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Biomedical Signal Processing - Homework 4

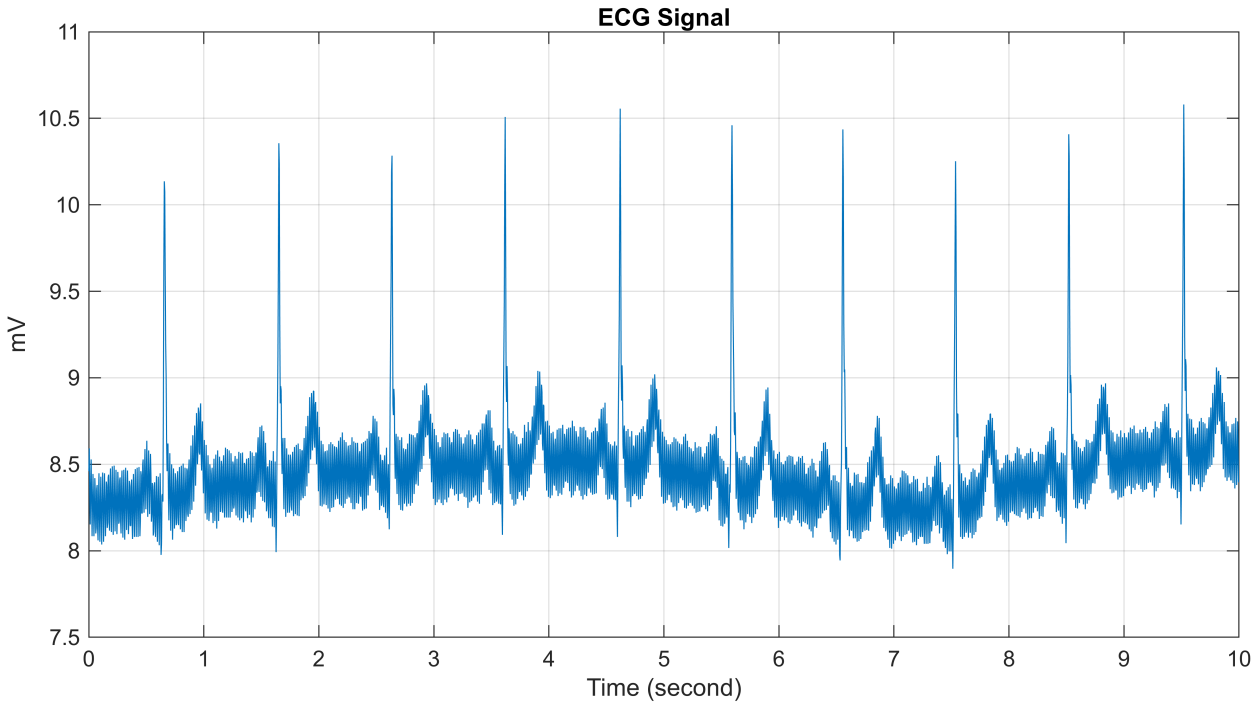
Fantasia Database

f1o01

Directly plot ECG signal from .dat file

According to 250Hz sampling rate, the fist 2500 samples show the first 10 seconds of signal

```
[sig, ~, tm] = rdsamp('Data/f1o-01/f1o01.dat', 2, 2500);
fig = figure();
fig.Position(3:4) = [3000, 1500];
plot(tm, sig);
title('ECG Signal');
xlabel('Time (second)');
ylabel('mV');
grid on;
```

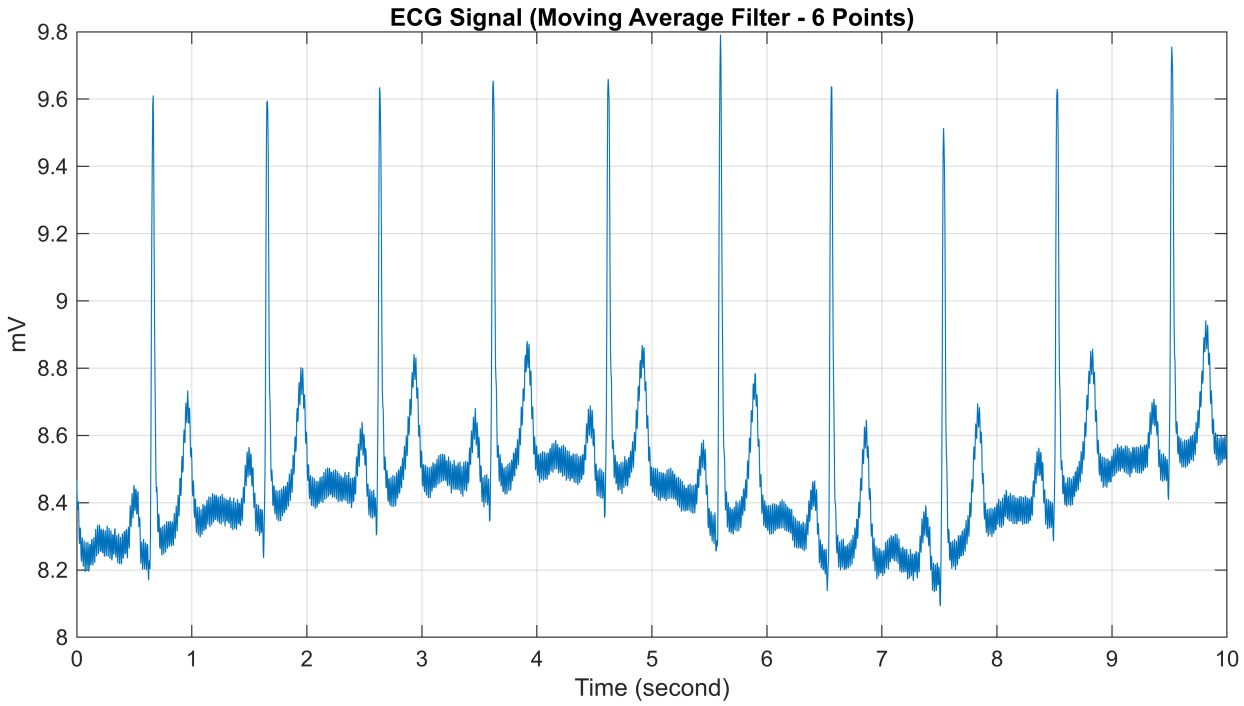


Using *movemean* function of MATLAB we filter (smotoh) our ECG signal.

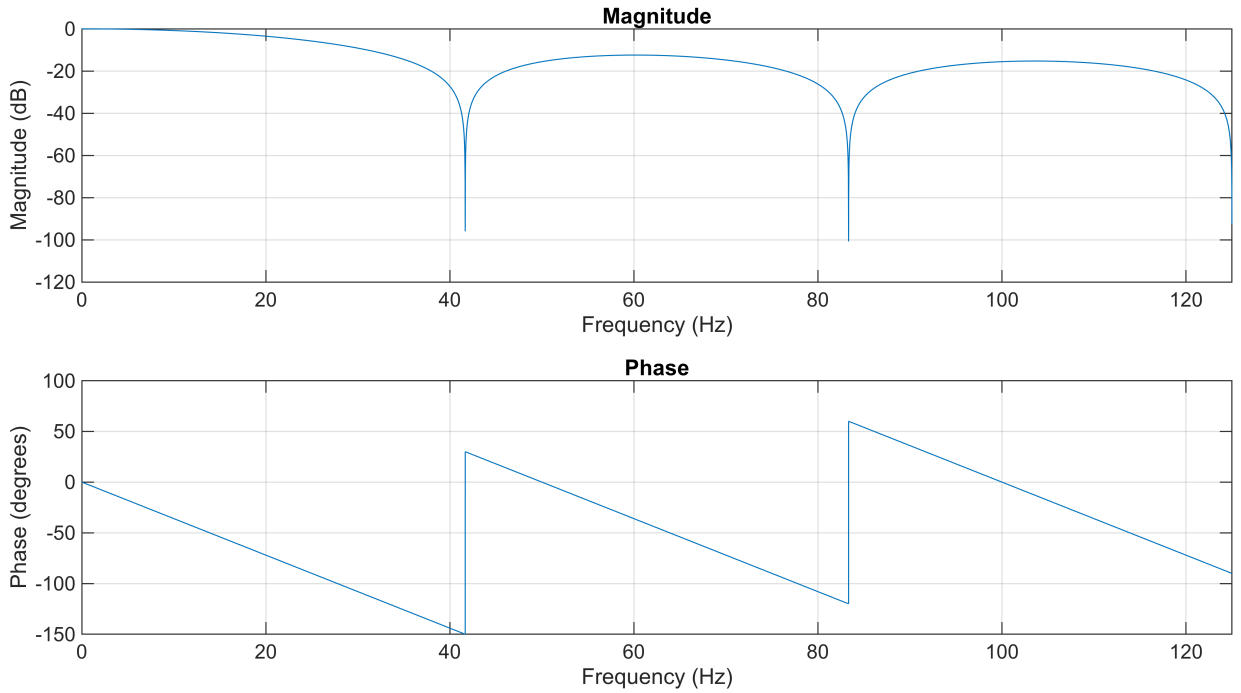
$K = \#\,\text{Points}$

$$\text{MovingAverageSignal} = \frac{1}{K}\sum_{i=0}^{K-1} x_{i-k}$$

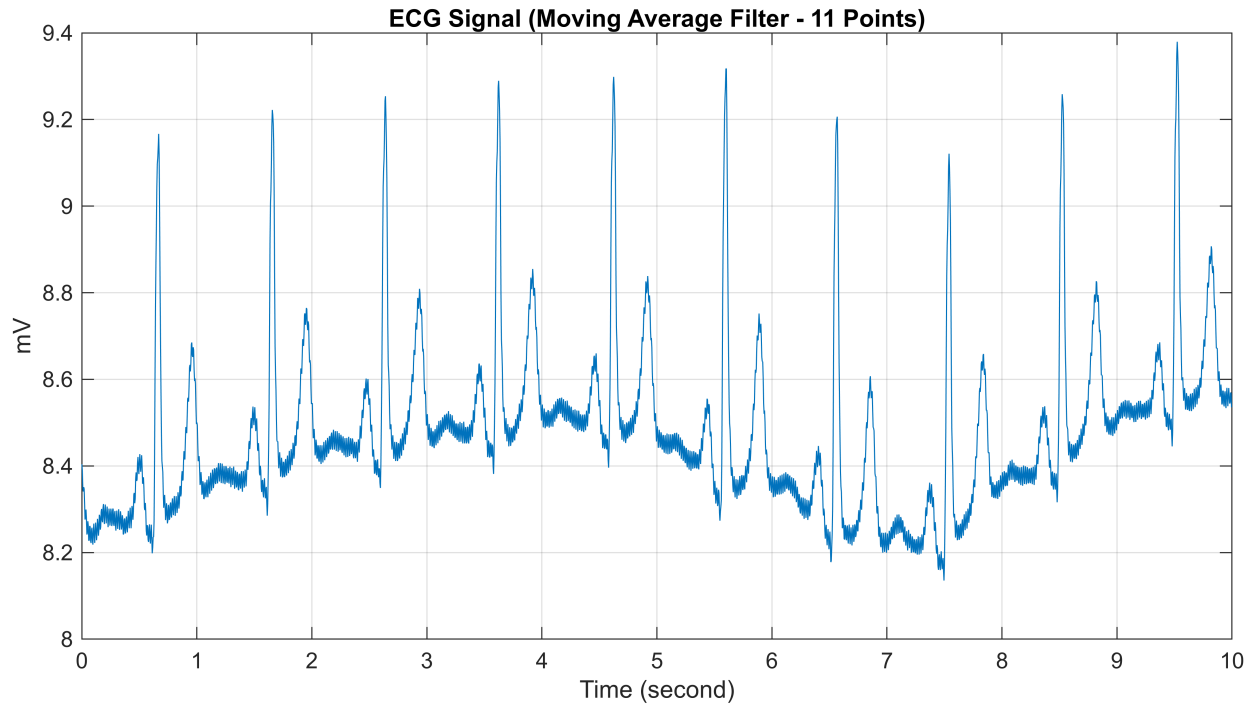
```
movingAverageFilter = movmean(sig, 6);
plot(tm, movingAverageFilter);
title('ECG Signal (Moving Average Filter - 6 Points)');
xlabel('Time (second)');
ylabel('mV');
grid on;
```



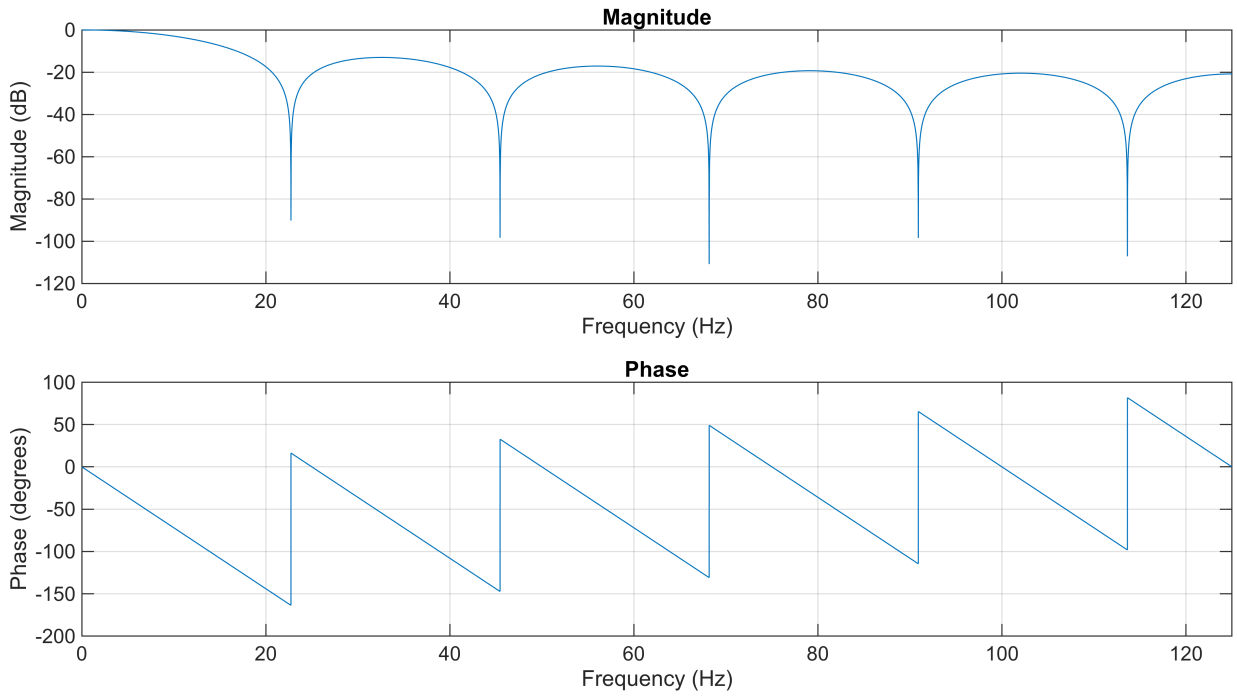

```
freqz(repelem(1/6, 6), 1, 2^16, 250);
```



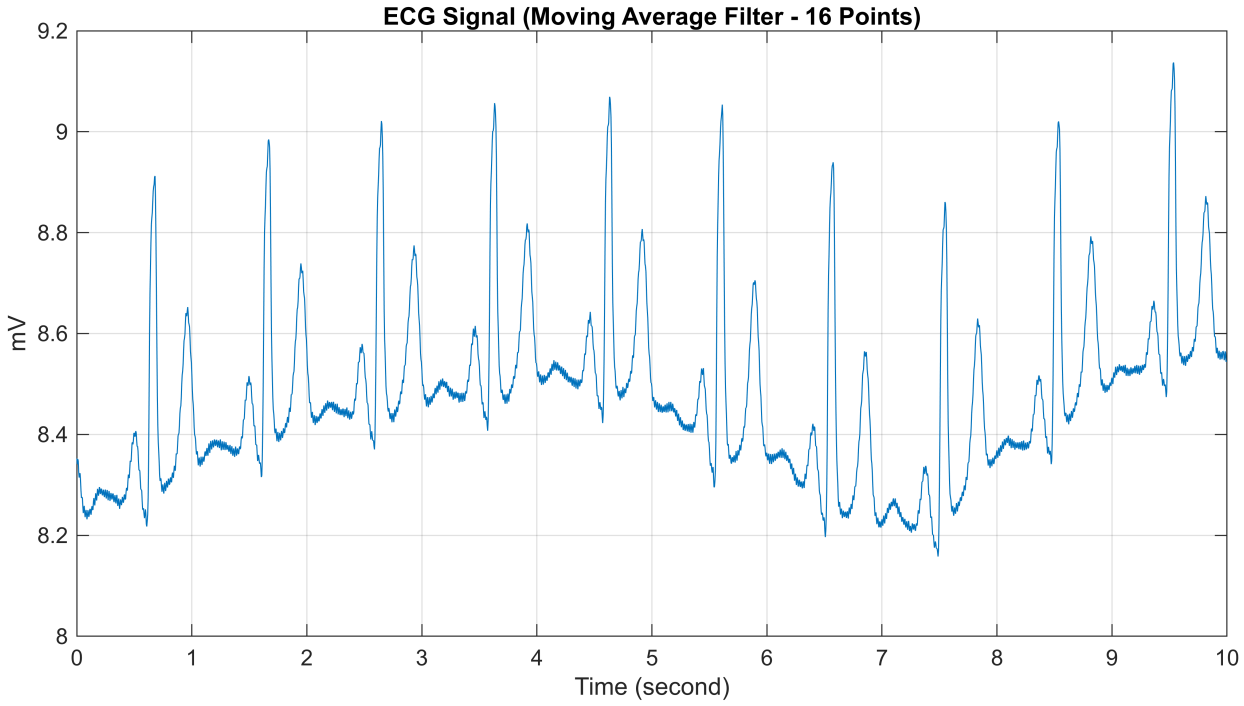

```
movingAverageFilter = movmean(sig, 11);
plot(tm, movingAverageFilter);
title('ECG Signal (Moving Average Filter - 11 Points)');
xlabel('Time (second)');
ylabel('mV');
grid on;
```



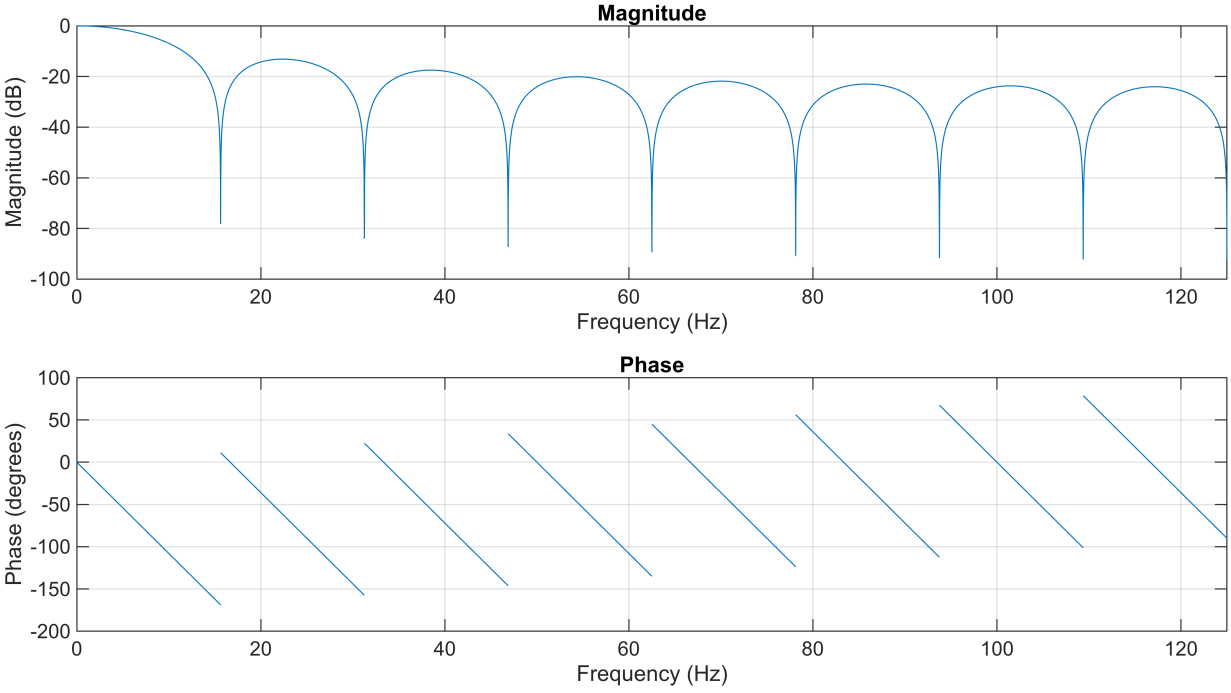
```
freqz(repelem(1/11, 11), 1, 2^16, 250);
```




```
movingAverageFilter = movmean(sig, 16);
plot(tm, movingAverageFilter);
title('ECG Signal (Moving Average Filter - 16 Points)');
xlabel('Time (second)');
ylabel('mV');
grid on;
```




```
freqz(repelem(1/16, 16), 1, 2^16, 250);
```



ECG-ID Database

person 1 - rec 14

Directly plot ECG signal from .dat file

According to 500Hz sampling rate, the fist 5000 samples show the first 10 seconds of signal

```
[sig, ~, tm] = rdsamp('Data/person 1 - rec 14/rec_14.dat', 1, 5000);
```

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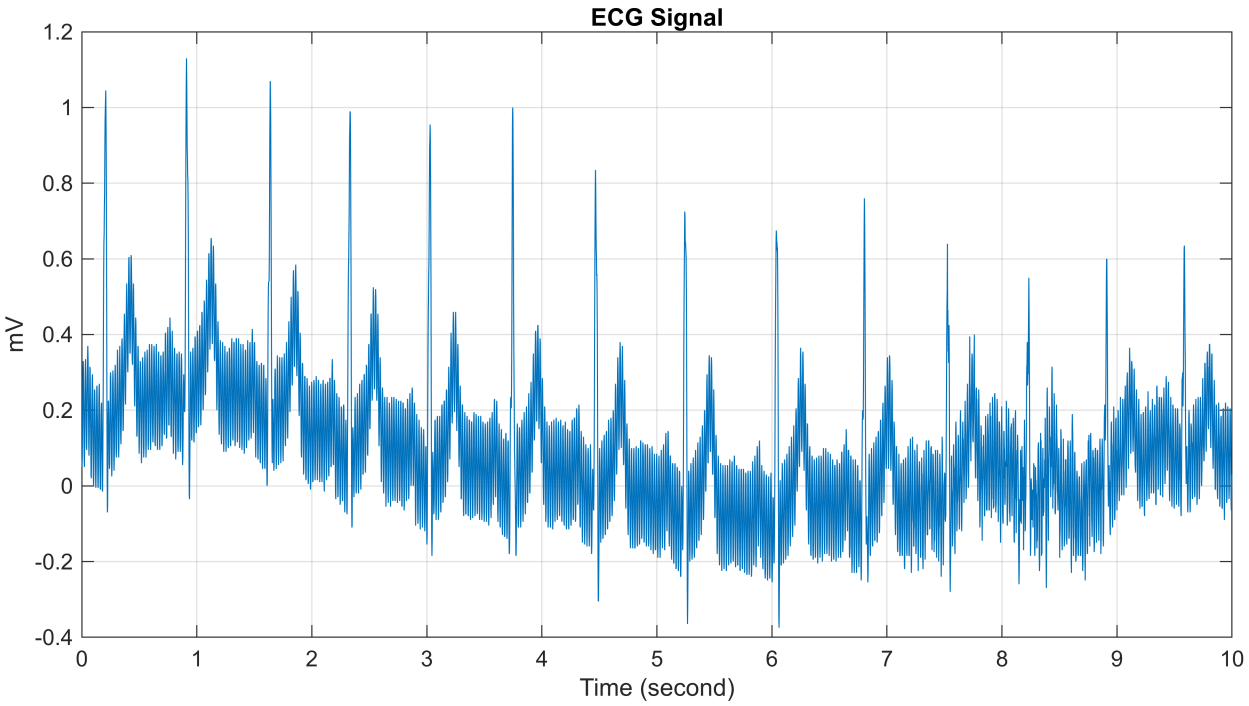
```

```
fig = figure();
fig.Position(3:4) = [3000, 1500];
plot(tm, sig);
title('ECG Signal');
xlabel('Time (second)');
ylabel('mV');
grid on;
```




```
[sig_f, ~, tm] = rdsamp('Data/person 1 - rec 14/rec_14.dat', 2, 5000);
```

```
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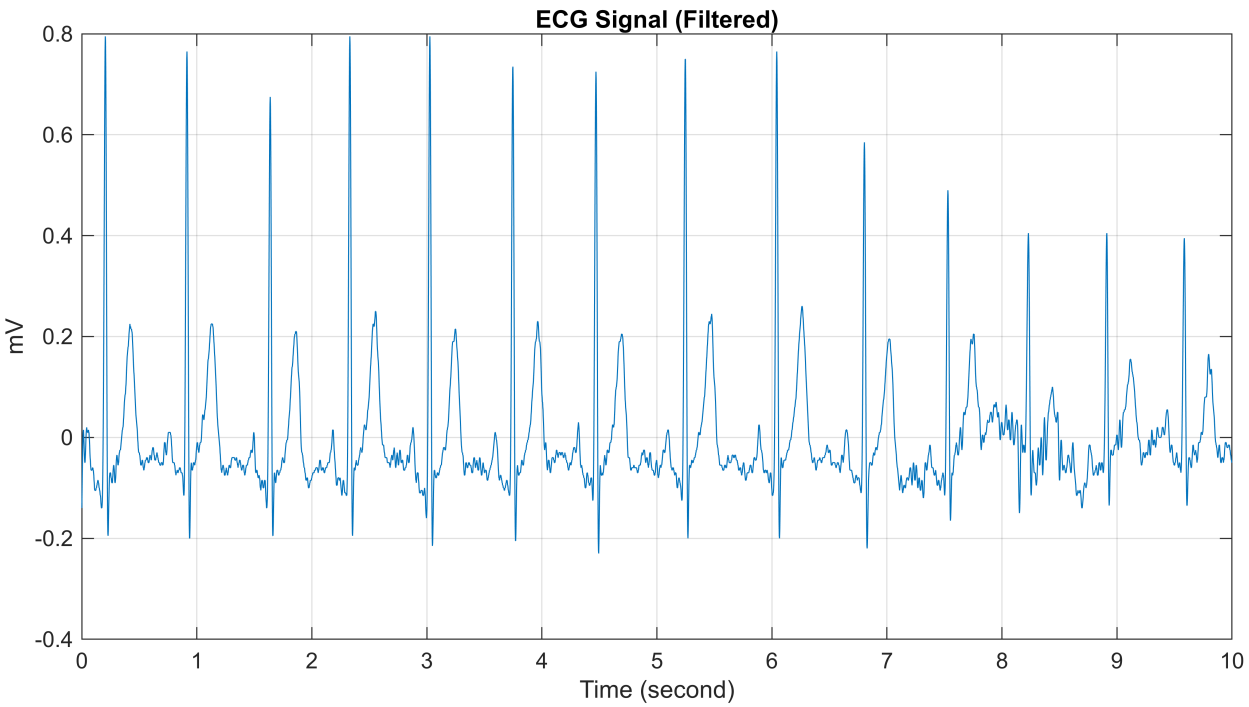
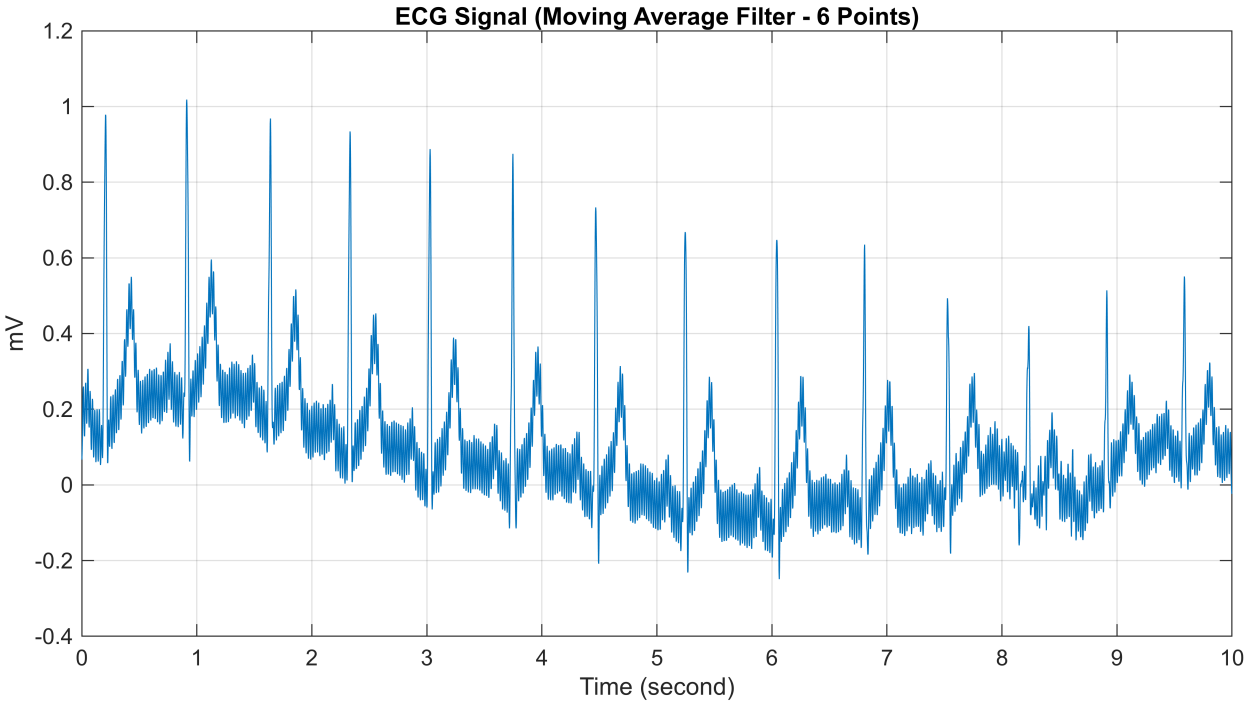
```

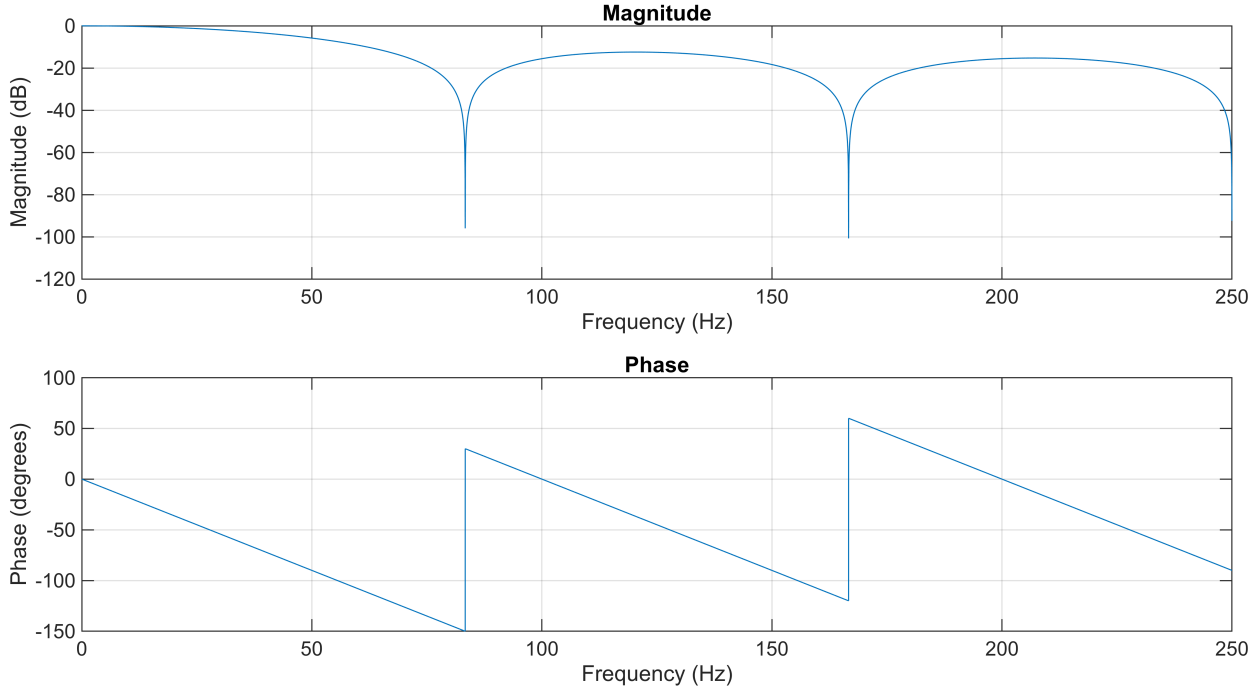
```
fig = figure();
fig.Position(3:4) = [3000, 1500];
plot(tm, sig_f);
title('ECG Signal (Filtered)');
xlabel('Time (second)');
ylabel('mV');
grid on;
```




```
movingAverageFilter = movmean(sig, 6);
plot(tm, movingAverageFilter);
title('ECG Signal (Moving Average Filter - 6 Points)');
xlabel('Time (second)');
ylabel('mV');
grid on;
```

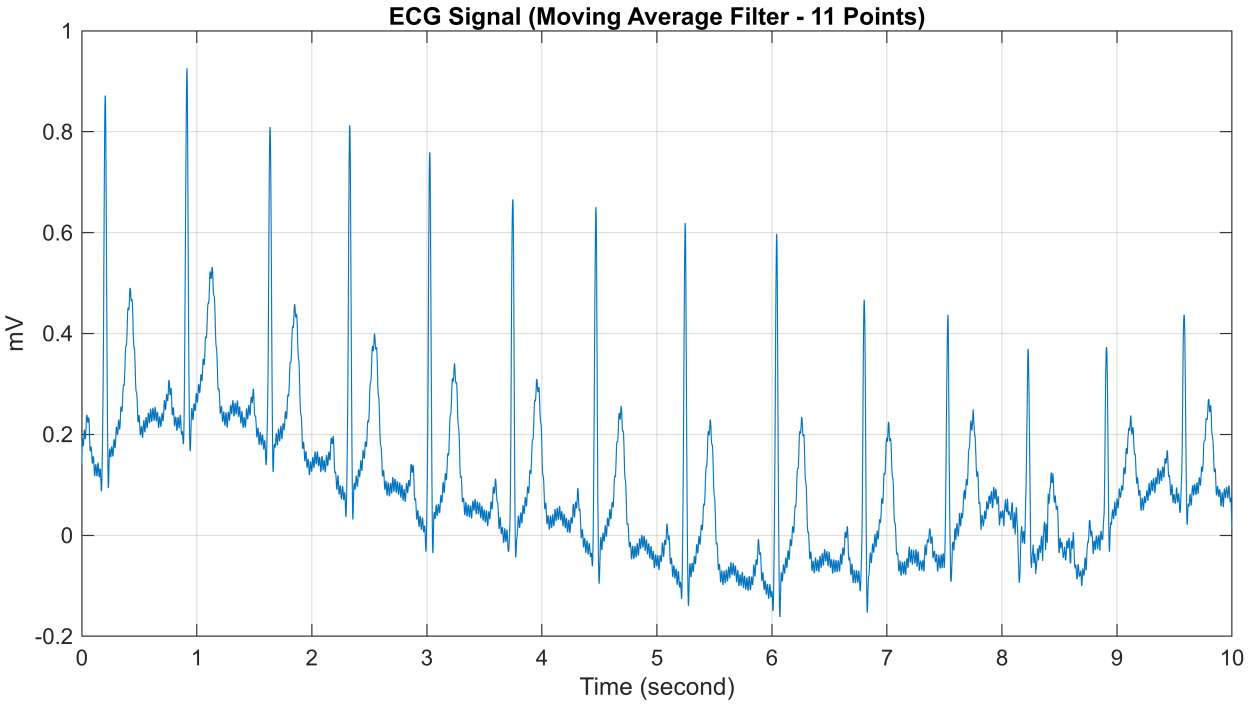



```
freqz(repelem(1/6, 6), 1, 2^16, 500);
```

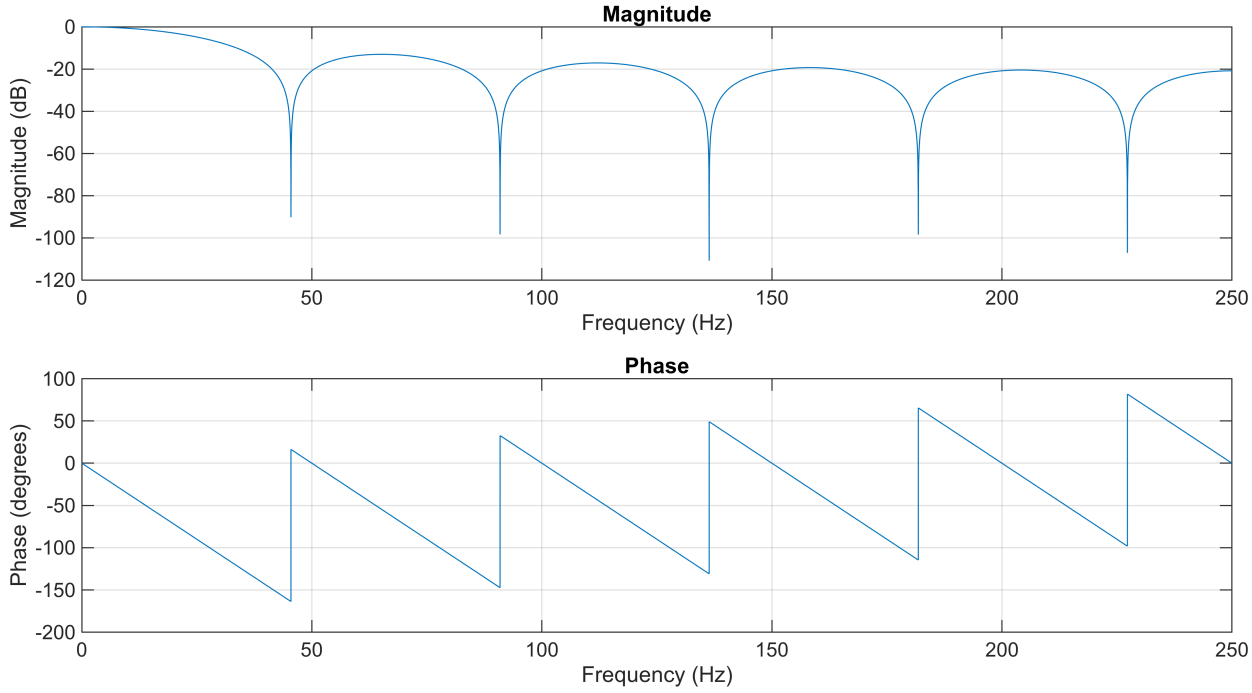



```
movingAverageFilter = movmean(sig, 11);
plot(tm, movingAverageFilter);
title('ECG Signal (Moving Average Filter - 11 Points)');
xlabel('Time (second)');
ylabel('mV');
```

```
grid on;
```

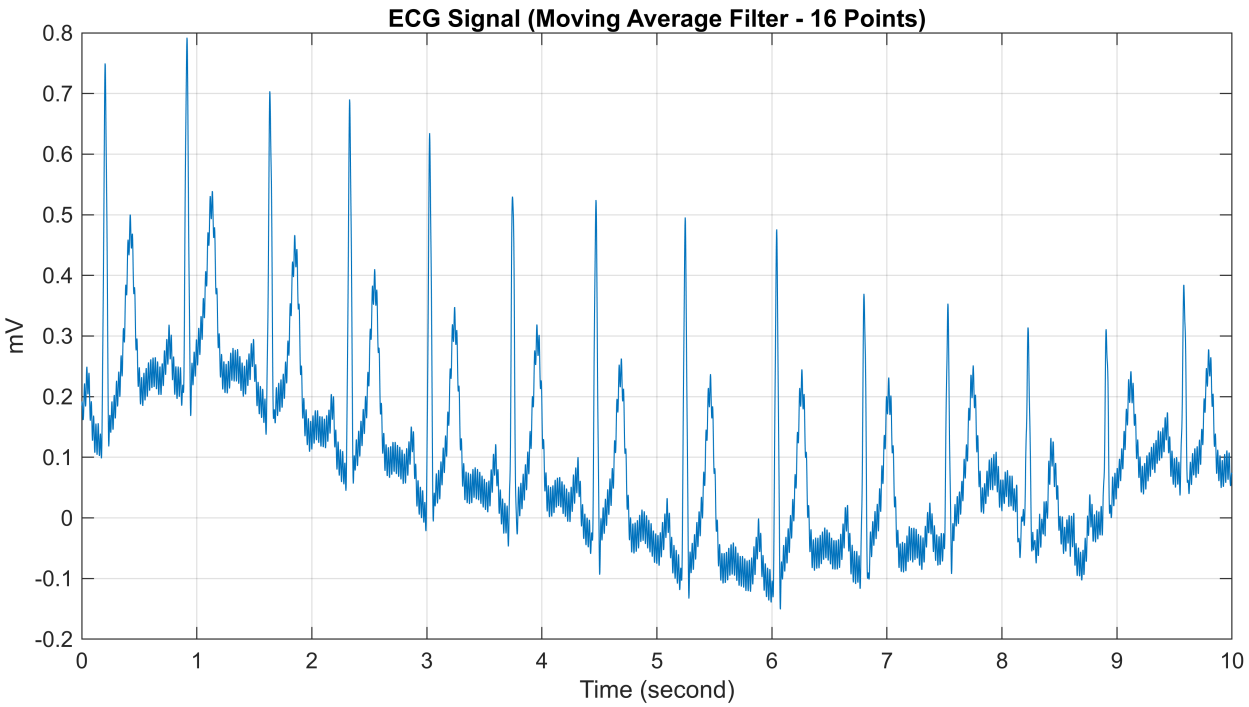



```
freqz(repelem(1/11, 11), 1, 2^16, 500);
```




```
movingAverageFilter = movmean(sig, 16);
plot(tm, movingAverageFilter);
title('ECG Signal (Moving Average Filter - 16 Points)');
xlabel('Time (second)');
```

```
ylabel('mV');
grid on;
```




```
freqz(repelem(1/16, 16), 1, 2^16, 500);
```