CSE 4392/5369 Special Topic: Natural Language Processing

Homework 12 - Spring 2026

Due Date: April 27, 2026, 11:59 PM

Welcome to this week's NLP homework assignment! Your task is to design and implement a real-time communication robot that can talk to you with audio, just like Siri or Google Assistant! This bot consists of three key components: speech-to-text conversion (ASR), dialogue response generation, and text-to-speech synthesis (TTS). **You're encouraged to utilize any API or tool** available for each component, allowing you to explore various NLP techniques and unleash your creativity in crafting an engaging and responsive communication robot. Whether you envision a virtual assistant, chatbot, or conversationalist, this assignment offers the opportunity to experiment with cutting-edge NLP technologies and bring your ideas to life. Happy coding!

Problem 1 - 100%

This assignment is to examine the abilities of:

- Information Retrieval
- Application of existing APIs
- Product design
- Engineering efforts

Real Time System

You need to design a real-time system that can:

1. Once the system is started, it should be able to listen to the user's voice.
2. The system could automatically stop listening when the user stops speaking.
3. A response should be generated in real-time in the form of audio.
4. After the response is generated, the system should be able to listen to the user's voice again.
5. Once the system hears a specific keyword (e.g., "Exit the bot"), it should stop listening and terminate the program.

Speech to Text

For speech-to-text conversion, you may use any available API or tool. For example:

- SpeechRecognition Library
- OpenAI Speech-to-Text
- Google Cloud Speech-to-Text
- ...

Response Generation

For response generation, you may use any available API or tool. For example:

- ChatterBot Library
- OpenAI API (Text Generation / Responses API)
- OpenAI Realtime API
- ...

Text to Speech

For text-to-speech synthesis, you may use any available API or tool. For example:

- OpenAI Text-to-Speech
- pyttsx3 Library
- ...

Attach your codes and a captured video demo that explains how your app works.

Submission Format: Submit one zip file via Canvas containing only the `.pdf` version of your homework (typed submissions are preferred; scanned images must be readable), the corresponding source files, and a `README` file describing how to run the code. The zip file must be named `lastname_studentID_hw12.zip`.