# *Project Report*

UNIVERSITY OF ASIA PACIFIC

DEPT. OF CSE

PROJECT TITLE:

## "JARVIS VOICE ASSISTANT"

SUBMITTED BY:

KANIZ FATIMA (18201030)

MEHEDI HASAN (18201042)

COURSE CODE:

CSE 410

COURSE TITLE:

SOFTWARE DEVELOPMENT

# Contents:

## Motivation

Knowingly, or unknowingly, personal assistants have become an integral part of our lives these days. It is because of all the features and ease of use they provide. Personal Assistants are also capable of automating some day-to-day tasks, so that a user can focus on what matters the most to them. Features like, making calls, writing messages, taking photographs, storing to-dos on the go, browsing internet etc., are offered by personal assistants. So, utilization of these features of a virtual assistant will save an individual a lot of time, and effort. Our motivation of developing this software was to make an open-source voice recognition system which can be edited and developed more by any user according to their need without spending huge amount of money on traditional voice recognition systems.

## Objective

People often spend more time on doing routine tasks, and they can be automated with these types of personal assistants. When someone works in an environment with which he/she is not familiar with, they often find it difficult to locate applications that they need, like browser, any IDE or nay other software. Most of the time, they will end up wasting hours of time, searching for the application alone. This results in unnecessary time wastage. Therefore, a voice enabled personal assistant will help automating this process. User is expected just to give a voice command, and the assistant will take care of the rest. Our objective is to develop a

Voice recognition assistant which can be implemented easily and modified by any user. For building it we have used pure python and exploited its different modules to implement it.

## Problem Statement

Voice assistants can answer questions, interact with apps, turn on lights, order food, and even find lost phones. People want to use voice recognition system for free. Also, they want to use that voice assistant as per their individual needs. We solve that problem by implementing an open-source voice recognition system which is JARVIS.

## Impact on Society

This project is going to decrease human effort and save time. The assistant can help to reduce human effort and consumes time while performing any task, it removed the concept of typing completely and behave as another individual to whom we are talking and asking to perform task. The assistant is no less than a human assistant, but we can say that this is more effective and efficient to perform any task. The libraries and packages used to make this assistant focuses on the time complexities and reduces time. Jarvis is different from other traditional voice assistants in terms that it is specific to desktop and user does not need to make account to use this, it does not require any internet connection while getting the instructions to perform any specific task.

# Related Works & Background Study

We have found some related work to our research. They are:

## RASPBERRY PI BASED PERSONAL VOICE ASSISTANT

The system's hardware model is designed in a way, where the main component is the raspberry pi to which various other peripherals (such as microphone, speaker, picampere, PIR sensor, buzzer etc.) are connected. The system works on the principle of speech recognition, the speech is fed through the microphone as an input which upon further parsing is converted to text and the system searches for desired key words to deliver to appropriate output and again the textual output is 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.

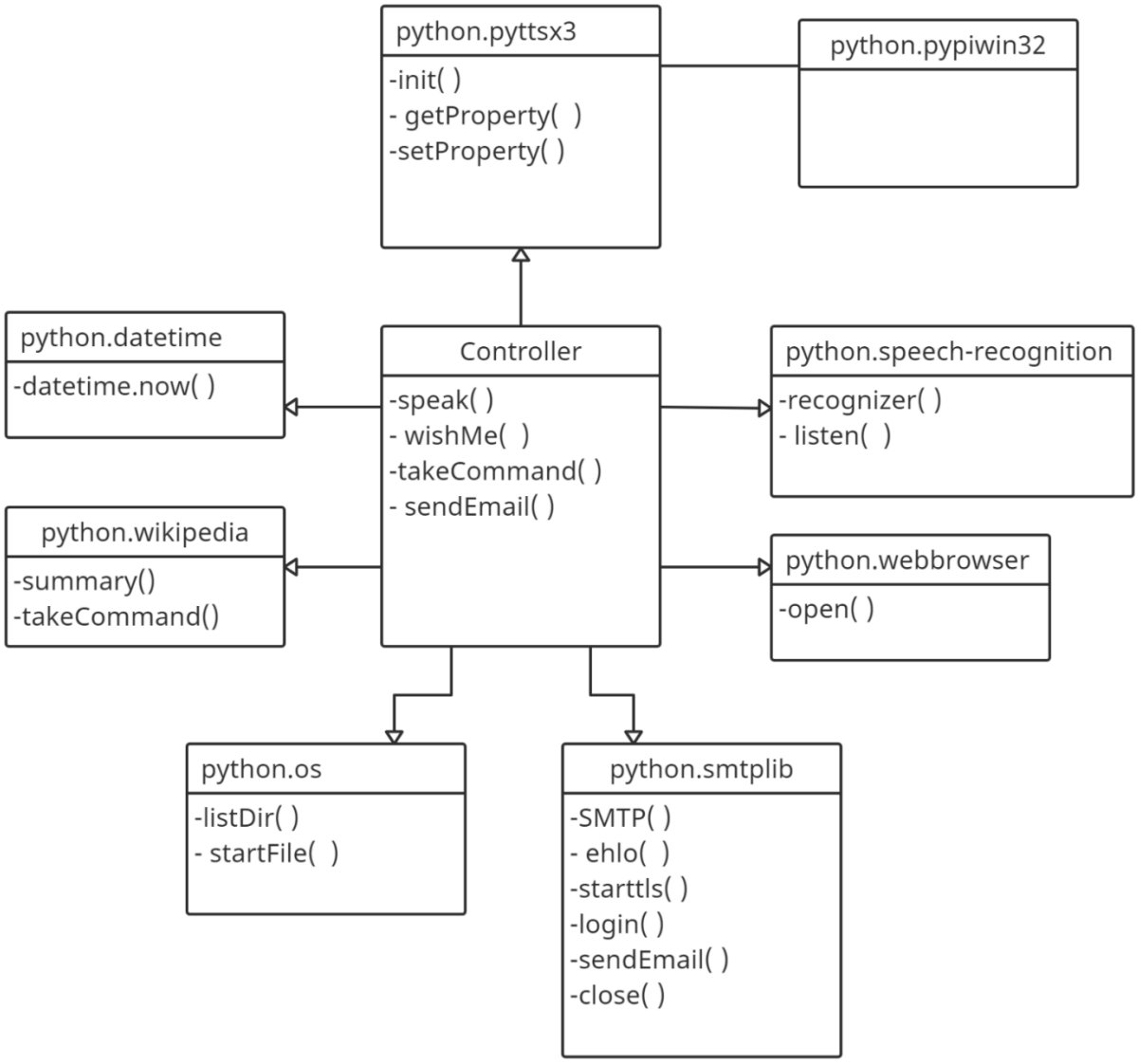
## HOME AUTOMATION USING CHATBOT AND VOICE ASSISTANT

Home Automation Systems have become a go-to arena in the recent years. In the following paper, we propose a Home Automation system that uses a wholesome blending of some technologies like Internet of Things, Natural Language Processing and Machine Learning. The prime feature of this system is that it provides two modes of communication to the user: Text and Voice. The text input from the user will be given via a Chatbot Application and the voice input from the user will be given via a voice assistant. The input will undergo Natural Language Processing to find the action that the user wants the system to perform. The IoT

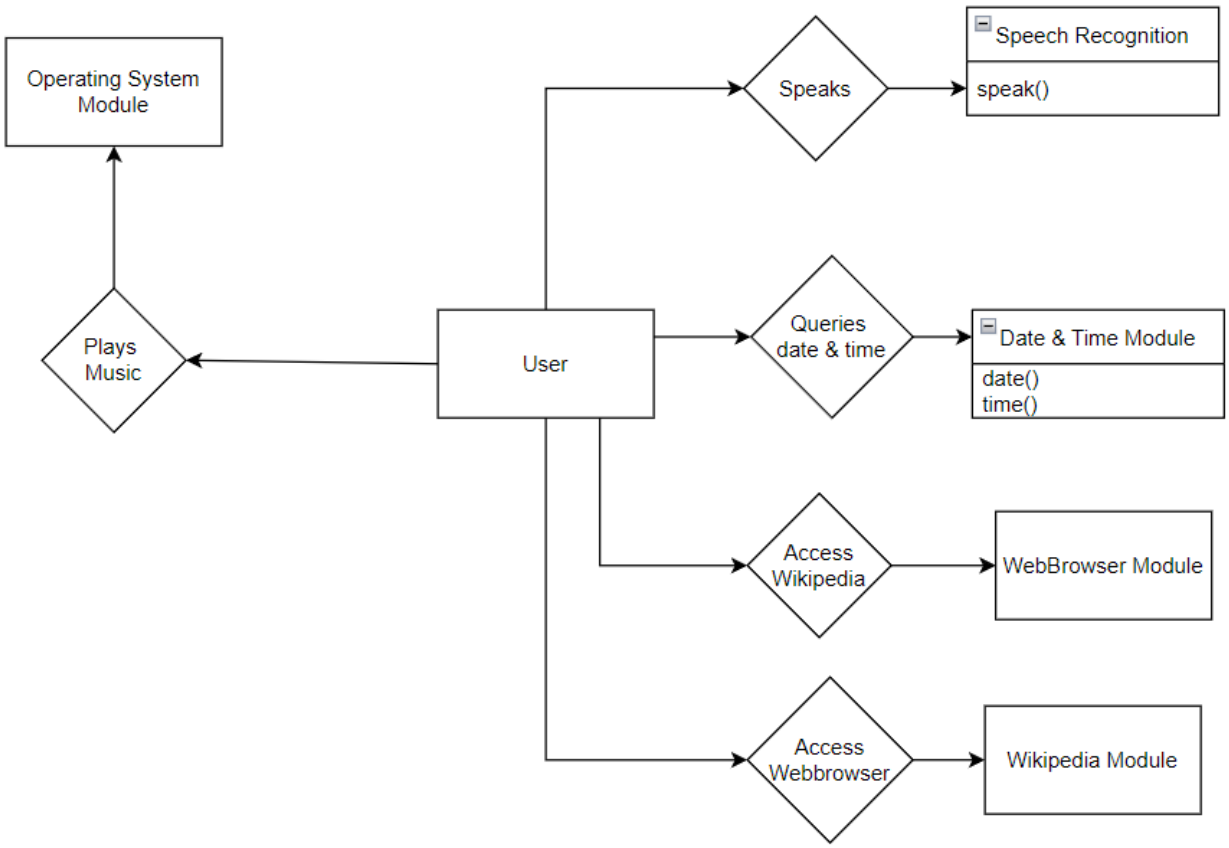
component, Raspberry Pi would perform the actuations in the form of switching On or Off of Lights and Fans of a room in the house.

# Solution Methodology

## UML Diagram



## ERD DIAGRAM


Operating System Module
Plays Music
User
Speaks
Speech Recognition
speak()
Queries date & time
Date & Time Module
date()
time()
Access Wikipedia
WebBrowser Module
Access Webbrowser
Wikipedia Module

# Risk Analysis

We have faced a few problems in this project.

I have a Windows 10 PC and I want to install pyaudio to use it with my chatbot, powered by chatterbot.

I tried 2 different ways to install pyaudio.

The first way is doing this on the command prompt:

```
python -m pip install PyAudio
```

This is the result:

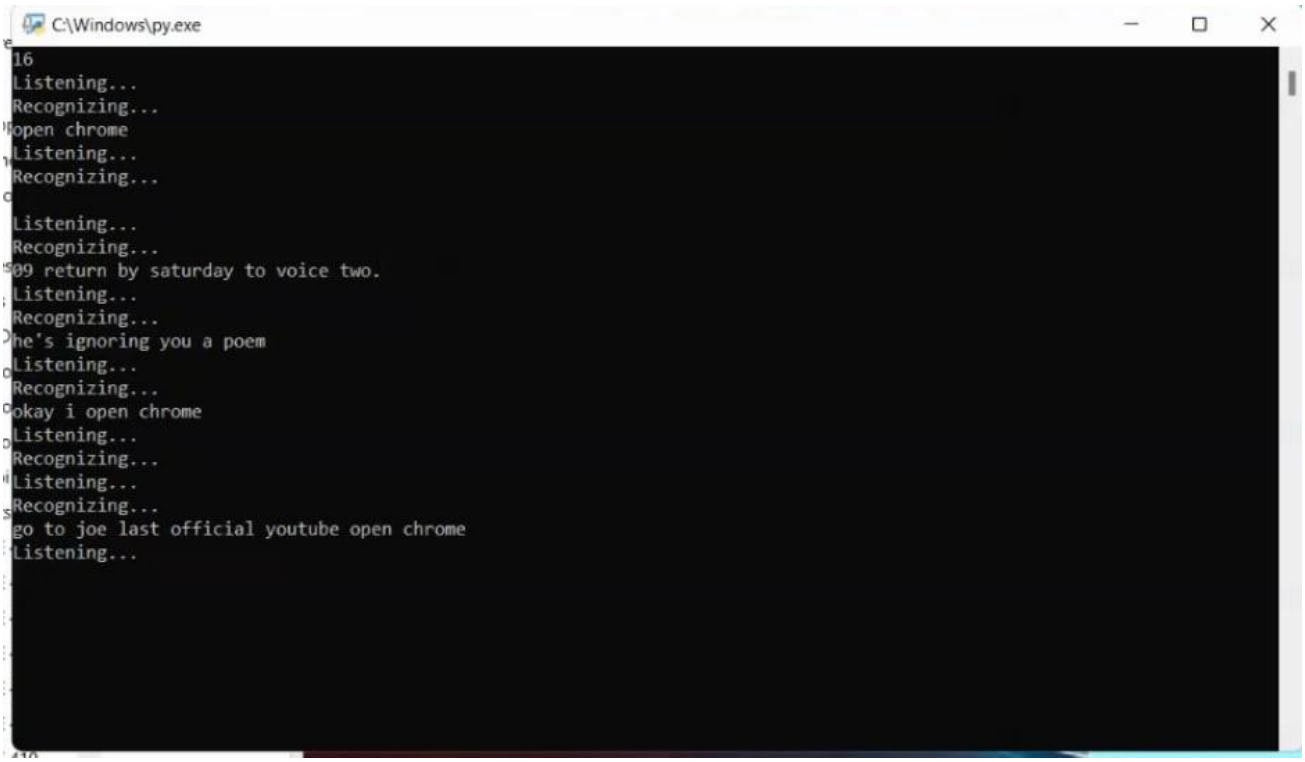
```
   C:\Users\Waaberi>python -m pip install PyAudio
Collecting PyAudio
  Using cached https://files.pythonhosted.org/packages/ab/42/b4f04721c5c5bfc196ce156b
Installing collected packages: PyAudio
  Running setup.py install for PyAudio ... error
    Complete output from command C:\Users\Waaberi\AppData\Local\Programs\Python\Pytho
    running install
    running build
    running build_py
    creating build
    creating build\lib.win32-3.7
    copying src\pyaudio.py -> build\lib.win32-3.7
    running build_ext
    building '_portaudio' extension
    error: Microsoft Visual C++ 14.0 is required. Get it with "Microsoft Visual C++ B

    ----------------------------------------
Command "C:\Users\Waaberi\AppData\Local\Programs\Python\Python37-32\python.exe -u -c
```

The same problem occurred while installing pyaudio and as solution we had to get it using a third-party website and installed it using windows

PowerShell. As third-party website we used unofficial python binaries. The link is given down below:

https://www.lfd.uci.edu/~gohlke/pythonlibs/

Another problem we have faced is that the voice assistant sometimes misinterprets the commands the users give it.

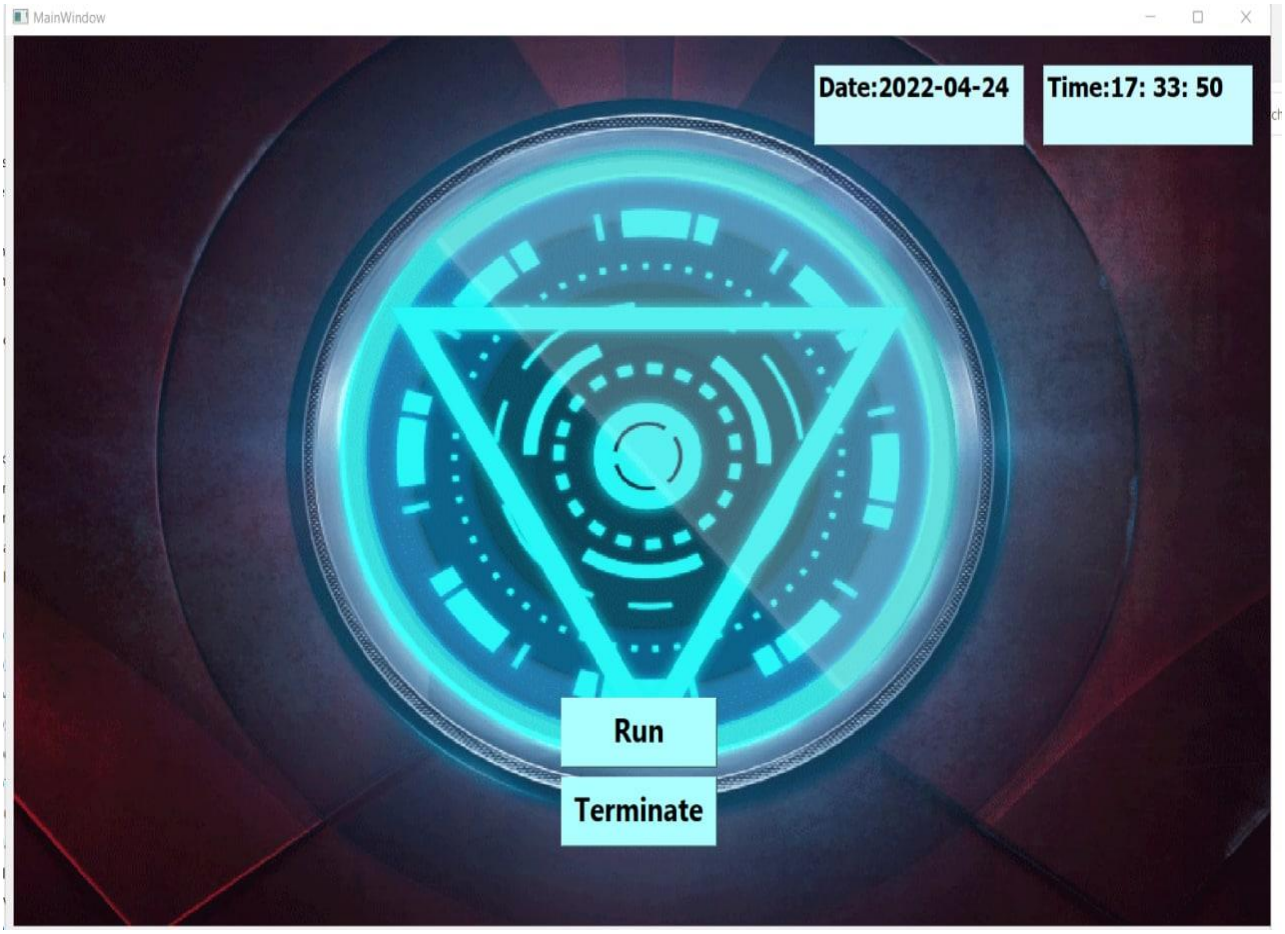



It is a very complex problem to fix since it doesn't understand too fast or too complicated commands.

# Results

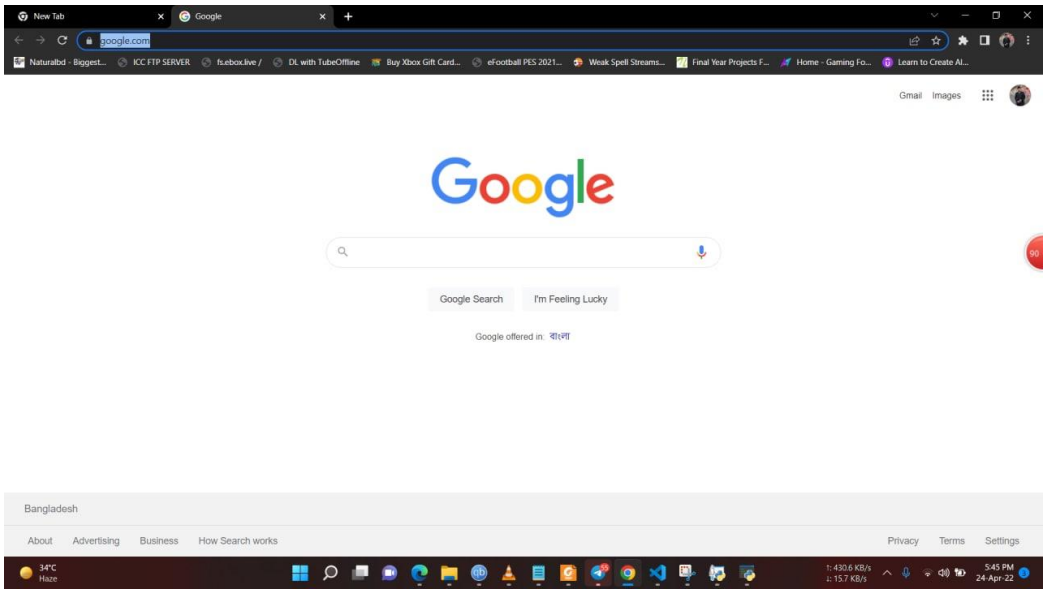
The completed project is shown down below:


This is the initial state of our project.




Once clicked on run it becomes active and this is how it looks like.

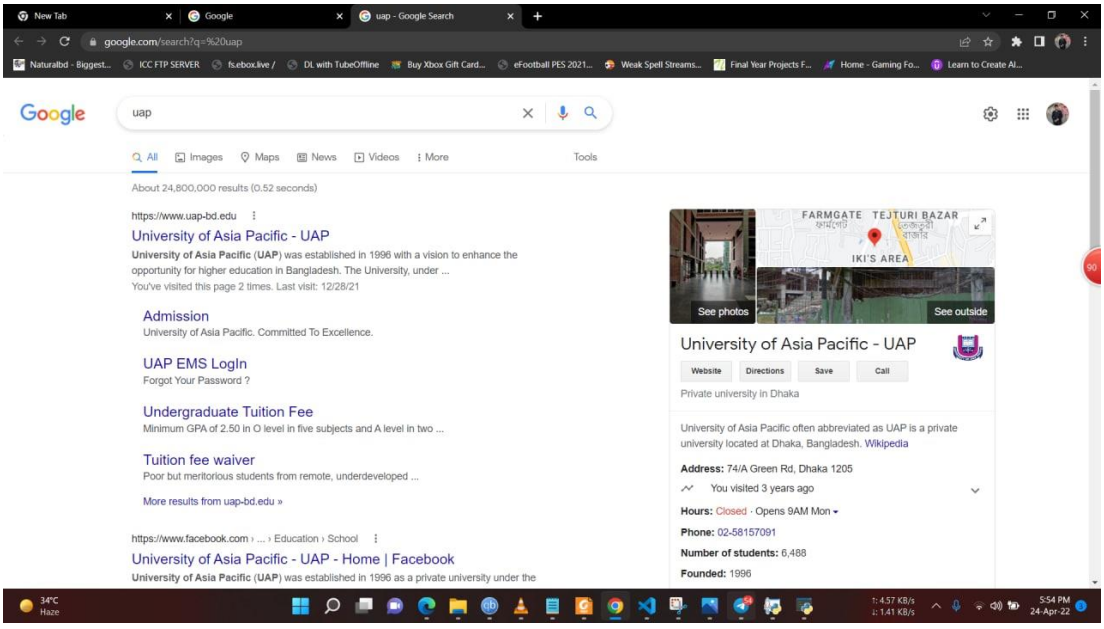
Here are some outputs of our commands:




Once above instruction is given this output can be seen.

```
Listening...
Recognizing...
search in chrome
Listening...
Recognizing...
Searching for  uap
Listening...
```

From this input the out we get is:



# Project Management

| Task | Time Duration |
|---|---|
| Project Proposal | 1st – 2nd week |
| Text to Speech, Different voice options and speed rate | 3rd week |
| Date & time function and greeting function | 4th week |
| Speech recognition and main function implementation | 5th – 6th week<br>7th – 8th week |
| Initiate Chrome search | 7th – 8th week |
| Play songs and finishing | 9th – 12th week |
| Report Writing | 13th week |
| Final presentation | 14th week |

# Learnings

By developing this project, we learned how can many modules be implemented and what do they do such as, PyAudio module, Pytts Module (Python Text to speech).

We also learned how to access web browser or open websites or search for queries using Webbrowser Module.

Also learned Querying something using Wikipedia Module.

Finally, we learned how to design a frontend using QT module and python GUI QTDesginer.

# References

[1] Hoy, Matthew B. (2018). "Alexa, Siri, Cortana, and More: An Introduction to Voice Assistants". Medical Reference Services Quarterly

[2] Klüwer, Tina. "From chatbots to dialog systems." Conversational agents and natural language interaction: Techniques and Effective Practices. IGI Global, 2011. 1–22.

# *Appendix A*

## CEP MAPPING

### HOW K'S ARE ADDRESSED THROUGH THE PROJECT

| Ks | Attributes | How the K's addressed through the project | Cos | POs |
|---|---|---|---|---|
| K3 | Engineering Knowledge Fundamental | This project requires knowledge of Python and PyCharm IDE and a good understanding of concepts of AI. Data analysis is also required. | CO1 | PO-a |
| K4 | Specialist Knowledge | On this system, there will be a machine learning and Artificial Intelligent based frontend which will need advanced engineering knowledge to implement. | CO1, CO2, CO4 | PO-a, PO-b, PO-e |
| K5 | Engineering Design | Here, we are using modern engineering design to identify and solve the problem with a powerful and more efficient approach. | CO3, CO4 | PO-c, PO-e |
| K6 | Engineering Practice | As we will need to implement voice recognition system, so using advanced technology for that is necessary. | CO5 | PO-f |
| K8 | Research Literature | A project requires a study of existing systems with similar goals such as Google Assistant, Amazon Alexa, and Microsoft Cortana. | CO10 | PO-l |

# HOW P'S ARE ADDRESSED THROUGH THE PROJECT

| PS | Attributes | How the Ps are addressed through the project | COs | POs |
|---|---|---|---|---|
| P1 | Depth of Knowledge requirement | The project requires rigorous study of all existing virtual voice assistant (K8), conducts surveys on stakeholders' customers, sellers, and monitoring authority (K3, K4), web-based backend, and frontend design (K5, K6). | CO1, CO2 | PO-a, PO-b |
| P2 | Range of conflicting requirement | Conflicting requirement: User data security with user data sharing in website. | CO2 | PO-b |
| P3 | Depth of analysis requirement | No obvious formulation as a machine learning problem. Depth of analysis is required to select the best algorithm for maximizing the result. | CO4, CO6 | PO-e, PO-h |
| P4 | Familiarity issues | Lack of open-source AI Assistant and traditional existing AI Assistant being very costly. | CO5, CO8 | PO-f, PO-k |
| P7 | Interdependence | This project involves interdependent components such as requirement analysis, designing back-end, frontend, data collection, training module and detection etc. | CO7, CO8 | PO-i, PO-k |

## ADDRESSING COMPLEX ACTIVITIES (AS) THROUGH THE PROJECT

| As | Attributes | How the A's are addressed | COs | POs |
|---|---|---|---|---|
| A1 | Range of Resources | For developing this project, we need diverse resources such as python, Visual Studio code IDE, python GUI. Also, we would need different python modules that can communicate and interact with user using voice command. Also, efficient developers are needed to implement it perfectly. | CO8 | PO-j |
| A2 | Level of Interaction | Users will give inputs using voice commands and the project will recognize what is being told using different Voice to text Modules and give output to the satisfaction of the user. | CO8 | PO-j |
| A5 | Familiarity | This project deals with Artificial Intelligence<br>Based on NLP (Natural Language Processing). | CO8 | PO-j |