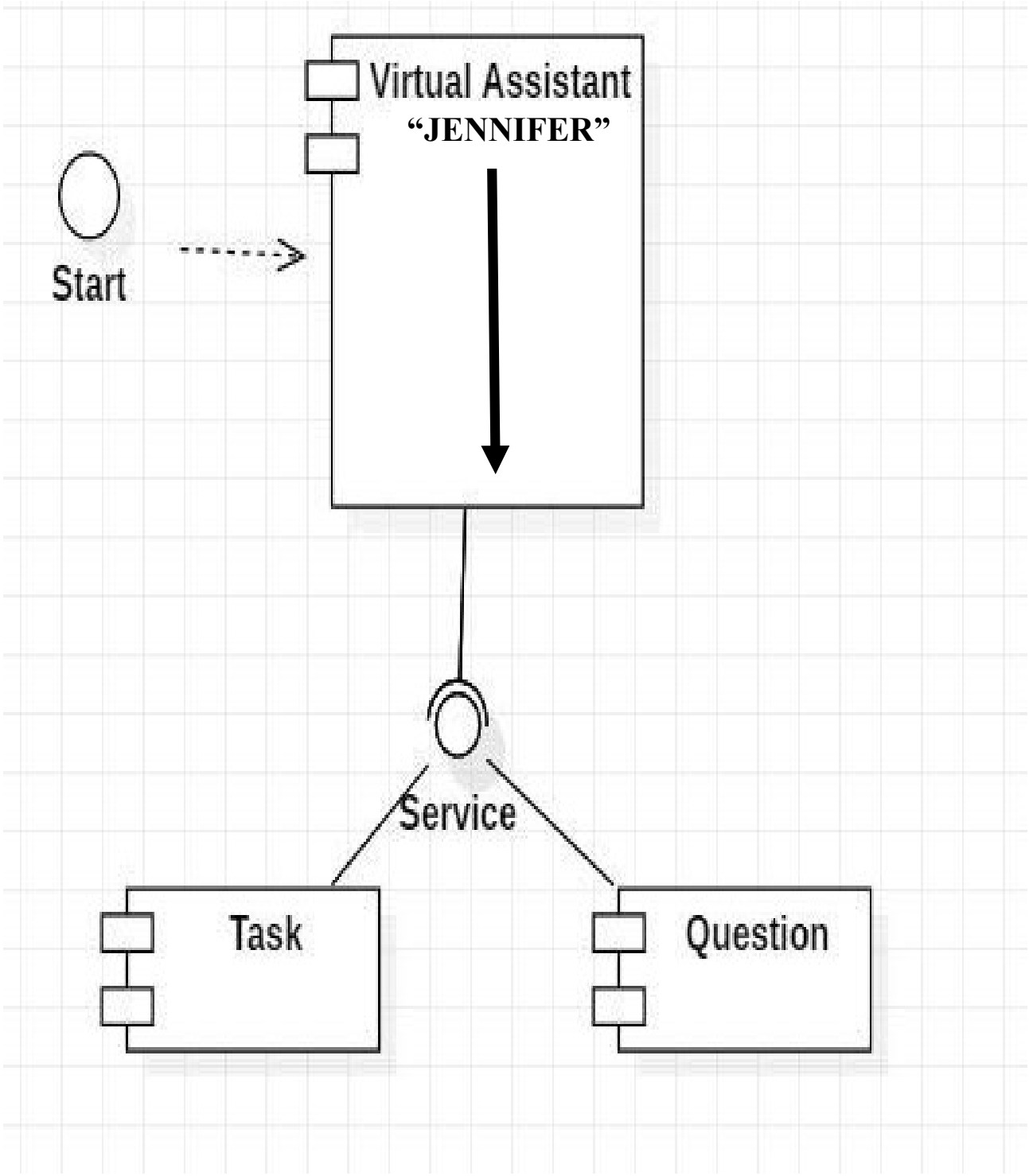


Settings of Virtual Assistant



4.7 COMPONENT DIAGRAM

The main component here is the Virtual Assistant. It provides two specific service, executing Task or Answering your question.



4.8 TEST CASE DESIGN

- **Test Case1**

Test Title: Response Time

Test ID: T1

Test Priority: High

Test Objective: To make sure that the system respond back time is efficient.

Description:

Time is very critical in a voice based system. As we are not typing inputs, we are speaking them. The system must also reply in a moment. User must get instant response of the query made.

- **Test Case 2**

Test Title: Accuracy

Test ID:T2

Test Priority: High

Test Objective: To assure that answers retrieved by system are accurate as per gathered data.

Description:

A virtual assistant system is mainly used to get precise answers to any question asked. Getting answer in a moment is of no use if the answer is not correct. Accuracy is of utmost importance in a virtual assistant system.

- **Test Case3**

Test Title: Approximation

Test ID: t3

Test priority: Moderate

Test Objective: To check approximate answers about calculations.

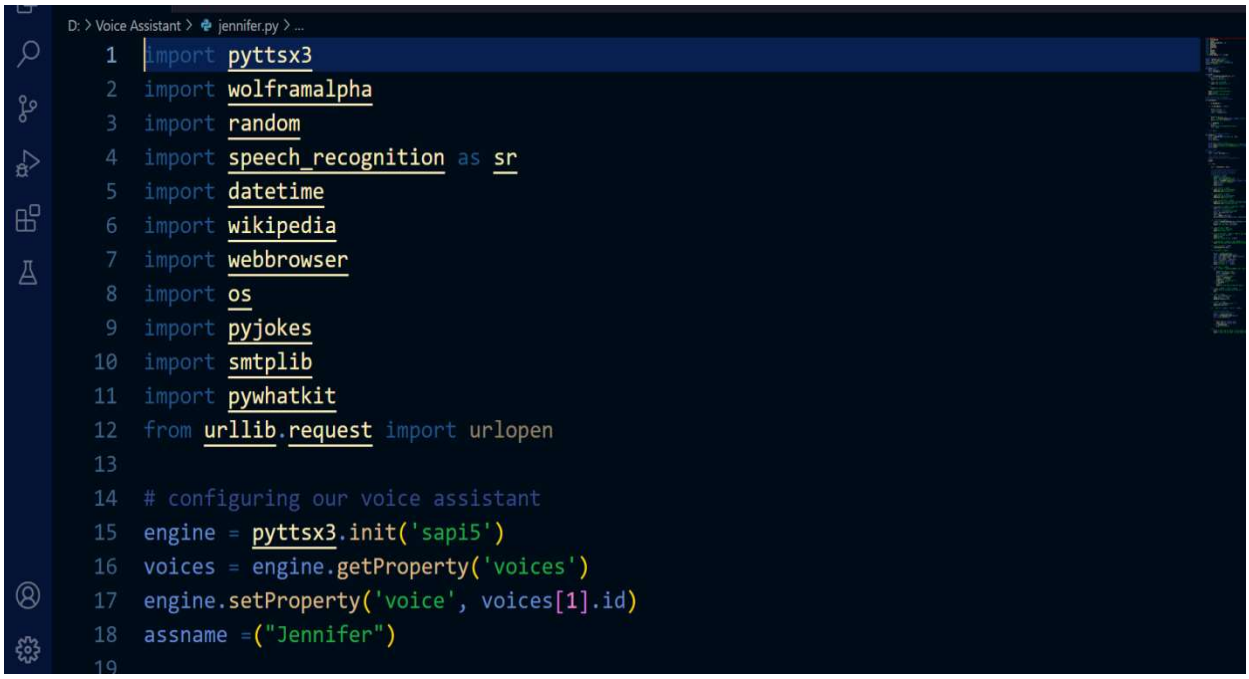
Description:

There are times when mathematical calculation requires approximate value. For example, if someone asks for value of PI the system must respond with approximate value and not the accurate value. Getting exact value in such cases is undesirable.

➢ Note: There might include a few more test cases and these test cases are also subject to change with the final software development.

5. SAMPLE CODE SNIPPET: -

- **SOURCE CODE:**



```
D: > Voice Assistant > jennifer.py > ...
1  import pyttsx3
2  import wolframalpha
3  import random
4  import speech_recognition as sr
5  import datetime
6  import wikipedia
7  import webbrowser
8  import os
9  import pyjokes
10 import smtplib
11 import pywhatkit
12 from urllib.request import urlopen
13
14 # configuring our voice assistant
15 engine = pyttsx3.init('sapi5')
16 voices = engine.getProperty('voices')
17 engine.setProperty('voice', voices[1].id)
18 assname =("Jennifer")
19
```

```
D: > Voice Assistant > jennifer.py > ...
38     speak("How can i Help you, Sir")
39
40 # this function takes user command
41 # and converts it to an executable query
42 def takeCommand():
43
44     r = sr.Recognizer()
45
46     with sr.Microphone() as source:
47
48         print("Listening...")
49         r.pause_threshold = 1
50         audio = r.listen(source)
51
52     try:
53         print("Recognizing...")
54         query = r.recognize_google(audio, Language ='en-in')
55         print(f"User said: {query}\n")
56
```


jennifer.py
D: > Voice Assistant > jennifer.py > ...
88 # All the commands said by user will be
89 # stored here in 'query' and will be
90 # converted to lower case for easily
91 # recognition of command
92 if 'wikipedia' in query:
93 speak('Searching Wikipedia...')
94 query = query.replace("wikipedia", "")
95 results = wikipedia.summary(query, sentences = 2)
96 speak("According to Wikipedia")
97 print(results)
98 speak(results)
99
100 elif 'open youtube' in query:
101 speak("Here you go to Youtube\n")
102 webbrowser.open("youtube.com")
103
104 elif 'open google' in query:
105 speak("Here you go to Google\n")
Ln 1, Col 1 Spaces: 4 UTF-8 CRLF Python 3.10.1 64-bit


jennifer.py
D: > Voice Assistant > jennifer.py > ...
138 elif 'tell me a joke' in query:
139 speak(pyjokes.get_joke())
140
141 elif 'calculate' in query:
142
143 app_id = "53RRWR-3PG84VJEX7"
144 client = wolframalpha.Client(app_id)
145 indx = query.lower().split().index('calculate')
146 query = query.split()[indx + 1:]
147 res = client.query(' '.join(query))
148 answer = next(res.results).text
149 print("The answer is " + answer)
150 speak("The answer is " + answer)
151
152 elif 'send email' in query:
153 dict = {'ayush': 'ayushcoolz10@gmail.com', 'dev krishna': 'devkroy2001@gmail
154 try:
155 speak("whom should i send")
Ln 1, Col 1 Spaces: 4 UTF-8 CRLF Python 3.10.1 64-bit

SAMPLE OUTPUT:

```
Listening...
Recognizing...
User said: who are you

My name is Jennifer and I am your personal voice assitant
Listening...
Recognizing...
User said: who created user report

I didn't get you there, can you please repeat that
Listening...
Recognizing...
User said: who created you Jennifer

Two gentlemen named Mayank and Dev Krishna created me
Listening...
Recognizing...
User said: what's the time

Sir, the time is 16:37:31
Listening...
```

```
Listening...
Recognizing...
User said: calculate 25 multiply 5

The answer is 125
Listening...
Recognizing...
User said: calculate sin 30

The answer is 1/2
Listening...
Recognizing...
User said: Amitabh Bachchan Wikipedia

Amitabh Bachchan (pronounced [əmɪˈt̪ɑːbʱ ˈbət̪ːʃən]; born Amitabh Srivastava; 11 October 1942) is an Indian actor, 
ck singer and former politician known for his work in Hindi cinema. He is regarded as one of the most influential
Listening...
Recognizing...
User said: play music

['adhi-adhi-raat-bilal-saeed-128-kbps-sound.mp3', 'Brown Munde - AP Dhillon.mp3', 'chidiya-vilen-128-kbps-sound.m
s-sound.mp3', 'Tu Aake Dekhle (AmitMusic.In).mp3']
Listening...
```

```
Listening...
Recognizing...
User said: what is rap music

noun | genre of African-American music of the 1980s and 1990s in which rhyming lyrics are chant
Listening...
Recognizing...
User said: what is greenhouse effect

noun | warming that results when solar radiation is trapped by the atmosphere; caused by atmosp
t is radiated back from the warmed surface of the earth
Listening...
Recognizing...
User said: what's the time

Sir, the time is 16:56:51
Listening...
Recognizing...
User said: tell me a joke

'Knock, knock.' 'Who's there?' ... very long pause ... 'Java.'
Listening...
```

```
Listening...
Recognizing...
User said: calculate integration of x cube

The answer is integral x x^3 dx = x^5/5 + constant
Listening...
Recognizing...
User said: Michael Jordan Wikipedia

Michael Jeffrey Jordan (born February 17, 1963), also known by his initials MJ, is an American businessman and forme
fteen seasons in the National Basketball Association (NBA), winning six NBA championships with the Chicago Bulls.
Listening...
Recognizing...
User said: tell me a joke

Two bytes meet. The first byte asks, 'Are you ill?' The second byte replies, 'No, just feeling a bit off.'
Listening...
Recognizing...
User said: exit

Thanks for giving me your time sir
PS C:\Users\mayan>
```

6. REFERENCE AND BIBLIOGRAPHY

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THANK YOU

MAYANK SHARMA

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