Lab Work – Digital Signal Processing

Denoising of an audio signal

In this lab, you should provide and implement a method to “correct" an audio signal that has been echoed and to which interfering signals (assimilated to noise) were added.

Task 1 – File recovery
Download the audio file from moodle: corruptedFile .wav
Plug in your headphones and listen to the signal.

Task 2 - Removal of “jammers”
From listening to the signal and the observation of its power spectral density, you can deduct and identify two pure frequencies which alter the useful signal. You are completely free to program the automatic identification of these frequencies. Express these frequencies in Hz.
Remove these interfering carriers by filtering. To do this, you should create a filter cleverly positioning its poles and zeros.

Task 3 - Echo cancellation
The signal has been echoed- the echo was synthetically generated by a single copy of the signal itself with an attenuation coefficient. The delay of the echo is between 100 and 400 ms. The attenuation coefficient is between 0 and 1.
Identify these settings and remove the echo signal.