



Capstone Presentation

Virtual Hospitality Assistant

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The hospitality industry often grapples with challenges like inconsistent customer service, lack of 24/7 availability, and limitations in multilingual support. Traditional methods involving human agents are prone to delays, miscommunication, and inability to handle high-volume queries during peak hours.

The hospitality industry faces several challenges in maintaining consistent, efficient, and 24/7 customer support, particularly during peak hours or in high-demand scenarios. Traditional support methods may result in delayed responses, miscommunication, and limited multilingual support. There is a growing need for an intelligent system that can:

- Understand and interpret user voice commands accurately,
- Retrieve appropriate information swiftly,
- Respond in real-time using natural, conversational output.



- To develop an AI-based Virtual Assistant capable of executing voice commands like opening apps, websites, and answering queries.
- To build a Hotel Recommendation System that retrieves relevant hotel data using user queries via voice or text.
- To integrate speech recognition, natural language processing, and text-to-speech to facilitate smooth human-machine interaction.
- To reduce dependency on human staff while improving response time and customer satisfaction.
- To create a scalable, modular, and interactive solution suited for real-world hospitality applications.



Problem Statement

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To address these shortcomings, there is a growing need for an intelligent system that can accurately interpret voice commands, process natural language queries, retrieve relevant hotel or travel-related data, and provide real-time conversational responses.

Proposed Solution

- Develop an AI-driven Virtual Hospitality Assistant that automates customer interactions.
- Features include chat-based assistance, voice support, booking management, and personalized recommendations.
- Integration with hotels, restaurants, and travel services for seamless customer experience.



Understanding system architecture

• **User Interaction:** The process starts when a user provides a voice input/query through an interface (e.g., a computer or mobile device).

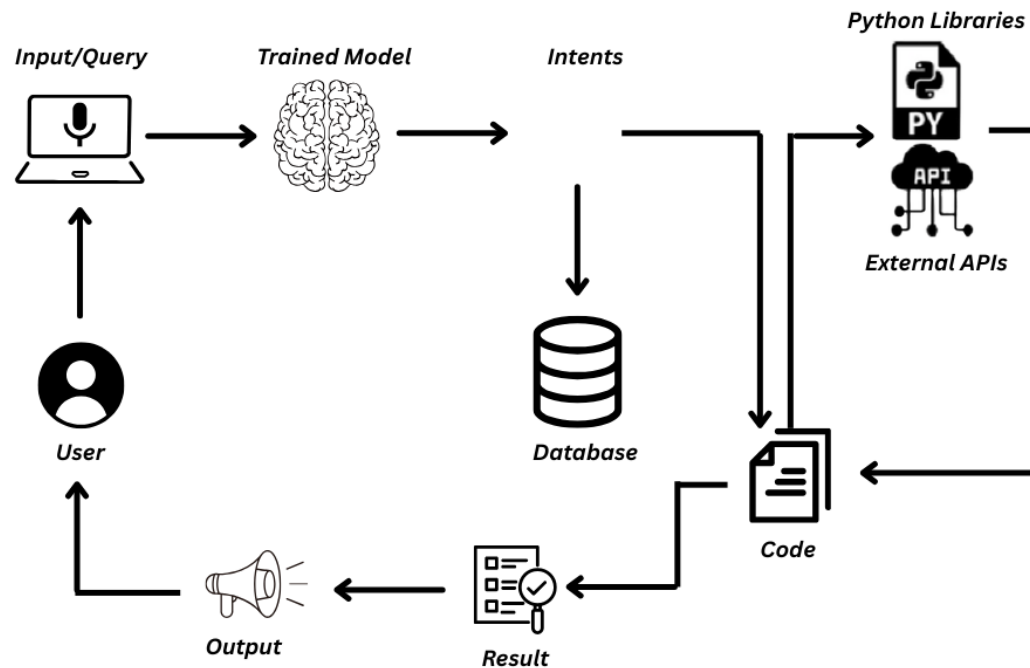
• **Intent Recognition:** The input is processed by a trained AI model to extract the user's intent from the voice command.

• **Data Processing:** The extracted intent is passed to a database and code modules, which interact with Python libraries and external APIs to fetch or process relevant information.

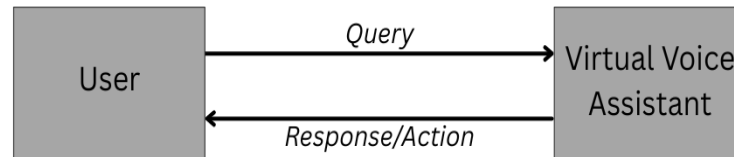
• **Response Generation:** The system compiles the final result and converts it into an audio output.

• **User Output:** The audio response is returned to the user, completing an interactive and automated service loop.

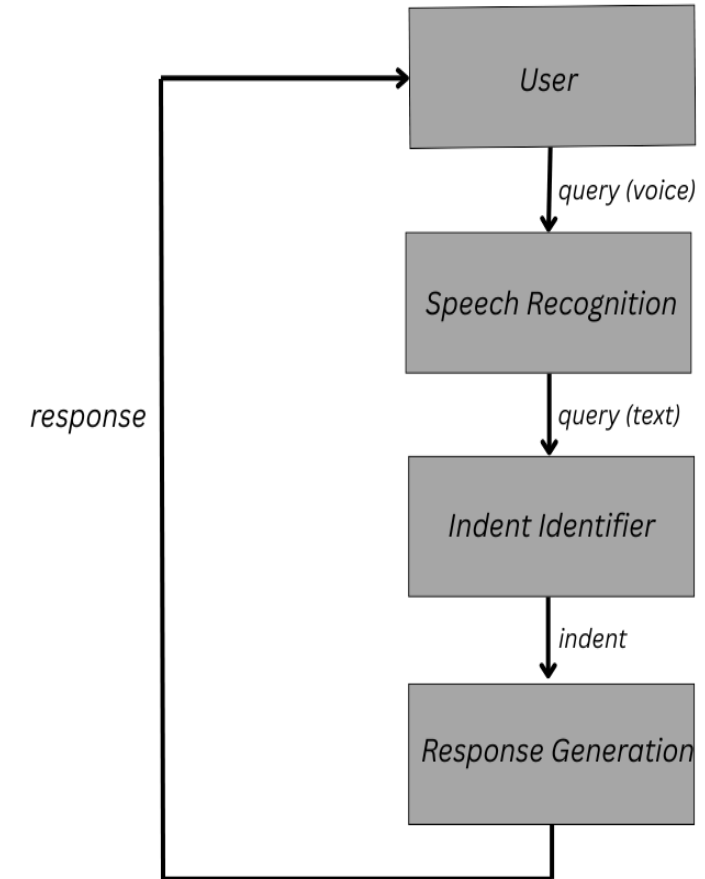
System Architecture



- The system architecture diagram illustrates the workflow of a Virtual Hospitality Assistant.
- It highlights how user queries are processed to generate appropriate responses.
- The process starts with the user's voice input.
- This voice input is interpreted by a trained model to extract intents.



Level 1 data flow diagram



Key Findings

- Virtual Assistant achieved an accuracy of ~92% under ideal conditions.
- The Hotel System responded in <2 seconds for database queries.
- Speech Command Execution Success: ~90%
- Database Query Match Accuracy: 100% for known destinations
- Both systems were tested for robustness, showing consistent and user-friendly performance.

Challenges Faced

- Implementing support for multiple languages and regional dialects to cater to a global user base.
- Ensuring robust data security and privacy measures to protect sensitive customer information during interactions.
- Enhancing the accuracy of AI models to effectively comprehend and respond to diverse customer queries.



- Add Multiple Language Support
- Help guests talk to the assistant in their own language.
- Control Smart Room Devices
- Let users turn on lights, AC, or TV using voice commands.
- Give Personalized Suggestions
- Suggest food, places to visit, or hotel services based on guest preferences.
- Collect Feedback from Guests
- Ask guests for reviews or ratings to improve the assistant's performance.



- The Virtual Hospitality Assistant successfully automates guest interactions using voice-based AI technology.
- It improves customer service by providing fast, accurate, and 24/7 responses.
- The system reduces the workload on human staff and increases operational efficiency.
- It is scalable and can be enhanced with features like multilingual support, emotion detection, and smart device integration.
- The assistant has strong potential to transform the hospitality industry by offering personalized and seamless user experiences.
- Continuous updates and user feedback will help further refine the system for broader real-world applications.



- [Python Official Documentation](#)
- SpeechRecognition Library: <https://pypi.org/project/SpeechRecognition/>
- pyttsx3 TTS Library: <https://pypi.org/project/pyttsx3/>
- SQLite Official Docs: <https://www.sqlite.org/index.html>
- Webbrowser/OS Module – Python Standard Library





Thank you!

