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## The Superior University

### Project Title

***Voice Assistant with Emotion Detection***

### Project Details

1. Course: Artificial intelligence
2. Instructor: Mr.Rasikh Ali
3. Semester: 3rd
4. Section: 3A
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### Abstract

This project focuses on building a Python-based voice assistant capable of performing tasks such as opening web applications, providing Wikipedia summaries, and executing commands like playing music and retrieving the current

time. A distinguishing feature of this assistant is its **emotion detection** capability, which analyzes user audio to adapt responses based on emotional tones (e.g., calm, excited, or neutral). The assistant leverages speech recognition and audio processing libraries to create an interactive and adaptive user experience, enhancing accessibility and functionality. The project serves as a practical application of concepts in data structures and algorithms, alongside Python programming.

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### **1. Introduction**

- The Voice Assistant with Emotion Detection is designed to recognize voice commands and perform specific tasks such as opening websites, playing music, or fetching information from Wikipedia. The emotion detection feature makes the assistant more interactive by tailoring responses based on user emotions, providing a more personalized experience. This project demonstrates the practical use of Python programming and audio processing to solve real-world problems, making it relevant to modern-day applications.

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### **2. Objectives**

- Develop a voice assistant that can execute basic tasks based on voice commands.
- Integrate emotion detection to enhance the assistant's interactivity.
- Demonstrate the application of Python libraries such as SpeechRecognition, Pyttsx3, and Librosa.

- Improve problem-solving skills by implementing a structured approach to software development.

### **3. System Requirements**

- **Hardware Requirements:**

- Processor: Intel Core i5 or higher
- RAM: 8 GB or more
- Microphone: External or built-in

- **Software Requirements:**

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- Operating System: Windows 10 or later
- Python 3.9 or later
- Libraries:
- SpeechRecognition
- Pyttsx3
- Librosa
- Wikipedia

### **4. Methodology**

- **Planning and Design:**

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- Identify core functionalities such as voice command recognition, task execution, and emotion detection.
- Design a modular structure to separate logic for command processing and emotion recognition.

- **Development:**

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- Use the SpeechRecognition library to capture and process voice input.
- Implement audio analysis using Librosa to detect emotions based on pitch and volume.

- **Testing and Debugging:**

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- Conduct extensive testing for command recognition accuracy.
- Debug common errors such as NoneType in audio processing.

- **Final Integration:**

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- Combine emotion detection with task execution logic for a seamless user experience.

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## 5. Implementation

### - **Core Functionality:**

- The assistant listens for voice commands and converts them into text using the SpeechRecognition library.
- Commands are matched with predefined tasks, and corresponding actions are executed.

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### - **Emotion Detection:**

- The Librosa library is used to extract audio features such as pitch and volume. These features are analyzed to classify emotions into three categories: calm, neutral, or excited.

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### - **Tools Used:**

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- Python for scripting and development.
- Libraries like SpeechRecognition, Librosa, and Pytsx3.

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## 6. Challenges and Solutions

- **Challenge:** Recognizing audio input in noisy environments.
- **Solution:** Adjusted the recognizer's sensitivity and applied noise reduction techniques.

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- **Challenge:** Preventing errors like NoneType in command recognition.

- **Solution:** Added robust error handling and fallback mechanisms for unrecognized commands.

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- **Challenge:** Integrating emotion detection without affecting performance.

- **Solution:** Optimized audio feature extraction using Librosa to minimize processing time.

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## **7. Conclusion**

This project successfully demonstrates a modular and scalable voice assistant with the added functionality of emotion detection. The assistant provides an interactive user experience by tailoring responses based on emotional states. Future enhancements could include support for more complex tasks, multilingual support, and integration with external APIs for advanced functionalities.