

Core Python Libraries for Voice Translation System

speech_recognition (sr)

Purpose: Convert speech to text using various engines (Google, Sphinx, etc.)

Core Classes and Functions:

- Recognizer(): Main class for speech recognition
- Microphone(): Accesses system microphone
- AudioFile('file.wav'): Accesses pre-recorded audio files
- recognizer.listen(source): Records audio from a given source
- recognizer.adjust_for_ambient_noise(source, duration=1): Reduces noise to improve recognition
- recognizer.recognize_google(audio, language='en'): Uses Google Web Speech API
- recognizer.recognize_sphinx(audio): Offline recognition using CMU Sphinx
- recognizer.recognize_ibm(...): Recognizes speech using IBM Watson API
- recognizer.recognize_bing(...): Recognizes speech using Microsoft Bing Voice
- recognizer.recognize_wit(...): Wit.ai API support
- recognizer.recognize_houndify(...): Houndify support

Common Exceptions:

- UnknownValueError: Couldn't understand speech.
- RequestError: Could not reach the API.

googletrans (Google Translate API for Python)

Purpose: Translate text from one language to another using Google Translate.

Core Classes and Functions:

- Translator(): The main translation class
- .translate(text, dest='te', src='auto'): Translates text from source to target language
- .detect(text): Detects the language of the input text

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- `.translate(...).text`: Returns only translated text
- `.translate(...).pronunciation`: Returns pronunciation (if available)
- `.translate(...).src`: Returns source language code
- `.translate(...).dest`: Returns target language code

gTTS (Google Text-to-Speech)

Purpose: Convert text to speech, and save it as an .mp3 file.

Core Classes and Functions:

- `gTTS(text='Hello', lang='en')`: Creates speech audio from text
- `.save("output.mp3")`: Saves the generated speech to a file
- `slow=True`: Slows down the speech (optional)
- `lang='en'`: Sets the output language

os (Standard Python Library)

Purpose: Interact with your operating system.

Commonly Used Functions:

- `os.system("start file.mp3")`: Opens file with default app (Windows)
- `os.remove("file.mp3")`: Deletes a file
- `os.getcwd()`: Gets current working directory
- `os.listdir()`: Lists files in the current folder

time (Standard Python Library)

Purpose: Time-related utilities (timing, delays, timestamps)

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Useful Functions:

- `time.time()`: Returns current time in seconds (Unix timestamp)
- `time.sleep(n)`: Pauses the program for n seconds
- `time.strftime('%Y-%m-%d')`: Returns current date/time as string
- `int(time.time())`: Used to generate a unique ID