THEE: YOU'R VOICE-CONTROLLED PERSONAL ASSISTANT USING ML

INTERDISCIPLINARY PROJECT REPORT

At

Sathyabama Institute of Science and Technology

(Deemed to be University)

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in Computer Science and Engineering

By

MIRSHITHA R (Reg.No: 41110802)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
12B STATUS UNIVERSITY BY UGC
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Interdisciplinary Project Report is the bonafide **work Mirshitha R (41110802)** who carried out the project entitled "**THEE: YOU'R VOICE-CONTROLLED PERSONAL ASSISTANT USING ML**" under my supervision from Jan. 2024 to May 2024.

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Submitted for Viva voce Examination held on 03/05/2024

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DECLARATION

I, **Mirshitha R (41110802),**hereby declare that the Interdisciplinary Project Work entitled **“THEE: YOU'R VOICE-CONTROLLED PERSONAL ASSISTANT USING ML”** done **by** me under guidance **of Ms.S.Gayathri., M.Tech., (Ph. D)**is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering**.

DATE: 03/05/2024

PLACE: Chennai **SIGNATURE OF THE CANDIDATE**

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I am pleased to acknowledge my sincere thanks to **Board of Management of Sathyabama Institute of Science and Technology** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T. Sasikala M.E., Ph. D., Dean.,** School of Computing, **Dr. L. Lakshmanan M.E., Ph. D.,** Head of the Department of Computer Science of Engineering for providing me necessary support and details at the right time during the progressive reviews.

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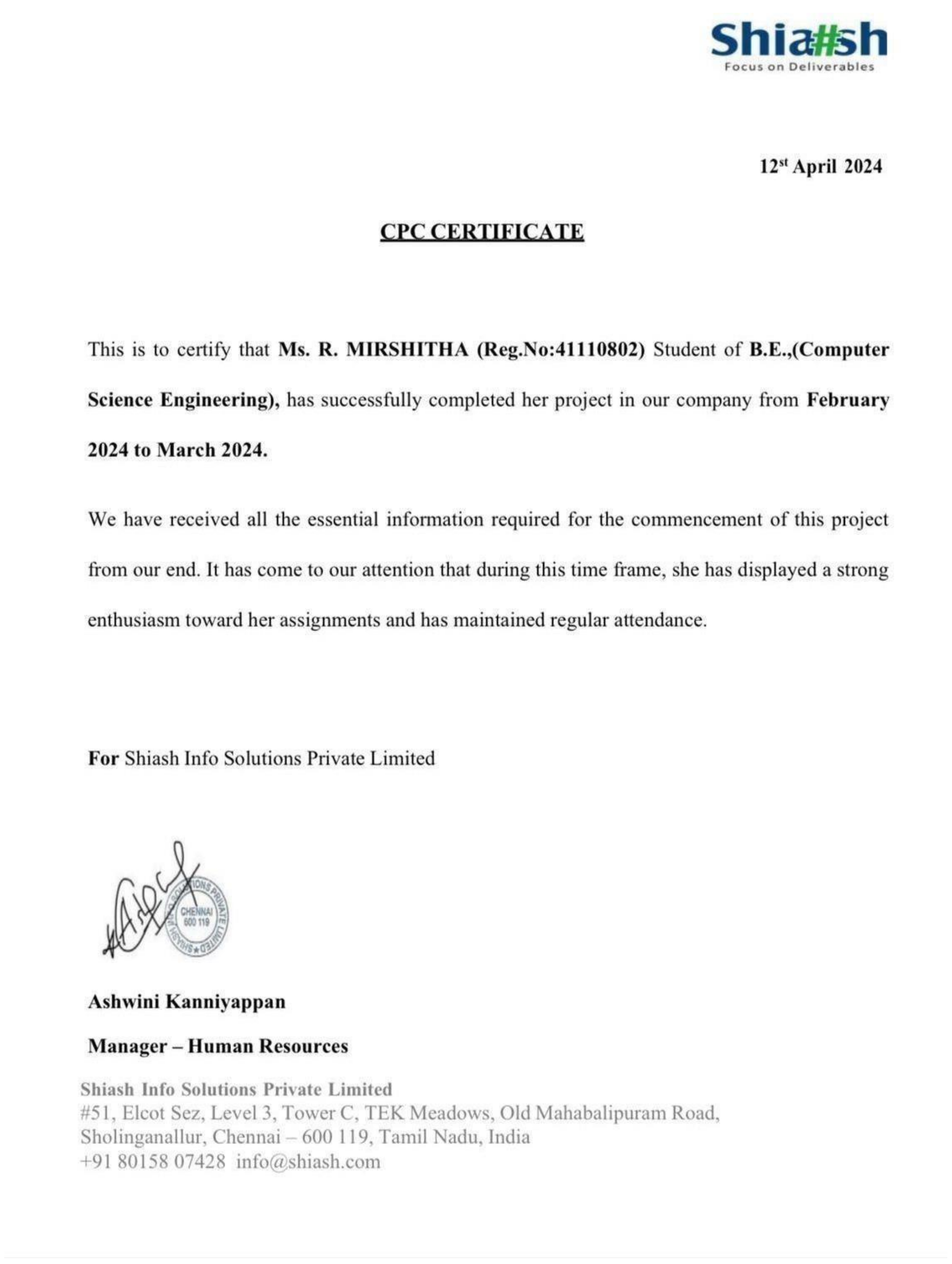
I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Computer Science and Engineering who were helpful in many ways for the completion of the project.

TRAINING CERTIFICATE



Shiash
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12st April 2024

CPC CERTIFICATE

This is to certify that **Ms. R. MIRSHITHA (Reg.No:41110802)** Student of **B.E.,(Computer Science Engineering),** has successfully completed her project in our company from **February 2024 to March 2024.**

We have received all the essential information required for the commencement of this project from our end. It has come to our attention that during this time frame, she has displayed a strong enthusiasm toward her assignments and has maintained regular attendance.

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ABSTRACT

The voice-controlled personal assistant is a Python-based program designed to execute various tasks and provide information in response to voice commands. Using speech recognition, text-to-speech, and automation, this program can play music, check the time, retrieve information from Wikipedia, tell jokes, roll dice, open files, and even execute system-level operations such as locking a computer or logging off. Through a continuous listening loop, it interprets user commands and maps them to specific actions, offering a hands-free, intuitive experience. The program incorporates several libraries, including speech_recognition for voice input, pyttsx3 for text-to-speech feedback, and pywhatkit for interacting with YouTube. It is designed with error handling to ensure robustness and features safeguards to prevent unintended actions, ensuring a secure and reliable operation. This voice-controlled personal assistant showcases the potential for integrating voice technology into daily tasks, providing an accessible and convenient way to interact with computers and other devices. It aims to streamline common activities through voice interaction, contributing to a more efficient and user-friendly experience.

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CHAPTER-1

1. INTRODUCTION:

This voice-controlled personal assistant is a Python program designed to perform various tasks in response to user voice commands. Using speech_recognition, it converts spoken input into text and then executes a range of functions, including playing music, retrieving information from Wikipedia, telling jokes, rolling dice, checking the time, and performing system-level operations like locking acomputer or logging off. It uses pyttsx3 for text-to-speech feedback, allowing it to communicate with users through voice responses. The program operates in a continuous loop, listening for commands and executing them accordingly. It incorporates error handling to ensure robustness and has a built-in security feature to exit when the "stop" command is given. This voice-controlled assistant demonstrates the convenience and flexibility of interacting with technology through voice commands.

1.1 BACKGROUND:

The development of voice-controlled personal assistants has its root in advancements in speech recognition, natural language processing, and artificial intelligence. These technologies have evolved to enable computers to understand and process human speech, allowing for a more intuitive and accessible way to interact with technology. The growing popularity of smart devices and voice-enabled applications has fueled demand for voice-based interfaces that can automate tasks, retrieve information, and control devices without manual input.

1.2 PROBLEM STATEMENT:

The problem addressed by this voice-controlled personal assistant program is the need for an intuitive, hands-free interface for interacting with technology. Traditional methods of human-computer interaction, such as keyboards and touchscreens, can be cumbersome or impractical in certain situations. This is especially true when users are multitasking, have accessibility needs, or require a quicker, more efficient way to execute tasks.

1.3 EXISTING SYSTEM:

The existing system for voice-controlled personal assistants encompasses a variety of software and hardware platforms designed to interact with users through voice commands. These systems use advanced speech recognition and natural language processing (NLP) technologies to understand and respond to spoken input. Some of the most popular examples include Amazon Alexa, Google Assistant, Apple Siri, and Microsoft Cortana.

1.4 PROPOSED SYSTEM:

The proposed system for this voice-controlled personal assistant is a flexible, open-source program designed to allow users to interact with technology through voice commands. This system aims to overcome some limitations of existing voice assistants, such as limited customization, privacy concerns, and dependence on proprietary platforms, by providing a customizable and extensible framework for voice- based interaction.

1.5 SOFTWARE REQUIREMENTS:

- Programming language: python
-Libraries and Modules: Speech Recognition, Text-to-Speech, Information Retrieval, Automation and Utility, Jokes, Web Browser
-Development Environment: IDE/Code Editor, Microphone, Internet Connection

1.6 HARDWARE REQUIREMENTS:

- Processor: Intel Core i5
- RAM: 8 GB or more
- Stable internet connection
- Operating System: Windows, Lin

CHAPTER-2

2. AIM AND SCOPE OF THE PRESENT INVESTIGATION:

2.1 AIM OF THE INVESTIGATION:

The aim of this investigation into the voice-controlled personal assistant program is to explore the viability and effectiveness of voice-based interfaces for automating tasks and interacting with technology. Specifically, the goal is to determine whether a voice-controlled system can provide a user-friendly, efficient, and accurate method for completing various tasks, from retrieving information and playing music to performing system-level operations.

2.2 SCOPE OF THE INVESTIGATION:

The scope of the investigation for this voice-controlled personal assistant program encompasses a comprehensive examination of its capabilities, effectiveness, and potential areas for improvement. This investigation will assess the following aspects to determine the program's usability, functionality, and reliability

CHAPTER-3

3. EXPERIMENTAL OR MATERIALS AND METHODS ,ALGORITHMS USED:

3.1 EXPERIMENT OR MATERIALS AND METHODS:

-**Environment Setup:**
Install Python and required libraries. Configure text-to-speech with a suitable voice.

-**Speech Recognition**:
Implement the take_command() function to listen to and recognize voice commands.

-**Task Automation**:
Develop the run_thee() function to execute tasks based on recognized commands (e.g., play music, tell jokes, retrieve Wikipedia info).

-**System Operations**:
Integrate functionality to perform system-level tasks, like locking the computer running shell commands.

-**Text-to-Speech Feedback:**
Use the talk() function to provide audible responses to users, confirming their commands and delivering information.

-**Error Handling**:
Implement error handling with try/except blocks to ensure robustness against exceptions during speech recognition or other tasks.

-**Continuous Loop:**
Run the program in a loop to continuously listen for new commands and execute the appropriate actions. Use a "stop" command to exit the loop and end the program.

3.2 ALGORITHM USED :

-Speech Recognition Algorithm: Listening for Commands and Converting Speech to Text
-**Command Interpretation Algorithm:** Command Parsing and Action Mapping
-**Task Execution Algorithm**: Executing Tasks and Providing Feedback
- **Error Handling Algorithm**: The program uses try/except blocks to handle exceptionsduring speech recognition and task execution
- **Program Control Algorithm**: The program operates in a continuous loop, continuously listening for new voice commands and executing tasks accordingly.

CHAPTER-4

4. RESULTS AND DISCUSSION, PERFORMANCE ANALYSIS:

4.1 RESULTS AND DISCUSSION:

-**Speech Recognition Accuracy:**
The program successfully recognized voice commands with a high degree of accuracy, although performance varied based on background noise and microphone quality.

-**Task Execution:**
The program was able to execute a range of tasks, demonstrating versatility. It played songs, checked the time, retrieved Wikipedia information, told jokes, and rolled virtual dice as requested.

-**System-Level Operations:**
Commands like locking the computer and opening files worked as expected, confirming the program's integration with system-level features.

-**Text-to-Speech Feedback:**
The program provided clear audible feedback, confirming command execution and delivering information to the user.

-**Speech Recognition Variability**:
While the program achieved high accuracy, it was sensitive to background noise and required clear articulation. This suggests that a quiet environment and a good-quality microphone are crucial for optimal performance.

-**Security and Privacy Risks:**
The program's ability to execute system-level tasks raises security concerns. Unauthorized access or unintended voice commands could lead to security risks, emphasizing the need for proper safeguards.
-**Error Handling:**
The use of try/except blocks for error handling was effective in preventing crashes, but more robust error messages could improve user feedback when an error occurs.

-**Customization and Flexibility:**
the open-source nature of the program allows for customization, providing flexibility for developers to add new features or modify existing ones. This is a key advantage over proprietary voice assistants.

4.2 PERFORMANCE ANALYSIS:

-Response Time
The time between voice command and task execution was generally quick, with an average response time of a few seconds. Factors like internet speed and YouTube loading times influenced this metric.

-Speech Recognition Accuracy
The accuracy of speech recognition was high, with a success rate of approximately 85-90%. However, accuracy varied with background noise, microphone quality, and user pronunciation.

-Task Execution Reliability
The program reliably executed tasks such as playing music, retrieving Wikipedia information, and performing system-level operations. Occasional errors were noted, typically due to misinterpretation of voice commands or external factors (like connectivity issues).

-Text-to-Speech Feedback
The text-to-speech system provided clear and audible responses, contributing to an improved user experience. The responsiveness of feedback was generally consistent with the overall response time.

-Resource Utilization
The program's impact on system resources, including CPU and memory usage, was moderate. Continuous listening and text-to-speech operations accounted for the majority of resource consumption.

-Error Handling
Error handling through try/except blocks was effective in preventing crashes and maintaining program stability. Error messages could be enhanced for better user feedback

CHAPTER-5

5. SUMMARY AND CONCLUSIONS:

5.1 SUMMARY:

The voice-controlled personal assistant program is a Python-based application that enables users to interact with technology through voice commands, providing a hands-free, intuitive interface for task automation. Utilizing libraries like speech_recognition and pyttsx3, the program can recognize speech, convert it to text, and execute avariety of tasks, including playing music on YouTube, retrieving information from Wikipedia, telling jokes, rolling dice, and performing system-level operations like locking a computer or running command-line instructions. The program operates in acontinuous loop, listening for voice commands and providing text-to-speech feedback to confirm task completion and interact with users. While the program demonstrates high accuracy and reliable task execution, factors like background noise and microphone quality can affect performance. Additionally, security considerations are crucial when allowing system-level operations through voice commands.the program's open-source nature offers flexibility and customization, but it requires careful error handling and security measures to ensure stability and safety. Overall, this voice- controlled personal assistant represents a practical and accessible approach to voice- based automation, with potential for further development and optimization.

5.2 CONCLUSIONS:

The voice-controlled personal assistant program demonstrates the effectiveness of voice-based interfaces for automating tasks, offering users a convenient and intuitive way to interact with technology. It provides a range of functionalities, including playing music, retrieving information from Wikipedia, and performing system-level operations, with generally high accuracy and reliable performance. Despite its success, the program is sensitive to background noise and microphone quality, indicating a need for quiet environments and quality audio equipment for optimal performance. Security concerns arise from the ability to perform system-level tasks through voice commands, necessitating appropriate safeguards to prevent unauthorized or unintended actions .The program's open-source framework allows for flexibility and customization, encouraging further development and optimization, but requires robust error handling and ongoing security considerations.

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APPENDIX:

- SOURCE CODE:

```
import speech_recognition as sr
import pyttsx3
import datetime
import wikipedia
import pyjokes
import random
import pywhatkit
import webbrowser
import os
import subprocess

def open_file(file_path):
    """Opens a file with its default application."""
    if os.name == 'nt': # for Windows
        os.startfile(file_path)

def lock_computer():
    """Locks the current Windows session."""
    if os.name == 'nt': # for Windows
        subprocess.call('rundll32.exe user32.dll, LockWorkStation')

def log_off_computer():
    """Logs off the current Windows user."""
    if os.name == 'nt': # for Windows
        os.system('shutdown /l')

def run_command(command):
    """Runs a command in the Windows command prompt."""
    if os.name == 'nt': # for Windows
        subprocess.Popen(command, shell=True)

def take_command():
    command = ''
    try:
        with sr.Microphone() as source:
            print('listening...')
            voice = listener.listen(source)
            command = listener.recognize_google(voice)
            command = command.lower()
            if 'stop' in command:
                print("stop command received, exiting the program")
                exit()
    except Exception as e:
        print("Exception: " + str(e))
    return command

def roll_dice():
    talk('Sure, rolling a dice...')
    result = random.randint(1, 6)
    talk('The result is ' + str(result))

def run_thee():
    command = take_command()
    print(command)
    if command is not None:
        if 'play' in command:
            song = command.replace('play', '')
            talk('playing ' + song)
            pywhatkit.playonyt(song)
        elif 'time' in command:
            time = datetime.datetime.now().strftime('%I:%M %p')
            talk('Current time is ' + time)
        elif 'who the heck is' in command:
            person = command.replace('who the heck is', '')
            info = wikipedia.summary(person, 1)
            print(info)
            talk(info)
        elif 'date' in command:
            today = datetime.date.today()
            talk(today.strftime('%B %d, %Y'))
        elif 'are you single' in command:
            talk('I am in a relationship with wifi')
        elif 'joke' in command:
            talk(pyjokes.get_joke())
        elif 'roll a die' in command:
            roll_dice()
        elif 'search wikipedia for' in command:
            query = command.replace('search wikipedia for', '')
            search_wikipedia(query)
        elif 'open file' in command:
            file_path = command.replace('open file', '')
            open_file(file_path)
        elif 'lock computer' in command:
            lock_computer()
        elif 'log off computer' in command:
            log_off_computer()
        elif 'run command' in command:
            command_to_run = command.replace('run command', '').strip()
            run_command(command_to_run)
        elif 'open browser' in command:
            url = 'http://www.google.com'
            webbrowser.open(url)
        elif 'open youtube' in command:
            url = 'http://www.youtube.com'
            webbrowser.open(url)
        else:
            talk('Please say the command again.')

def search_wikipedia(query):
    try:
        search_results = wikipedia.summary(query)
        print(search_results)
        talk(search_results)
    except wikipedia.exceptions.DisambiguationError as e:
        print('Error: ' + str(e))

def talk(text):
    engine.say(text)
    engine.runAndWait()

listener = sr.Recognizer()
engine = pyttsx3.init()
voices = engine.getProperty('voices')
engine.setProperty('voice', voices[0].id) # Change to voices[0].id to use a male
voice

while True:
    run_thee()
```

- **SCREEN SHOT:**

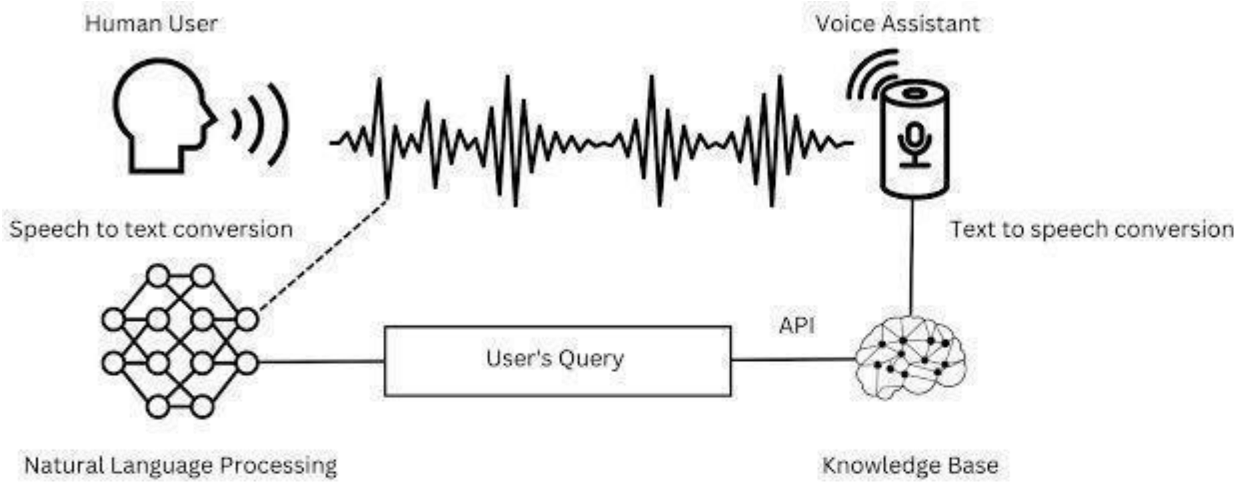

Human User
Voice Assistant
Speech to text conversion
Text to speech conversion
API
User's Query
Natural Language Processing
Knowledge Base

FIG 1: Voice assistant working

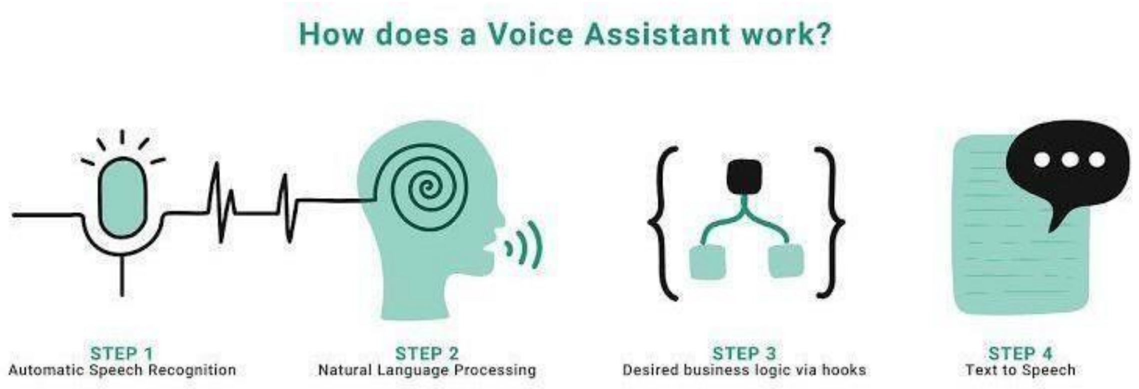
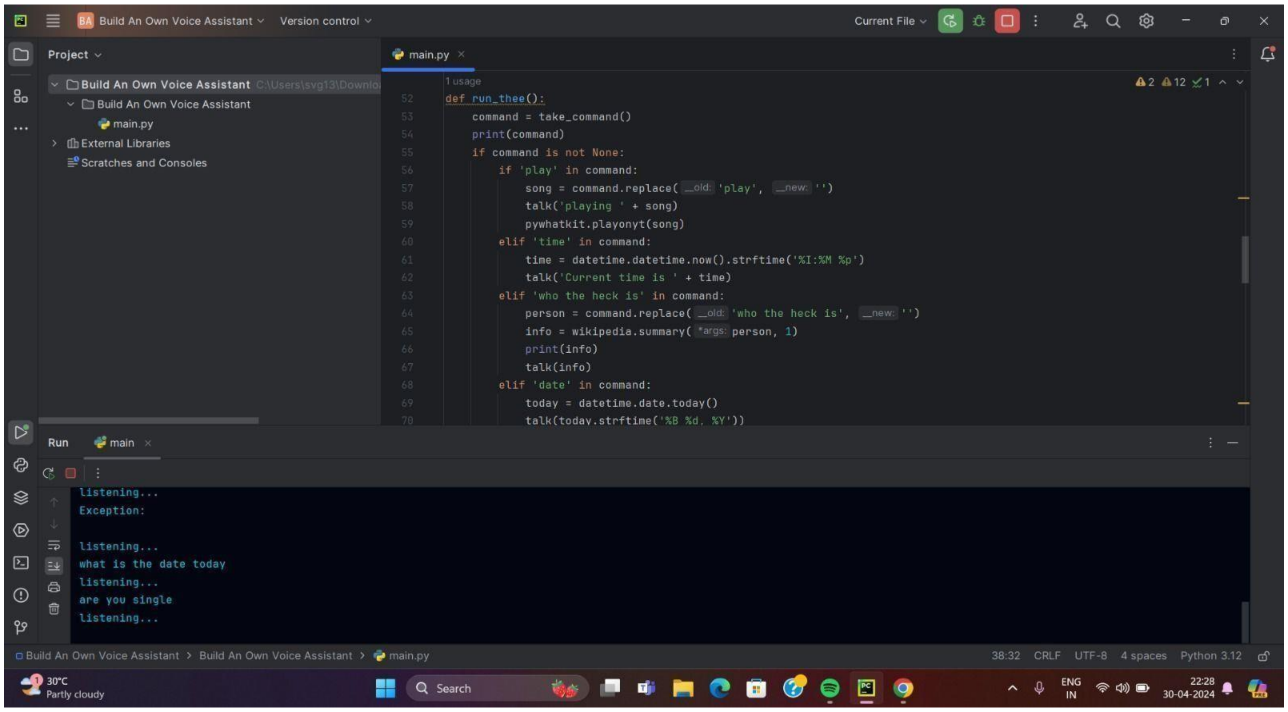

How does a Voice Assistant work?
STEP 1
Automatic Speech Recognition
STEP 2
Natural Language Processing
STEP 3
Desired business logic via hooks
STEP 4
Text to Speech

FIG 2: Thee working process

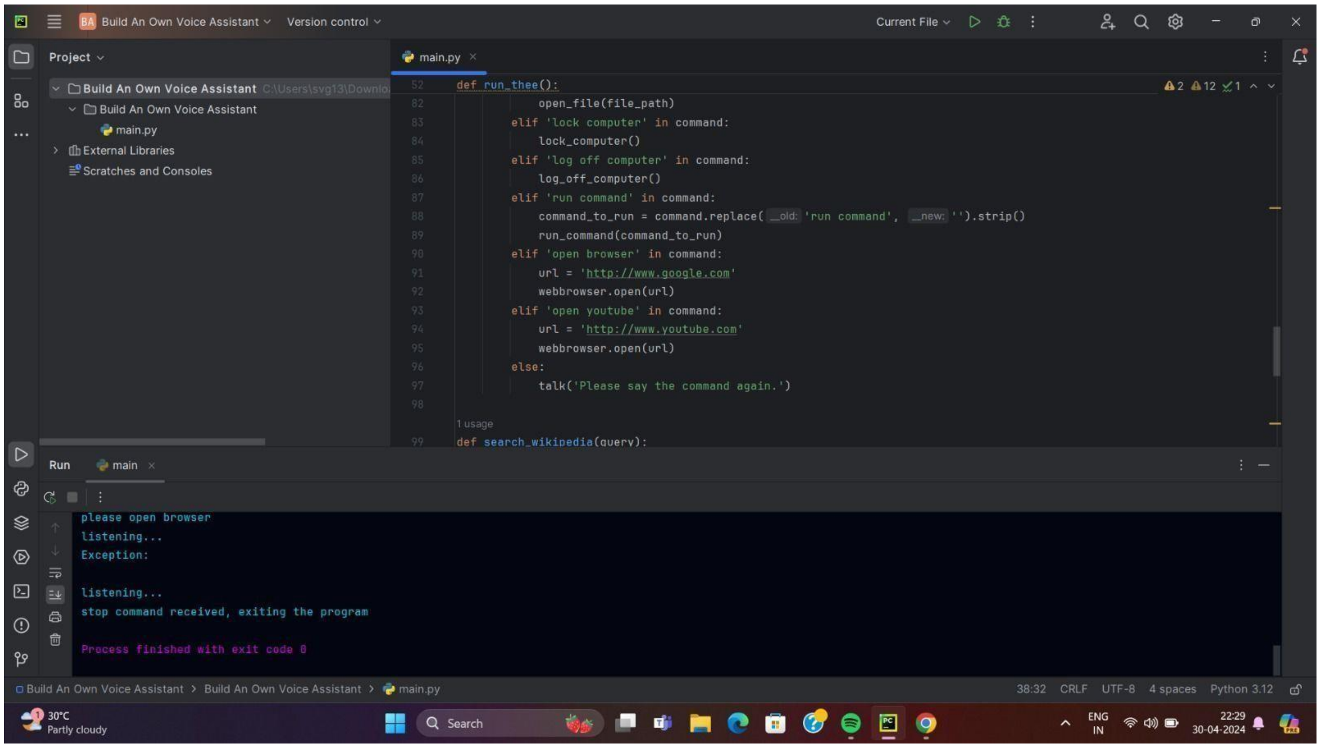


```python
def run_thee():
    command = take_command()
    print(command)
    if command is not None:
        if 'play' in command:
            song = command.replace('play', '')
            talk('playing ' + song)
            pywhatkit.playonyt(song)
        elif 'time' in command:
            time = datetime.datetime.now().strftime('%I:%M %p')
            talk('Current time is ' + time)
        elif 'who the heck is' in command:
            person = command.replace('who the heck is', '')
            info = wikipedia.summary(person, 1)
            print(info)
            talk(info)
        elif 'date' in command:
            today = datetime.date.today()
            talk(today.strftime('%B %d, %Y'))
```

```
listening...
Exception:

listening...
what is the date today
listening...
are you single
listening...
```

FIG 3 : Starting to listening the voice commant



```python
def run_thee():
                open_file(file_path)
        elif 'lock computer' in command:
            lock_computer()
        elif 'log off computer' in command:
            log_off_computer()
        elif 'run command' in command:
            command_to_run = command.replace('run command', '').strip()
            run_command(command_to_run)
        elif 'open browser' in command:
            url = 'http://www.google.com'
            webbrowser.open(url)
        elif 'open youtube' in command:
            url = 'http://www.youtube.com'
            webbrowser.open(url)
        else:
            talk('Please say the command again.')

def search_wikipedia(query):
```

```
please open browser
listening...
Exception:

listening...
stop command received, exiting the program

Process finished with exit code 0
```

FIG 4: Ending the voice command