ELEC-A5204 Homework 3

13.8.2019

Answer to all questions in given Matlab files and use Matlabs publish feature to generate a pdf file. Always return the published pdf AND Matlab files. Task are also written to Exercise1 X.m files which can be downloaded from Mycourses. When an exercise ask you to draw figures, return them always with suitable axis labels and titles. Return the functions, and published pdf.

1 Filter Coefficients.

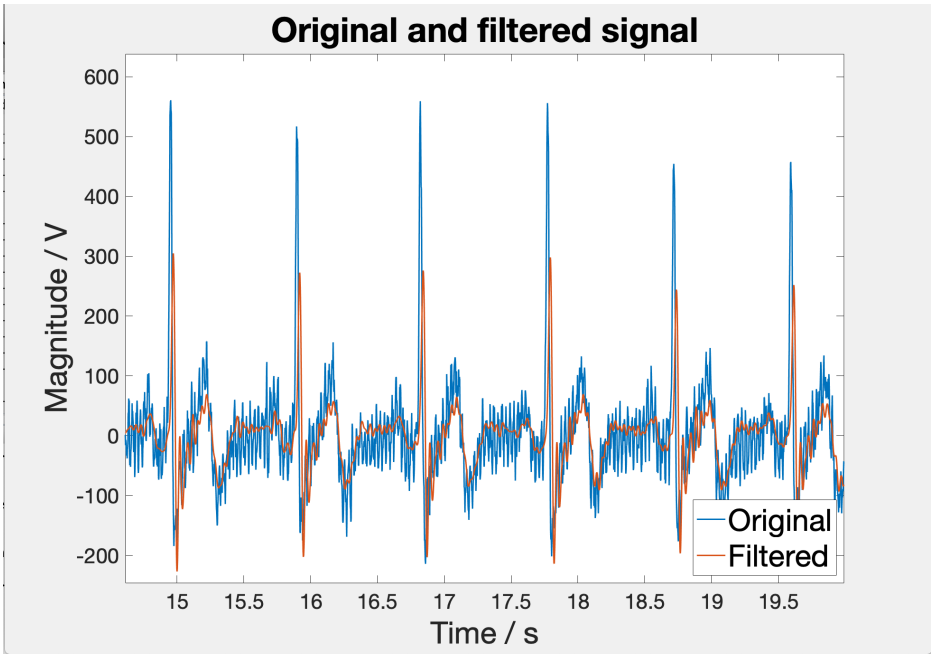
Make a function which calculates biquad notch filter coefficients from filter parameters. return the biquand parameters floored to nearest 0.1 (only for evaluating). Keep in mind that different sources offer different equations, but they each work well.

2 Anti-Alias Filtering

You are provided with an audio file. The Audio is downsampled from 44.1 kHz to 14.700 kHz. Audio will be severely contaminated. Your task is to implement anti-alias filtering with at least -30 dB of attenuation in the reject band. Anti aliasing noise must not be present in the final signal. Return your filter description and the filtered audio. You can play the files in matlab to evaluate your work.

3 Filtering Noisy signal

Take the data and improve the S/N ratio of the signal by filtering the signal with proper filter. Present the FFT of original and filtered signal. There is an example next page how the signal and filtered signal should look in time domain.


Original and filtered signal
Magnitude / V
600
500
400
300
200
100
0
-100
-200
15
15.5
16
16.5
17
17.5
18
18.5
19
19.5
Time / s
Original
Filtered