ECE 6342 Fall 2016 Project Due Thursday 12/1

ECE6342_morse_code_sound.wav is a mono (1-channel) 11,025 samples per sec, 16-bits per sample, WAV file. There is a Morse code signal within the audio file, you should be able to hear it in the background, but it is not very audible (able to be heard). Write a Matlab program titled "your_name_2.m" to analyze the wav file and determine the narrow range of frequencies occupied by the morse code sounds. Then separate the Morse code sound into a separate file and the music into a separate file. Write out the separated Morse code and the separated music to separate wav files titled your_name_morse.wav and your_name_music.wav, where you use your actual name in the naming the file.

https://en.wikipedia.org/wiki/Morse_code

A dot is one time-unit wide of the sinusoid.
A dash is 3 time-units wide of the sinusoid.
A letters is made up of a combination of dots and dashes.
A space between dots and dashes in a letters is one time-unit of silence.
A space between letters in a word is three time-units of silence.
A space between words is seven time-units of silence.
The end of a message is dot-dash-dot-dash-dot.

Decode the morse code into a sequence of dots, dashes, and spaces.
There is a specific message (I put a silly military message about an attack) in the morse code.
You can decode the message if you like.

Write up a short word-document describing what you did and how you did it. Be very precise about describing your algorithm. If you use any information that you extracted visually from the plot of the signal, or morse code signal, then reveal that in your description.
Include the decoded morse-code sequence of dots, dashes, and spaces. There will be between 100 and 200 of these.
You might represent a dot as a 'd', a dash as a 'D', and a space as an 's', so that your decoded morse-code sequence is something like
D D s s s d d D d s s s s s s ..... so that it will fit on two-lines of your report.
If you decode the message, include the decoded message.

Ideally, a DSP algorithm is fully-automated.
Parts of this project can be easily solved by visually inspection of the signal plots. That is not ideal, but it is ok.
For example you might find the morse-code frequency by visually finding a short interval in the plot of the sound file wherein the music is almost silent, then counting the zero-crossings of the signal and infer the resulting morse-code frequency.
You would then include this visual inspection method in your report of your algorithm and results.
The more automated your program is, the better is your project result.

Finally, E-mail your dsp project word-document, the two wav files, and your matlab programs to me by the due date.