**Noise Reduction with Python Libraries**

* **SpeechRecognition with PyDub**: PyDub and SpeechRecognition together can filter background noise. Here’s how:
  + Record a few seconds of ambient noise at the start, then use that as a sample to filter.
  + Use recognizer.adjust\_for\_ambient\_noise(source, duration=1) to automatically adjust the recognizer’s sensitivity to noise.
* **Noise Suppression with Noisereduce**: Noisereduce is a Python library designed for noise suppression.
  + First, install it: pip install noisereduce.
  + Use it to filter noise from an audio sample before feeding it to a speech recognizer.

import noisereduce as nr

import soundfile as sf

# Load audio file

data, rate = sf.read("input.wav")

# Perform noise reduction

reduced\_noise = nr.reduce\_noise(y=data, sr=rate)

sf.write("output.wav", reduced\_noise, rate)

**2. Using Speech Recognition APIs**

* **Google Cloud Speech-to-Text API**: This API has built-in noise suppression and can handle moderate background noise.
* **Microsoft Azure Cognitive Services**: Offers robust noise reduction and adaptive recognition features.