Student: Vlad-Eusebiu Baciu

ECG signal filtering

Matlab script – short description

- ECG waveform: PR, QRS, QT waveforms are created and then using convolution the complete ECG signal is created

- For the ECG waveform three types of noises are applied: random noise, baseline noise and interference noise (50/60 Hz)

- The filtering method consist of 3 steps: a low pass filter, a high pass filter and then the LMS adaptive filter. Both LPF and HPF are second order filters.

- The LMS filter is a narrow band filter that works only with frequencies near f_interference frequency. Is a 2 tap filter which adjusts b1 and b2 coefficients for ref signal: b1 – in phase signal; b2 – 90 degree shifted signal

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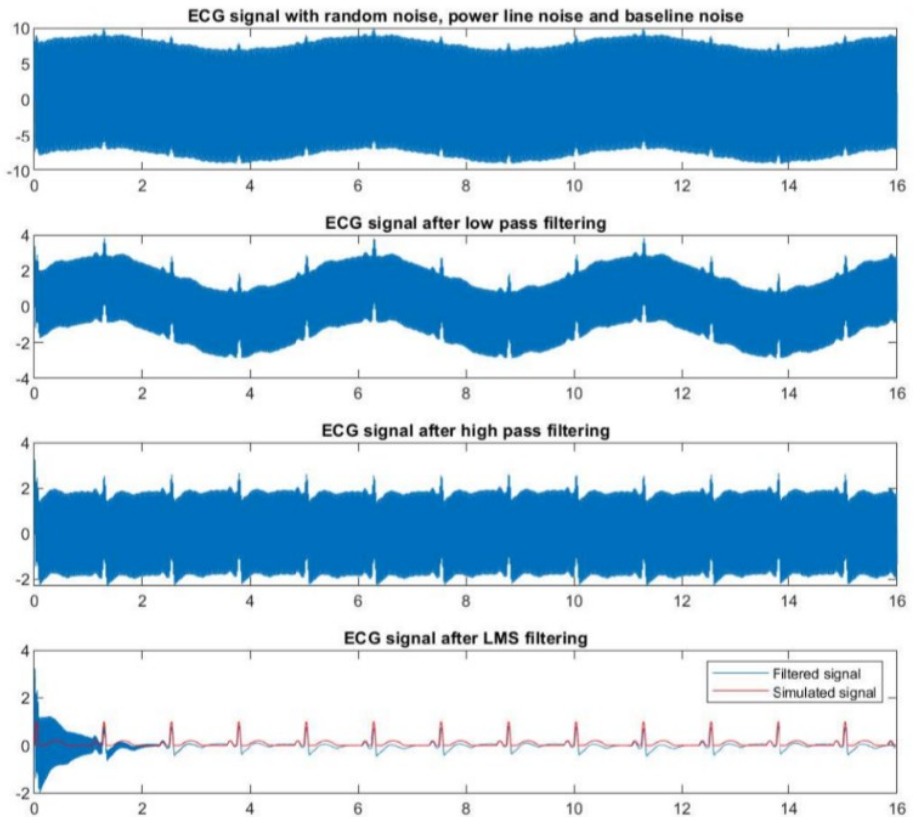
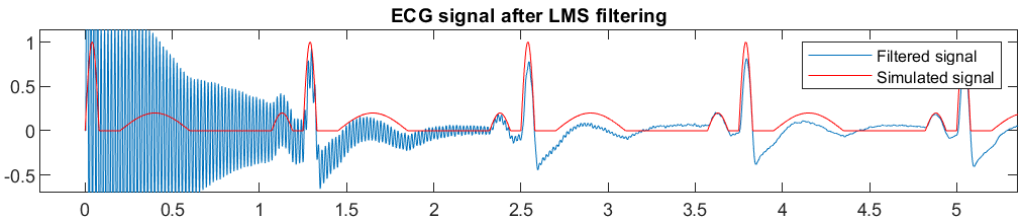
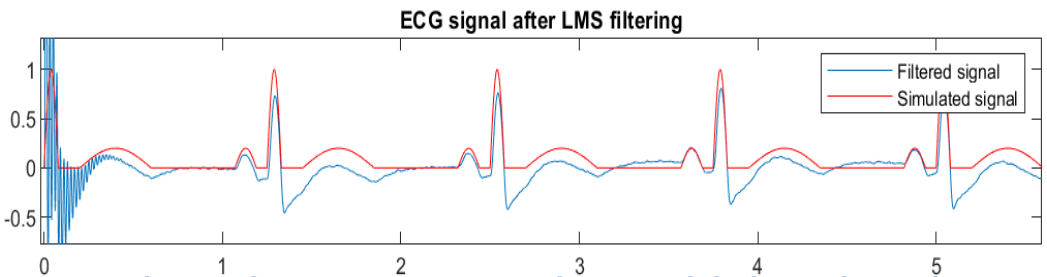


LMS_conv parameter = 0.004



LMS_conv parameter = 0.03



* When the LMS_conv has a high value the convergence time is lower but the steady state error is higher

```
* ref = sin(2*pi*f_interference*t)
```

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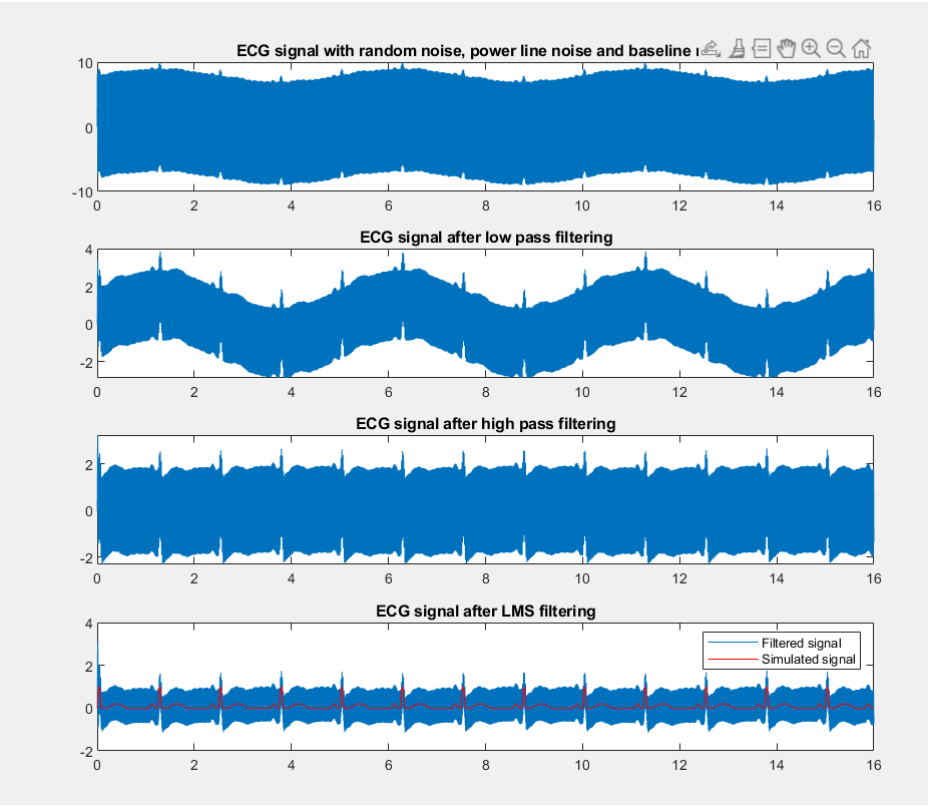

* The filter works only for frequencies near f_interference, when another signal of different frequency is imposed on the original interference signal the filtering method does not work.

A generic filter should be implemented.

```
* ref = sin(2*pi*f_interference*t  +0.3*sin(2*pi*2*f_interference*t);
```