AIN SHAMS UNIVERSITY **FACULTY OF ENGINEERING**

Computer Science Engineering Dept. **2nd Year Electrical Engineering**

Course Code: ***ECE251***

Course Project

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1. Matlab Code

```
[y,fs] = audioread ("Our names.wav");
num_of_samples = length(y);
time = linspace(0, num_of_samples/fs, num_of_samples);
figure
plot(time,y)
title ("Time Domain")
xlabel ( "Time" )
ylabel ( "Amplitude" )
grid on

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

f = linspace (0,fs,num_of_samples);
Y = fft (y,num_of_samples);
figure
plot(f,Y)
title( "Frequancy Domain" );
xlabel( "Frequancy" );
ylabel( "Magnitude" );
grid on

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
% High Pass Filter in time domain

cutoff_frequency = 500;
filter_order = 100;

% Design the high-pass filter using fir1
b = fir1(filter_order, cutoff_frequency / (fs/2), 'high');

% Apply the high-pass filter to the audio signal
filtered_audio_time_domain = filter(b, 1, y);

figure
plot(time,filtered_audio_time_domain);
title( "Filtered Signals in Time Domain" );
xlabel( "Frequancy" );
ylabel( "Magnitude" );
grid on

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% High Pass Filter in Freq. domain


filtered_audio_freq_domain = fft (filtered_audio_time_domain,num_of_samples);
figure
plot(f,filtered_audio_freq_domain)
title( "Filtered Signals in Frequancy Domain" );
xlabel( "Frequancy" );
ylabel( "Magnitude" );
grid on

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Play the original and filtered audio
sound(y, fs);                              % Play original
pause(10);                                 % Pause for a moment
sound(filtered_audio_time_domain, fs);     % Play filtered


audiowrite( "Filtered.wav" , filtered_audio_time_domain, fs);          % save audio file

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

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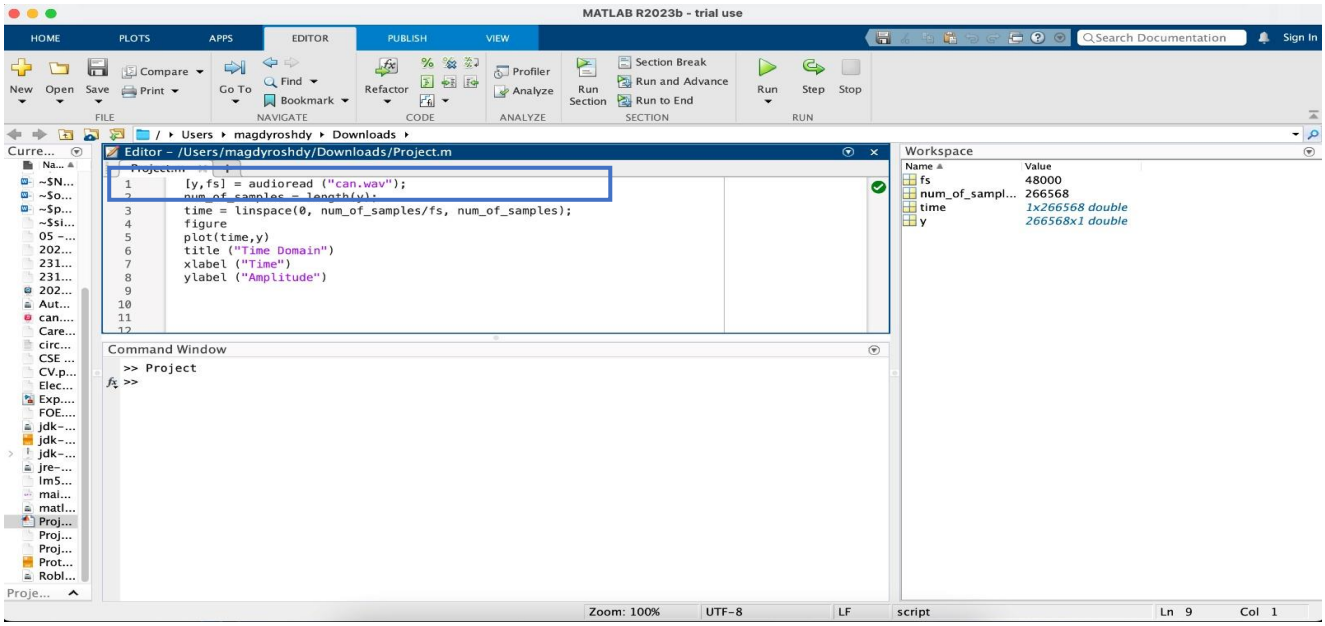
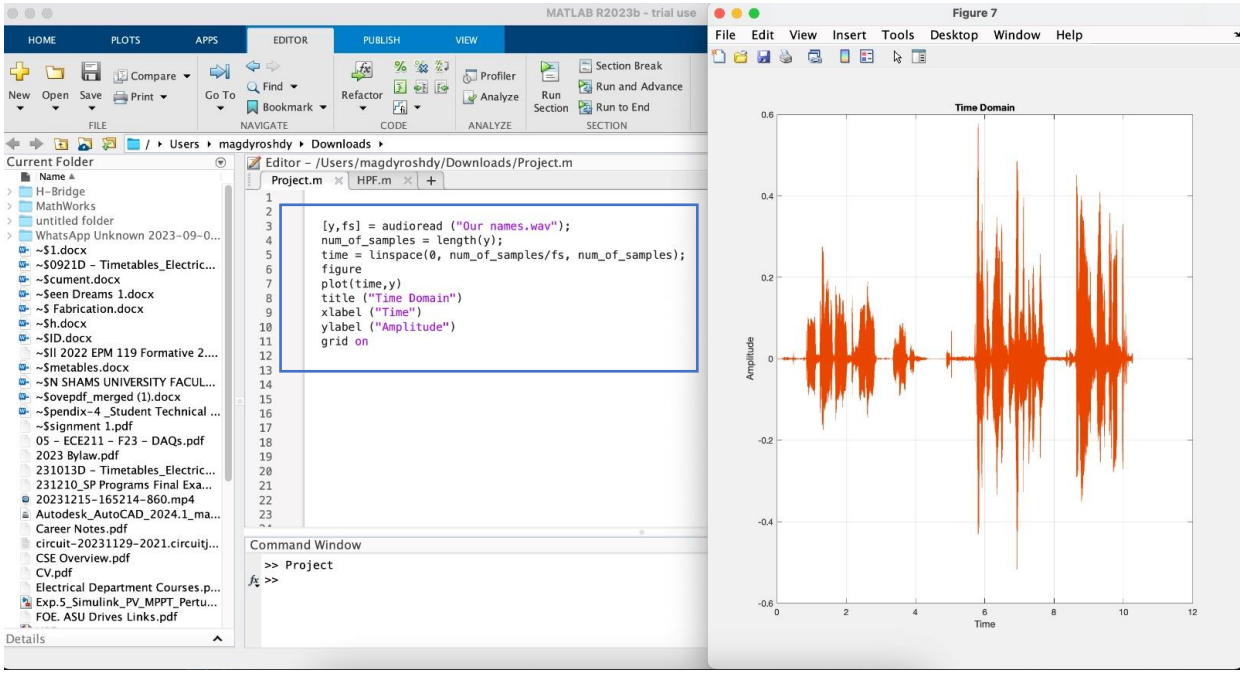
2. Read an audio file from the hard disk of the computer



3. Plot the audio signal in time domain



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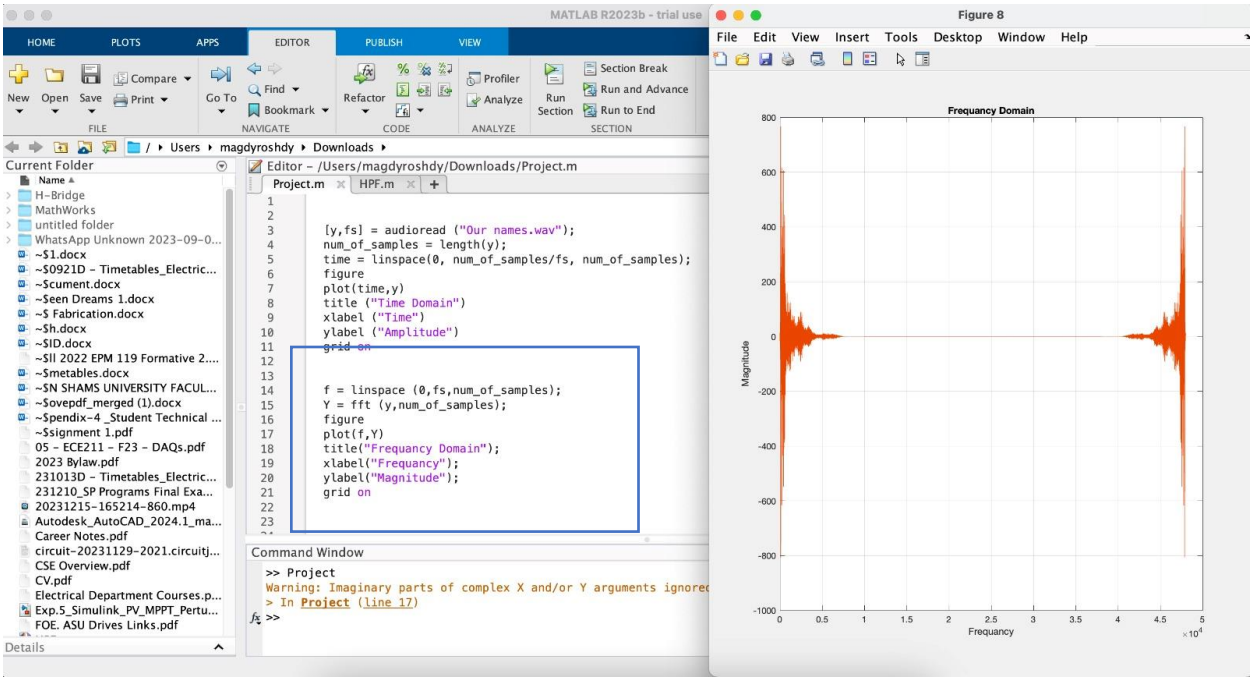
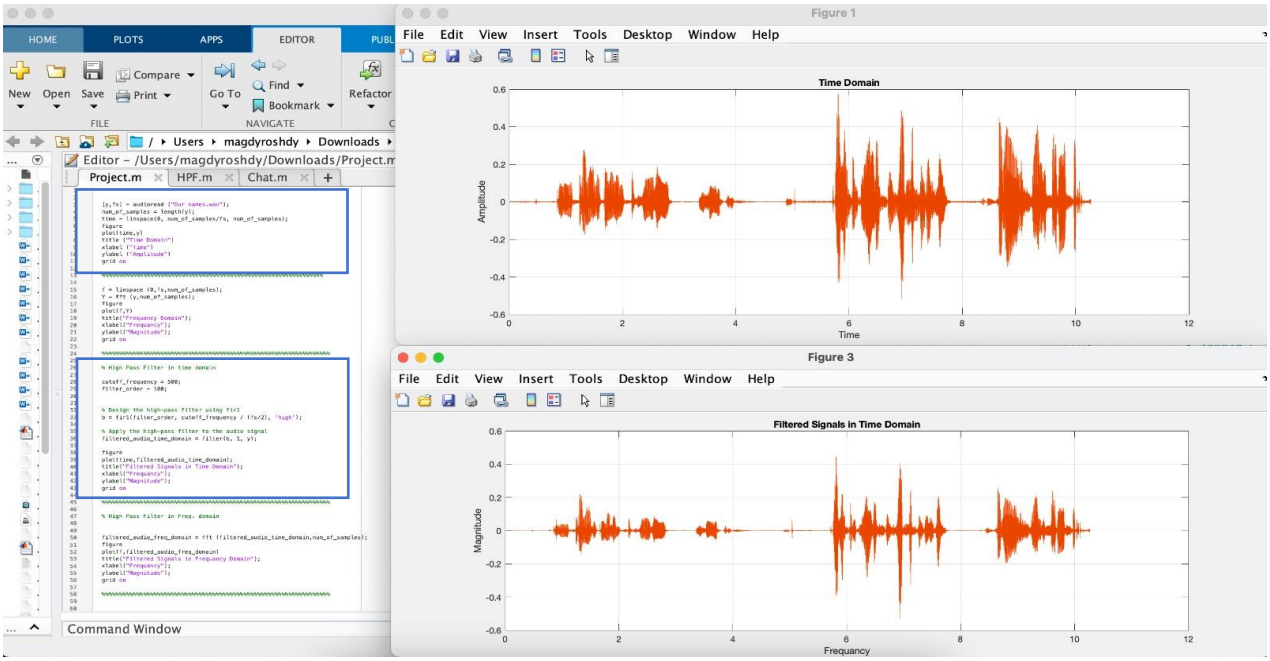
4. Frequency Domain Representation



5. Filtered Signal in Time Domain (Applying HPF)



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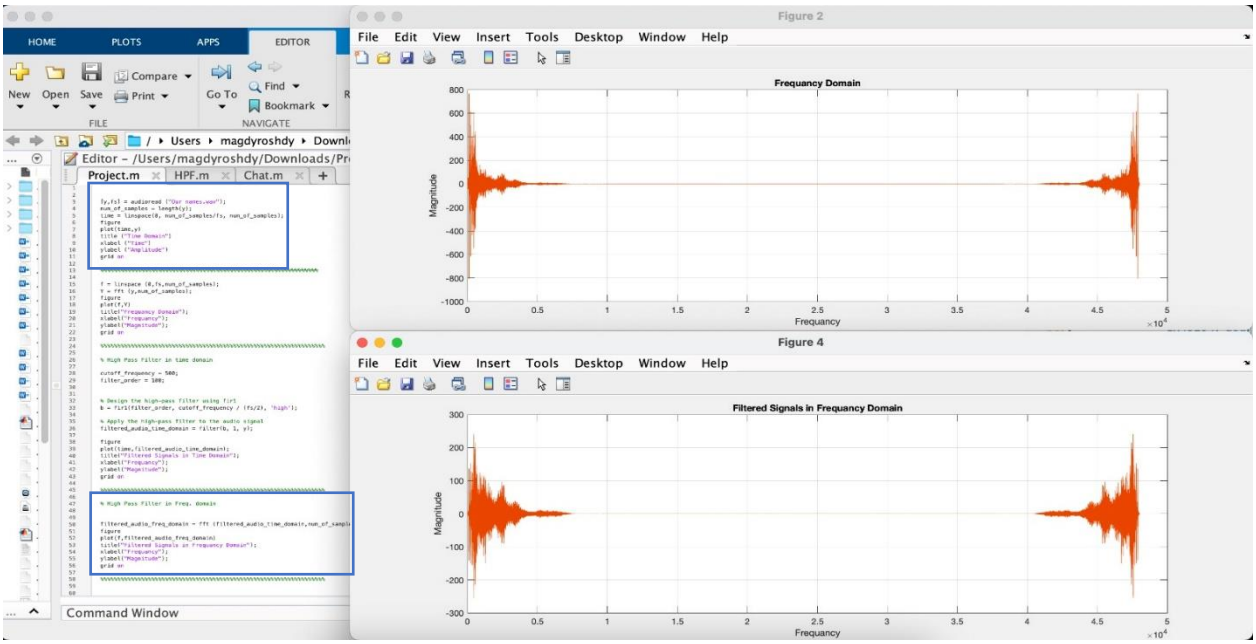
6. Filtered Signal in Frequency Domain (Applying HPF)



7. Save the filtered signal