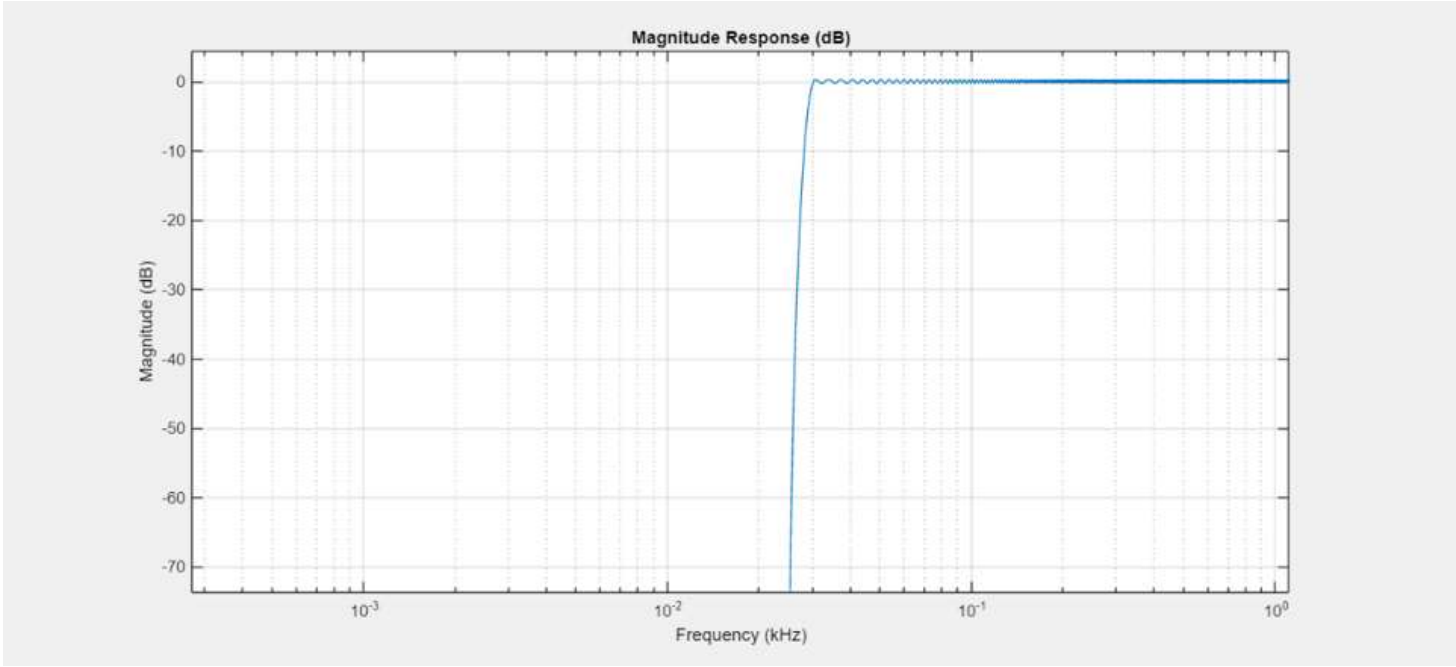
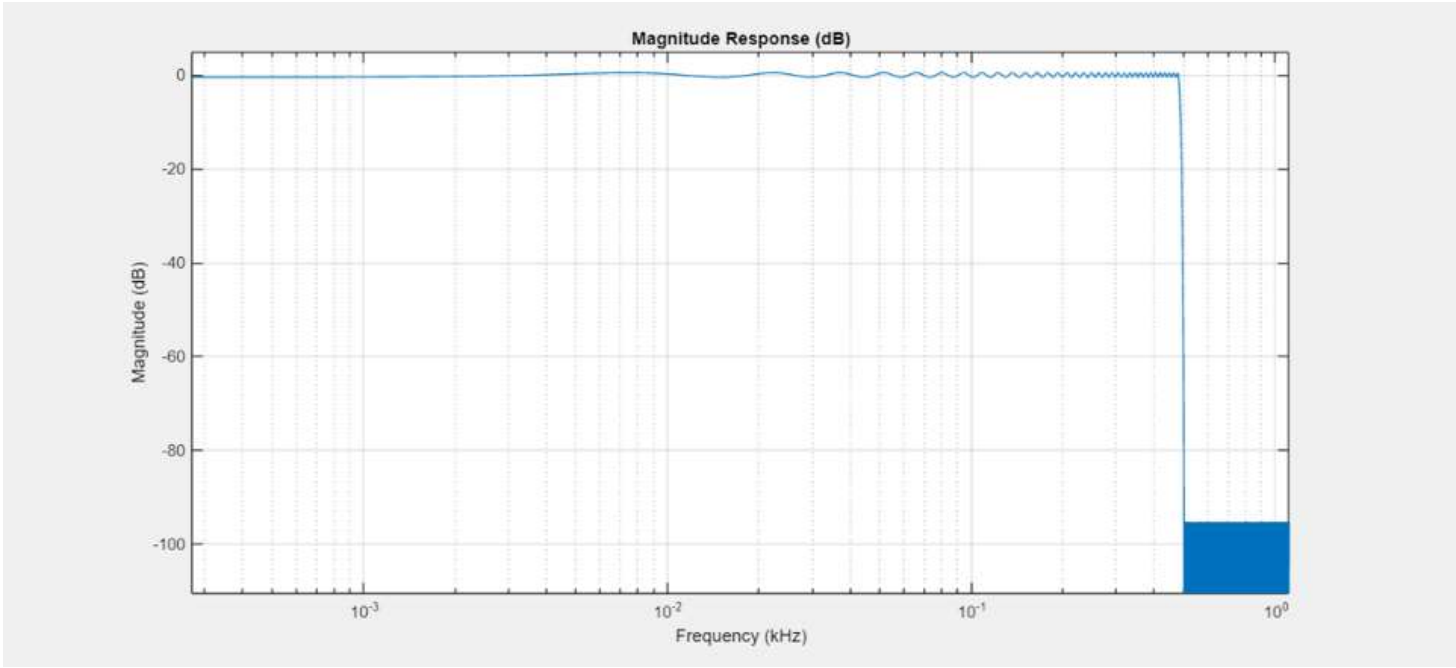
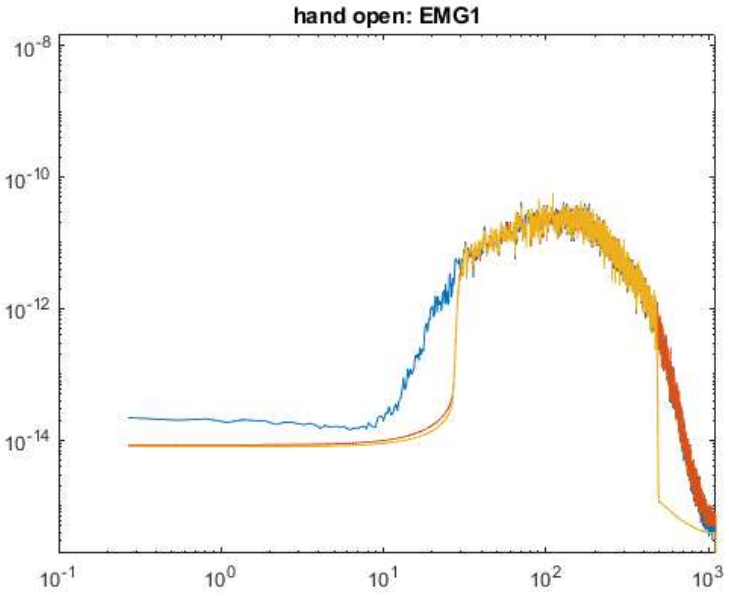
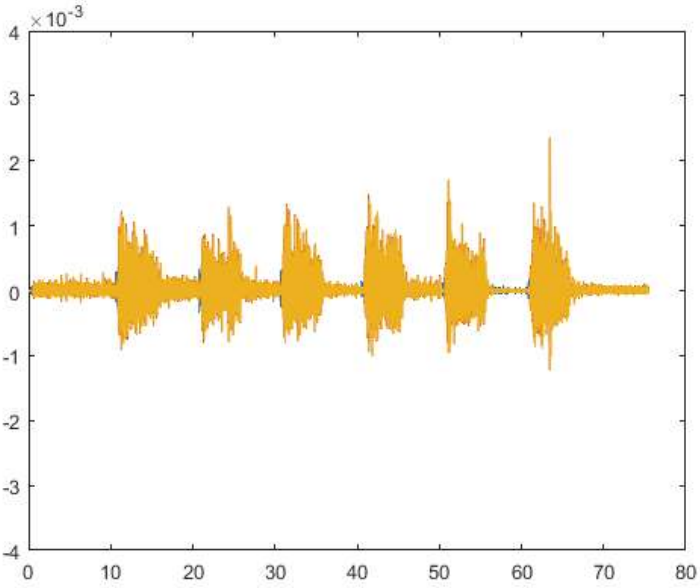
```
clear
close all

% We're here to filter the data

load EMG_Training.mat

% Pulling the sampling rate and setting up a time vector

Fs = EMG.HO.posture.Fs(1,1);
% This is giving me a weird error and slowing the whole thing down
% IDK why, I'll figure it out later, for now I'm only looking at one
% posture so it's fine
% t = (0:numel(Fs)-1/Fs);
t = EMG.HO.posture.Time;

% Bode plot of unfiltered data I'm looking at the third EMG from the "Hand
% Open" posture, because it had really clear difference between the "on"
% and "off" sections

[P,F] = pwelch(EMG.HO.posture.Data(3,:),ones(8192,1),8192/2,8192,Fs,'power');

figure(1);
y1 = loglog(F,P);
ylim([0,1.5*10^-8])
title('hand open: EMG1')
hold on

% Filters design
% Highpass, cutoff 30Hz

Fp = 30;    % Passband freq in Hz
Fst = 25;   % Stopband freq in Hz
Ap = 1;     % Passband ripple in dB
Ast = 95;   % Stopband attenuation dB

df = designfilt('highpassfir','PassbandFrequency',Fp, ...
    'StopbandFrequency',Fst,'PassbandRipple',Ap, ...
    'StopbandAttenuation',Ast,'SampleRate',Fs);

% Check filter response
hfvt = fvtool(df,'Fs',Fs,'FrequencyScale','log','FrequencyRange', ...
    'Specify freq. vector','FrequencyVector',F);

% Applying the HP filter
HPdata = filter(df,EMG.HO.posture.Data(3,:));

[P2,F2] = pwelch(HPdata,ones(8192,1),8192/2,8192,Fs,'power');

figure(1);
y2 = loglog(F2,P2);
hold on

% Lowpass, cutoff 480Hz

Fp2 = 480;    % Passband freq in Hz
Fst2 = 500;   % Stopband freq in Hz
Ap2 = 1;     % Passband ripple in dB
Ast2 = 95;   % Stopband attenuation dB

df2 = designfilt('lowpassfir','PassbandFrequency',Fp2, ...
    'StopbandFrequency',Fst2,'PassbandRipple',Ap2, ...
    'StopbandAttenuation',Ast2,'SampleRate',Fs);

% Check filter response
hfvt2 = fvtool(df2,'Fs',Fs,'FrequencyScale','log','FrequencyRange', ...
    'Specify freq. vector','FrequencyVector',F);

% Applying the Lowpass filter
LPdata = filter(df2,HPdata);

[P3,F3] = pwelch(LPdata,ones(8192,1),8192/2,8192,Fs,'power');

figure(1);
y3 = loglog(F3,P3);
```

```
% The Bode plots show that the filters do seem to be removing signal from
% the desired regions, which is grea

figure(2);
figure1 = plot(t,EMG.HO.posture.Data(1,:),t,HPdata,t,LPdata);
ylim([-0.004,0.004])

% Plotting the signal back after filtering it though doesn't show the kind
% of power drop I was expecting, maybe that's just because most of the
% power is already in the region I'm passing or maybe I made a mistake
% somewher, but I don't know what it would be

% I still need to put loops around the bits that apply the filters, and
% store the filtered data in a structure so I can call it later, but I've
% got working HP and LP filters I can apply to a signal


% After looking at a few of the data streams I don't see spikes at 60 Hz or
% any of the harmonics, so I'm leaving the notch filters out, if it becomes
% a problem I'll bring it back and put it in a loop to make a few of them
% and apply them to the data

% Notch @ 60 and harmonics (120, 180, 240, 300, 360, 420 up to pass band
%
% Fp3 = 50;    % Passband freq in Hz
% Fst3 = 55;   % Stopband freq in Hz
% Fst4 = 65;   % Stopband freq 2
% Fp4 = 70;    % Passband freq 2
% Ap3 = 1;     % Passband ripple in dB
% Ast3 = 50;   % Stopband attenuation dB
%
% df3 = designfilt('bandstopfir','PassbandFrequency1',Fp3, ...
%     'StopbandFrequency1',Fst3, 'StopbandFrequency2', ...
%     Fst4, 'Passbandfrequency2', Fp4, 'PassbandRipple1',Ap3, ...
%     'StopbandAttenuation',Ast3,'SampleRate',Fs);
%
% % Check filter response
% hfvt3 = fvtool(df3,'Fs',Fs,'FrequencyScale','log','FrequencyRange', ...
%     'Specify freq. vector','FrequencyVector',F);
```


Magnitude Response (dB)
Magnitude (dB)
0
-10
-20
-30
-40
-50
-60
-70
10^{-3}
10^{-2}
10^{-1}
10^{0}
Frequency (kHz)


Magnitude Response (dB)
Magnitude (dB)
0
-20
-40
-60
-80
-100
10^{-3}
10^{-2}
10^{-1}
10^{0}
Frequency (kHz)





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