

1. Short description of the problem and proposed solution.

The purpose of this project is to add noise to a wav file. This is accomplished by first reading in the wav file into MATLAB and replacing the last 10 seconds of the file with sine noise at 2500 Hz. I used the audioread function to read in the wav file and get the sampling frequency. I used a for loop to add sine noise to both channels of the wav file individually.

The c++ portion of the project is a bit more complicated. You must create a structure for the .wav file header. You need this so that you can get to the data portion of the .wav file. Once this is done, you can write the header to the new .wav file. Now you read in the .wav file one sample at a time. As you read in samples, you add sine noise and random noise to the file. The exact formula is given in the assignment. You then write the newly crafted sample to the output file.

2. Short description of WAV file format. What control fields do you have in the header? What is their location?

A detailed description of the WAV file header is shown below.

[1-4]	- "RIFF" - Marks file as RIFF type.
[5-8]	- File Size (integer) minus 8 bytes.
[9-12]	- "WAVE" - File type header.
[13-16]	- "fmt " - Format chunk marker.
[17-20]	- Length of "format data" area. Typically 16 for PCM.
[21-22]	- Type of format. "1" is PCM, which we work with.
[23-24]	- Number of channels (integer).
[25-28]	- Sample Rate = # of samples per second or Hz.
[29-32]	- $(\text{Sample Rate} * \text{Bits Per Sample} * \text{Channels}) / 8$ - Bytes per Second.
[33-34]	- $(\text{Bits Per Sample} * \text{Channels}) / 8$. 1: 8 bit mono. 2: 8 bit stereo. 3: 16 bit mono. 4: 16 bit stereo.
[35-36]	- Bits Per Sample.
[37-40]	- "data" - Data chunk header. Included in "size of data" below.
[41-44]	- Size of data section in bytes.

The header contains fields such as bits per sample, the number of channels, file format, etc. These are in the first 40 bytes of the file.

3. Summary text file. Explain if your program can work in real-time.

It works in real time because the length of the original file is about 17 seconds long, and the execution time is less than a second.

Summary File

Filename: Brown_A_mod1.wav

Sampling Frequency: 44100

Number of Channels: 2

Bits Per Sample: 16

Total Time of the Song 17.2569 seconds

The maximum amplitude is 22299. It occurs in the right channel.

Total Process Time: 336 milliseconds