A

Mini Project Report on

Intelligent Advisor System using AI Techniques

Submitted in partial fulfillment of the requirements
for the degree of
BACHELOR OF ENGINEERING
IN

Computer Science & Engineering
Artificial Intelligence & Machine Learning

by

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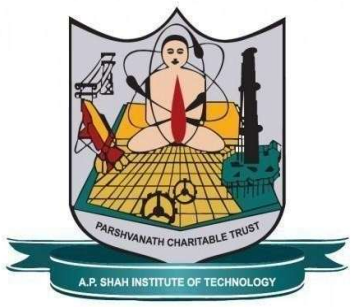

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CERTIFICATE

This is to certify that the project entitled "**Intelligent Advisor System Using AI Techniques"** is a bonafide work of Maaz Bubere (23106121), Sanket Kokare (23106105), Fuzail Moulvi (23106074) and Kaif Ansari(23106069) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning).**

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Project Report Approval

This Mini project report entitled "**Intelligent Advisor System Using AI Technique**" by **Maaz Bubere, Sanket Kokare, Fuzail Moulvi, and Kaif Ansari** is approved for the degree of ***Bachelor of Engineering*** in ***Computer Science &Engineering***, (AIML) ***2024-25***.

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ABSTRACT

This report details the development and implementation of an advanced artificial intelligence (AI) system designed to serve as a personalized virtual assistant, addressing the limitations commonly found in existing solutions. The primary focus of this AI system is to enhance offline capabilities, allowing users to perform various tasks without the constant need for internet connectivity. By improving contextual understanding, the system can better interpret user commands and provide more relevant responses, thereby creating a more intuitive interaction experience .In addition to its offline functionality, the AI system emphasizes customization, enabling users to tailor the assistant's features and responses to suit their individual preferences and needs. This level of personalization is crucial for fostering user engagement and satisfaction. The system is engineered for speed, ensuring that responses to user commands are delivered promptly, which is essential for maintaining a seamless user experience. Users can interact with the AI through voice commands, eliminating the need for text input and making the system accessible and user-friendly. Commands can range from simple requests, such as opening a music video or accessing the webcam, to more complex tasks, thereby showcasing the versatility of the assistant. This capability not only enhances convenience but also positions the AI as a time-efficient tool for managing daily activities. Overall, this innovative AI system represents a significant advancement in the field of virtual assistants, combining enhanced offline functionality, contextual awareness, and user-centric customization to deliver a reliable and efficient solution for everyday tasks. The findings and developments outlined in this report contribute to the ongoing evolution of AI technology, paving the way for future enhancements and applications in various domains.

Keywords: Virtual Assistant, Voice command, Customization and Task Automization.

Index

CHAPTER 1
INTRODUCTION

1. INTRODUCTION

The rapid advancement of artificial intelligence technology has led to the development of sophisticated virtual assistants that aim to enhance user experience and streamline daily tasks. However, many existing solutions face significant limitations, particularly in their reliance on constant internet connectivity and their ability to understand context in user interactions. As users increasingly seek more efficient and personalized tools, there is a growing demand for AI systems that can operate effectively in offline environments while providing a high level of contextual awareness. This project focuses on creating an AI system that addresses these challenges by enhancing offline capabilities and improving contextual understanding. By allowing users to perform tasks without the need for an internet connection, the system not only increases accessibility but also ensures that users can rely on the assistant in various situations, including those with limited connectivity. This is particularly important in scenarios where internet access may be intermittent or unavailable, such as during travel or in remote locations. In addition to offline functionality, the AI system is designed to offer extensive customization options. Users can tailor the assistant's features and responses to align with their individual preferences, creating a more engaging and relevant interaction. This level of personalization is essential for fostering user satisfaction and loyalty, as it allows the assistant to adapt to the unique needs of each user. The system's design prioritizes speed and efficiency, ensuring that responses to user commands are delivered promptly. By enabling voice command functionality, the AI eliminates the need for text input, making it more accessible and user-friendly. Users can issue a wide range of commands, from simple requests like playing music to more complex tasks, thereby showcasing the versatility and practicality of the assistant. Overall, this project aims to develop a cutting-edge AI system that not only overcomes the limitations of existing virtual assistants but also sets a new standard for user interaction and efficiency. By focusing on offline capabilities, contextual understanding, and customization, the AI system aspires to become an indispensable tool for users, enhancing their daily lives through intelligent automation and personalized assistance. The findings and innovations presented in this report contribute to the ongoing evolution of AI technology, highlighting its potential to transform how individuals interact with digital systems.

As the landscape of technology continues to evolve, the integration of AI into everyday life has become increasingly prevalent. Virtual assistants have emerged as valuable tools for managing tasks, providing information, and enhancing productivity. However, many existing solutions often fall short in delivering a seamless user experience due to their dependence on internet connectivity and limited contextual awareness.

This project seeks to bridge that gap by developing an AI system that not only functions effectively offline but also possesses the ability to understand and respond to user intent in a more nuanced manner. By leveraging advanced algorithms and machine learning techniques, the system aims to learn from user interactions, thereby improving its performance over time.

CHAPTER 2

LITERATURE SURVEY

2. LITERATURE SURVEY

2.1-HISTORY

The evolution of chatbots and virtual assistants has a rich history that spans several decades, reflecting the rapid advancements in artificial intelligence (AI) and natural language processing (NLP). The journey began in the 1960s with the creation of ELIZA, a pioneering program developed by Joseph Weizenbaum at MIT. ELIZA was designed to simulate conversation by using pattern matching and substitution techniques, allowing it to engage users in a dialogue that mimicked a psychotherapist. Although ELIZA's capabilities were limited, it laid the groundwork for future developments in conversational agents and demonstrated the potential for machines to engage in human-like interactions. In the following decades, the field of AI experienced significant growth, driven by advancements in computational power and the development of more sophisticated algorithms. The 1970s and 1980s saw the introduction of knowledge-based systems, which utilized databases to provide more accurate and contextually relevant responses. These systems marked a shift from simple pattern matching to more complex reasoning and understanding, allowing for richer interactions with users. The 1990s brought about a new wave of chatbot development, with the introduction of programs like ALICE (Artificial Linguistic Internet Computer Entity) and Jabberwacky. ALICE, created by Richard Wallace, utilized a more advanced form of natural language processing and was awarded the Loebner Prize multiple times for its conversational abilities. Jabberwacky, on the other hand, focused on learning from user interactions, allowing it to improve its responses over time. These developments highlighted the importance of machine learning in enhancing the capabilities of chatbots. The advent of the internet in the late 1990s and early 2000s further transformed the landscape of virtual assistants. With the rise of web-based applications, chatbots began to be integrated into customer service platforms, providing users with instant support and information. Companies recognized the potential of chatbots to improve customer engagement and reduce operational costs, leading to widespread adoption in various industries. The introduction of smartphones in the late 2000s marked a significant turning point for virtual assistants. Apple's Siri, launched in 2011, was one of the first voice-activated assistants to gain mainstream popularity. Siri's ability to understand natural language commands and perform tasks such as setting reminders and sending messages revolutionized the way users interacted with their devices. Following Siri, Google Assistant, Amazon Alexa, and Microsoft Cortana emerged, each offering unique features and capabilities. These virtual assistants leveraged advancements in machine learning and NLP to provide more accurate and context-aware responses, further enhancing user experience. As technology continued to evolve, the focus shifted towards creating more intelligent and adaptive virtual

assistants. The integration of deep learning techniques allowed for improved understanding of user intent and context, enabling assistants to engage in more meaningful conversations. Additionally, the rise of smart home devices and the Internet of Things (IoT) expanded the scope of virtual assistants, allowing them to control various aspects of users' environments. Despite these advancements, challenges remain in the development of effective virtual assistants. Many existing solutions still struggle with contextual understanding, particularly in complex or ambiguous situations. Additionally, the reliance on internet connectivity can limit functionality in certain scenarios, such as when users are in remote locations or experiencing connectivity issues. As a result, there is a growing demand for AI systems that can operate effectively offline while providing a high level of contextual awareness and personalization. In summary, the history of chatbots and virtual assistants reflects a continuous evolution driven by advancements in AI, NLP, and machine learning. From the early days of ELIZA to the sophisticated virtual assistants of today, the field has made significant strides in enhancing user interaction and engagement. However, the ongoing challenges highlight the need for further innovation, particularly in the areas of offline capabilities and contextual understanding, which our project aims to address.

2-LITERATURE REVIEW

1. **A Survey on Chatbot Implementation in Customer Service**

- **Authors**: A. K. Gupta, R. K. Gupta
- **Year**: 2020
- **Key Findings**: This paper emphasizes the transformative role of chatbots in customer service, showcasing their ability to provide efficient, round-the-clock support. The authors discuss various implementation strategies and highlight the benefits of chatbots, including reduced response times, improved customer satisfaction, and cost savings for businesses. They also explore the challenges faced during implementation, such as ensuring the chatbot can handle diverse queries and maintaining a human-like interaction quality. The findings underscore the importance of integrating contextual understanding and personalization to enhance user interactions, which aligns with the goals of our AI system. The paper suggests that future research should focus on developing hybrid models that combine rule-based and machine-learning approaches to improve the adaptability and responsiveness of chatbots.

2. **Conversational Agents: A Survey of the State of the Art**

- **Authors**: A. M. K. Alshahrani, A. A. Alzahrani
- **Year**: 2021
- **Key Findings**: This comprehensive survey provides an overview of various conversational agents, their architectures, and applications across different domains. The authors categorize conversational agents based on their functionalities, such as task-oriented and open-domain systems, and discuss the challenges faced in their development, such as understanding user intent and managing multi-turn conversations. They highlight the significance of dialogue management systems that can maintain context over multiple interactions, which is crucial for creating a more engaging user experience. The paper also emphasizes the need for robust evaluation metrics to assess the performance of conversational agents, suggesting that user satisfaction and task completion rates should be prioritized in future studies. This foundational knowledge is crucial for designing an effective virtual assistant that can operate in various contexts and provide meaningful interactions

3. Building Intelligent Chatbots: A Review of Techniques and Applications

- **Authors**: M. A. H. Alshahrani, M. A. Alzahrani
- **Year**: 2022
- **Key Findings**: This paper discusses various techniques for creating intelligent chatbots and their applications in different sectors, including healthcare, education, and customer service. The authors emphasize the importance of integrating machine learning algorithms to enable chatbots to learn from user interactions and improve their performance over time. They explore different architectures, such as sequence-to-sequence models and reinforcement learning approaches, that can enhance the adaptability of chatbots. The paper also highlights case studies demonstrating successful implementations of intelligent chatbots, showcasing their potential to improve user engagement and satisfaction. This research is particularly relevant to our project, as it provides insights into the design and implementation of adaptive learning mechanisms that can personalize user interactions.

4. The Role of Machine Learning in Chatbot Development

- **Authors**: J. D. Smith, L. R. Johnson
- **Year**:2020
- **Key Findings**: This paper explores the impact of machine learning on chatbot capabilities, particularly in enhancing user intent understanding and contextual awareness. The authors discuss various machine learning techniques, including supervised and unsupervised learning, and their applications in training chatbots to recognize user intents and extract relevant information. They emphasize the importance of feature engineering and data preprocessing in improving the performance of machine learning models. The paper also highlights the challenges associated with training models on diverse datasets, as biases in training data can lead to skewed responses and reduced effectiveness. Furthermore, the authors advocate for the integration of reinforcement learning techniques to enable chatbots to learn from user interactions dynamically, thereby improving their adaptability and responsiveness over time. This research is crucial for our project, as it underscores the need for a robust machine learning framework that can enhance the contextual understanding and personalization of our AI system.

CHAPTER 3

Problem Statement

3. Problem Statement

Many virtual assistants still rely on outdated rule-based systems, which limits their adaptability and responsiveness. Integrating advanced machine learning techniques is essential to improve understanding of user intent and enable learning from previous interactions.

A major challenge is ensuring these models are trained on diverse and representative data to prevent bias and maintain high performance across different user groups.

To address these limitations, our project focuses on developing an AI-powered virtual assistant with enhanced offline functionality and deeper contextual understanding. It will be capable of operating efficiently without constant internet access while adapting to user preferences over time.

The system will also feature face recognition for secure and streamlined user registration, offering a more personalized experience.

By prioritizing user adaptability, security, and offline accessibility, this assistant aims to provide a time-efficient and intuitive user experience that sets a new standard in the virtual assistant landscape.

This innovation contributes to the evolution of AI technology, ultimately improving how users interact with their devices and enhancing overall satisfaction.

CHAPTER 4

Experimental Setup

4. Experimental Setup

4.1 Hardware Setup

- **Network**:
- Stable internet connection (broadband) for API calls and online functionalities.
- **Peripherals**:
- Microphone and speakers (if voice interaction is implemented).
- Webcam (if face recognition or video interaction is included).

4.2 Software Setup

The tools, libraries, and configurations required to successfully run the AI virtual assistant system with face recognition and voice interaction:

Library:

1. Face_recognition:Used for face detection, encoding, and comparison. Helps identify users via their facial features.

2.Cv2 (OpenCV):Handles camera input, captures images, and processes video frames.

3.Pickle:Serializes and deserializes face encodings for database storage and retrieval.

4. Sqlite3:Manages the local database used to store user names and corresponding face encodings.

5.Speech_recognition (as sr):Converts spoken input to text for interaction with the assistant.

6. Pyttsx3:Provides offline text-to-speech (TTS) support for voice output.

7. tkinter:Builds the GUI window that hosts the virtual assistant interface and video canvas.

8. vlc:Plays multimedia content like background video or audio tracks.

9.pywhatkit:Sends scheduled WhatsApp messages and plays YouTube content.

10.pyowm:Retrieves weather information using the OpenWeatherMap API.

11. pyautogui:Simulates keyboard input for tasks like sending WhatsApp messages.

12.webbrowser:Opens web applications such as Gmail, WhatsApp Web, and YouTube.

subprocess and os:Executes system-level commands (shutdown, restart, sleep).

13. requests:Sends and receives data from the Gemini AI API for intelligent responses

14.textblob:Performs sentiment analysis on user input to adjust chatbot responses.

15. bs4 (BeautifulSoup):(Imported but not used in the visible code — likely planned for scraping web content.)

Fuctions used:

Key Functions and Their Purpose

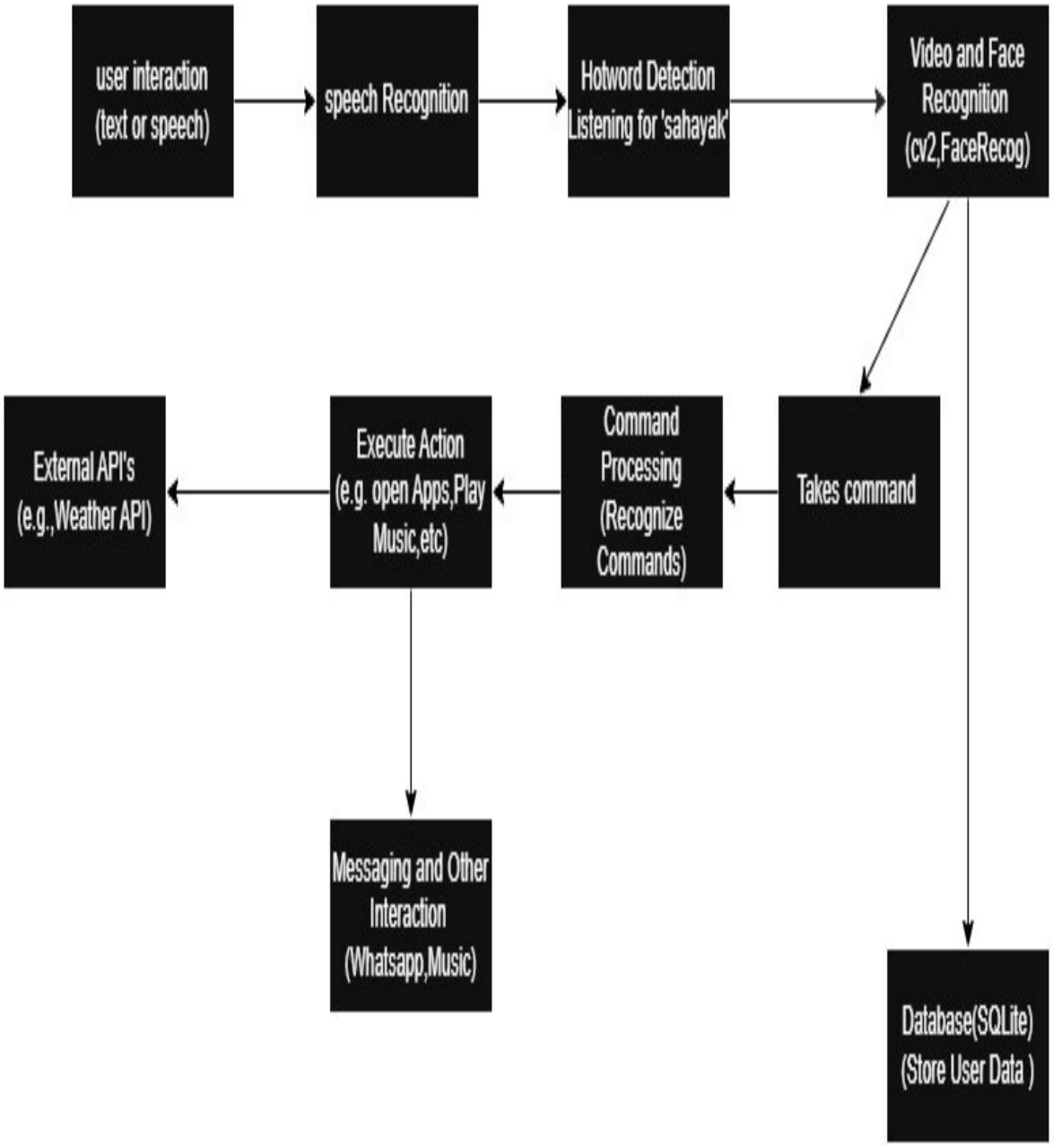
- capture_user_face_and_name():Captures a user's face, checks for recognition, or prompts for name registration.
- compare_faces_in_db():Compares a new face encoding with stored user data to recognize returning users.
- store_user_face_and_name():Saves a new user's name and face encoding into the SQLite database.
- recognize_speech():Listens to and processes spoken commands using Google's speech recognition API.
- speak_response_local():Speaks out text using the pyttsx3 engine, fully offline.
- execute_system_command():Handles system-level actions like shutdown, restart, and sleep.
- open_application(app_name):Launches commonly used apps or websites like Chrome, Gmail, or YouTube.
- send_whatsapp_message():Sends a message to a WhatsApp contact using PyWhatKit and PyAutoGUI.
- get_weather_info(city):Fetches and returns weather information for a specified city.
- get_gemini_response(user_query):Sends user queries to the Gemini AI API and returns the generated response.
- process_user_commands():Main command loop to process spoken input, execute actions, or call Gemini API.
- listen_for_hotword():Constantly listens for the hotword "Sahayak" to activate the assistant.
- start_assistant():Initializes the assistant, greets the user, captures face data

CHAPTER 5

Proposed System & Implementation

5. Proposed system & Implementation

5.1 Block diagram of proposed system



5.2 Description of block diagram

1. **User Interaction (Speech or Text):**

•This is the input module where the user communicates with the assistant. The user can either speak commands (via microphone) or type them. For speech, a hotword ("Sahayak") is used to activate the assistant.

2. **Hotword Detection:**

• This block listens for the activation hotword, **"Sahayak"**. Once detected, it triggers the assistant to start listening for the user's command.

3. **Speech Recognition:**

• After detecting the hotword, the assistant listens to the user's speech. The **Google Speech Recognition API** is used to convert the spoken words into text.

4. **Command Processing:**

• This block processes the text recognized from the user's speech. It interprets commands, performs sentiment analysis, and matches them with predefined commands (e.g., play music, send a WhatsApp message, etc.).

5. **Text-to-Speech (TTS):**

• Once a response is generated, the **pyttsx3** engine converts the response into audible speech. It also manages parameters like the rate and volume of the speech.

6. **Execute Actions:**

This block executes the tasks based on the recognized commands. For example:

- **Open applications**: It can open browsers, apps, etc.
- **Play music**: Plays audio files or streams.
- **Weather information**: Queries weather data via API.
- **Shutdown/Restart**: Executes system commands to power off or restart the system.

7. **External APIs:**

8. • For dynamic data, this module connects with external APIs, such as:

- **Weather API** (e.g., OpenWeatherMap): Fetches current weather data for a given city.
- **WhatsApp**: Sends messages through the WhatsApp Web API.
- **Gemini API**: Fetches generated responses from the Gemini API for natural language processing.

9. **Video & Face Recognition:**

- **OpenCV & Face Recognition**: The system can capture the user's face through the camera and recognize the user based on stored face data. If a recognized face is detected, it welcomes the user by name.
- If the user is new, it stores their name and face encoding in the **SQLite database**.

10. Messaging & Other Interactions:

- **WhatsApp Messaging**: The assistant can send WhatsApp messages using the **pywhatkit** library.
  - **Play Videos**: The system can play a video (e.g., a bhajan or any video from YouTube).
  - **Play Music**: It can play music from a specific path using VLC Media Player.

11. Database (SQLite):

- The **SQLite database** stores user-related data such as the name, face encoding, and voice encoding. It also allows storing interaction history and system preferences.

5.3 Implementation

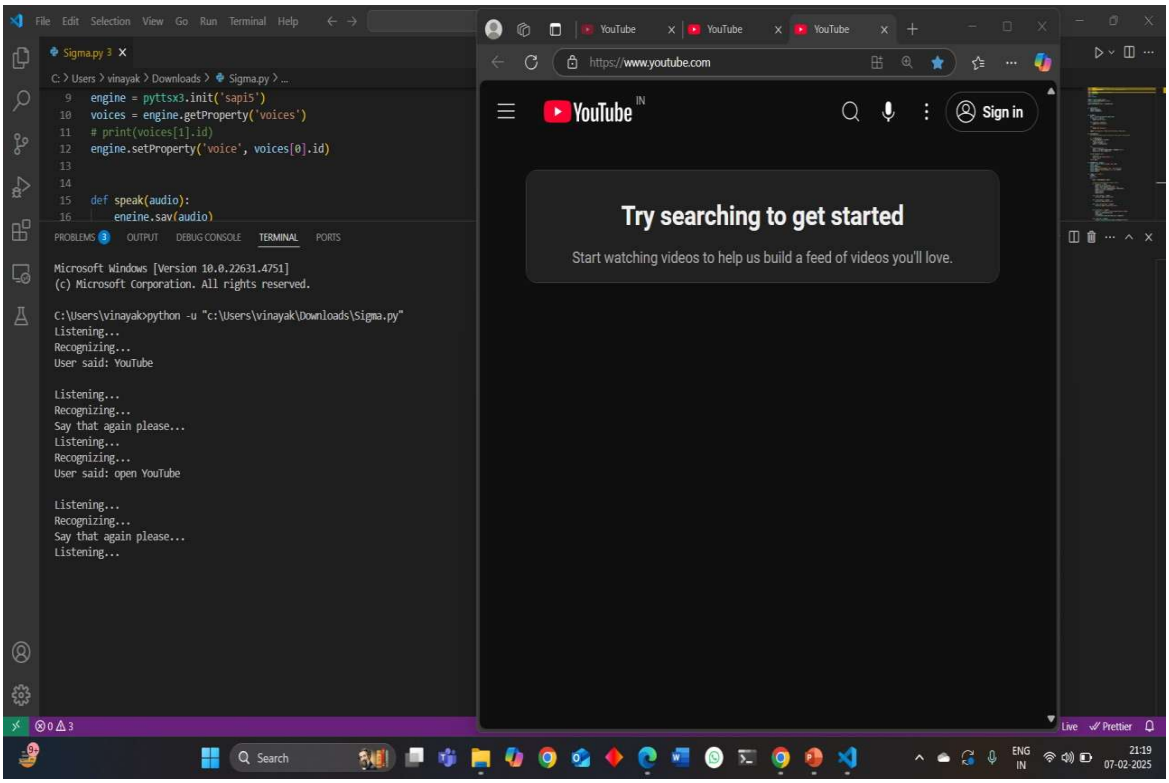


Figure 1 :Youtube open with the chatbot

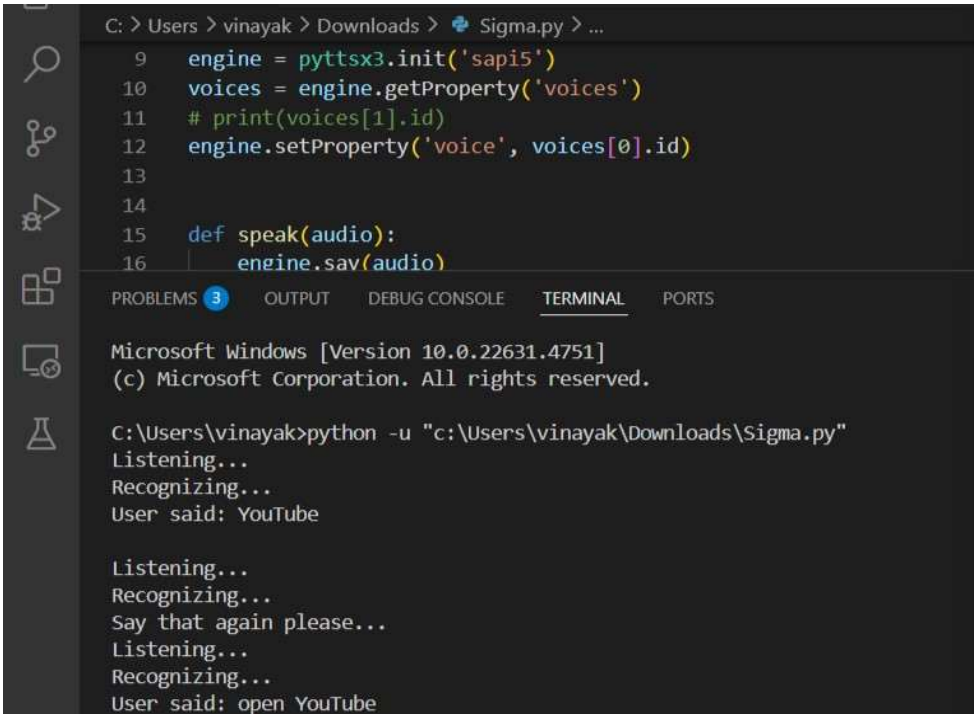


Figure 2:Chatbot Listening of command

5.4 Advantages/ Application/ result table can be included in this subsection.

Advantages

1. Personalized_Interaction:

   The chatbot can recognize individual users through facial recognition and adapt its tone, responses, and suggestions according to their past behavior, preferences, and needs—offering a truly customized experience.

2. Hands-Free_Operation

   Users with physical disabilities or limited motor skills can operate the system completely through voice and facial recognition, without needing to use keyboards, touchscreens, or other physical input devices.

3. Enhanced_Accessibility

   The integration of multiple AI technologies like natural language processing (NLP), speech recognition, and facial recognition ensures that the chatbot is accessible to people with various types of disabilities—be it physical, visual, or cognitive.

4. Real-Time_Assistance

   The chatbot provides instant support, answering queries, executing commands, and giving reminders. This ensures timely help without waiting for human caregivers, increasing independence.

   Emotion and Sentiment Awareness

   With future upgrades, the chatbot could detect the emotional state of the user through voice tone or facial expression, helping it respond empathetically or initiate necessary support when signs of stress or sadness are detected.

5. Task Automation:Routine activities such as turning on lights, setting alarms, or checking the weather can be performed by the chatbot, reducing the burden on the user and promoting a more self-sufficient lifestyle.

6. Secure and Seamless Login:Facial recognition offers an alternative to typing passwords or using fingerprint sensors, which might be challenging for some users. This makes logging into systems or devices both easier and more secure.

7. Support for Visual Impairments:Voice-based interaction enables visually impaired users to receive information in an audio format, navigate menus, or even have documents read aloud to them.
8. Promotes Digital Inclusion:The chatbot bridges the digital divide by enabling differently-abled individuals to participate more fully in digital spaces, education, employment, and communication.
9. 24/7 Availability:Unlike human assistants or caregivers, a chatbot can be available at all times—offering continuous support and help during emergencies or late-night needs.

Disadvantages

1. Privacy and Data Security Risks:

   Since facial recognition and voice inputs involve sensitive biometric data, improper handling or storage could lead to privacy violations or unauthorized data access.

2. High Cost of Setup and Maintenance:Developing, installing, and maintaining such an advanced system requires substantial investment in software, hardware, and AI training—making it less affordable for some users or institutions.
3. Limited Accuracy in Varied Conditions:Facial recognition can be affected by poor lighting, facial hair, accessories like glasses or masks, or even aging—resulting in failed or inaccurate identifications.
4. Internet Dependency: Many features of the chatbot require a constant internet connection. In areas with poor connectivity, functionality could be limited or entirely disrupted.
5. System Failures Could Affect Daily Life:In case of software bugs, voice recognition errors, or power failures, users might find themselves unable to perform essential tasks they depend on the chatbot for.
6. Incomplete Emotion Recognition:Although emotion analysis is a promising feature, current technology may misread emotions, leading to inappropriate or ineffective responses.
7. One-size-fits-all Limitation:Different disabilities require different solutions. Creating a single chatbot that suits all users equally well is difficult and may lead to underperformance for some groups.
8. Ethical Concerns Regarding Monitoring:Constant monitoring and data collection might feel invasive to some users, raising ethical issues about surveillance, autonomy, and informed consent.
9. Need for Continuous Updates:To stay relevant, secure, and accurate, the system needs regular updates, which could be challenging for users who aren't familiar with technology or who lack support.
10. Limited Usability for Non-tech-savvy Users:Despite being designed for accessibility, some users might still struggle to understand and use the technology effectively without proper training or onboarding.

Applications

1. Smart Home Automation:The chatbot can help differently-abled individuals control smart appliances such as fans, lights, TVs, air conditioners, and curtains through voice commands or facial triggers, offering greater control over their environment.
2. Virtual Healthcare Support:The system can remind users to take medications, monitor health stats through connected devices, book doctor appointments, and even alert caregivers or emergency contacts during a health crisis.
3. Education for Special Needs:In educational settings, the chatbot can assist students with disabilities by offering personalized learning tools, reading content aloud, explaining concepts via voice, and helping with assignments.
4. Assistive Communication Tool:Users who cannot speak or type can communicate with others using the chatbot as an intermediary, converting facial gestures or simple commands into text or voice messages.
5. Indoor and Outdoor Navigation Help:At airports, hospitals, or malls, the chatbot can provide location-based assistance, guide users through facial recognition, and help them reach their destinations safely.
6. Mental Health and Emotional Support:The chatbot can engage users in friendly conversation, offer calming responses during emotional distress, and recognize signs of loneliness or depression for timely intervention.
7. Daily Planning and Organization:It can serve as a digital planner—scheduling meetings, giving reminders, helping with to-do lists, and sending alerts for important tasks, helping users stay organized.
8. Secure System Access:Differently-abled users can log into devices, websites, or apps securely using facial recognition, avoiding the difficulty of entering passwords or solving CAPTCHAs.
9. Emergency Alerts and Safety:In case of accidents or health emergencies, the chatbot can quickly detect distress and notify emergency contacts, caregivers, or services automatically.
10. Workplace Integration:The system can assist in office tasks such as sending emails, managing files, attending virtual meetings, or scheduling events—enabling differently-abled individuals to work more independently and efficiently.

CHAPTER 6

Conclusion

6.Conclusion

In conclusion, developing a Jarvis-like chatbot integrated with facial recognition marks a major advancement in AI-driven, personalized user interaction—especially for differently-abled individuals. By combining natural language processing, voice, and facial recognition, the system can offer secure, adaptive support tailored to individual needs. Future improvements may include enhanced facial recognition, emotion detection, expanded task capabilities, multilingual support, and stronger data privacy measures—making the chatbot more empathetic, accessible, and reliable.

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