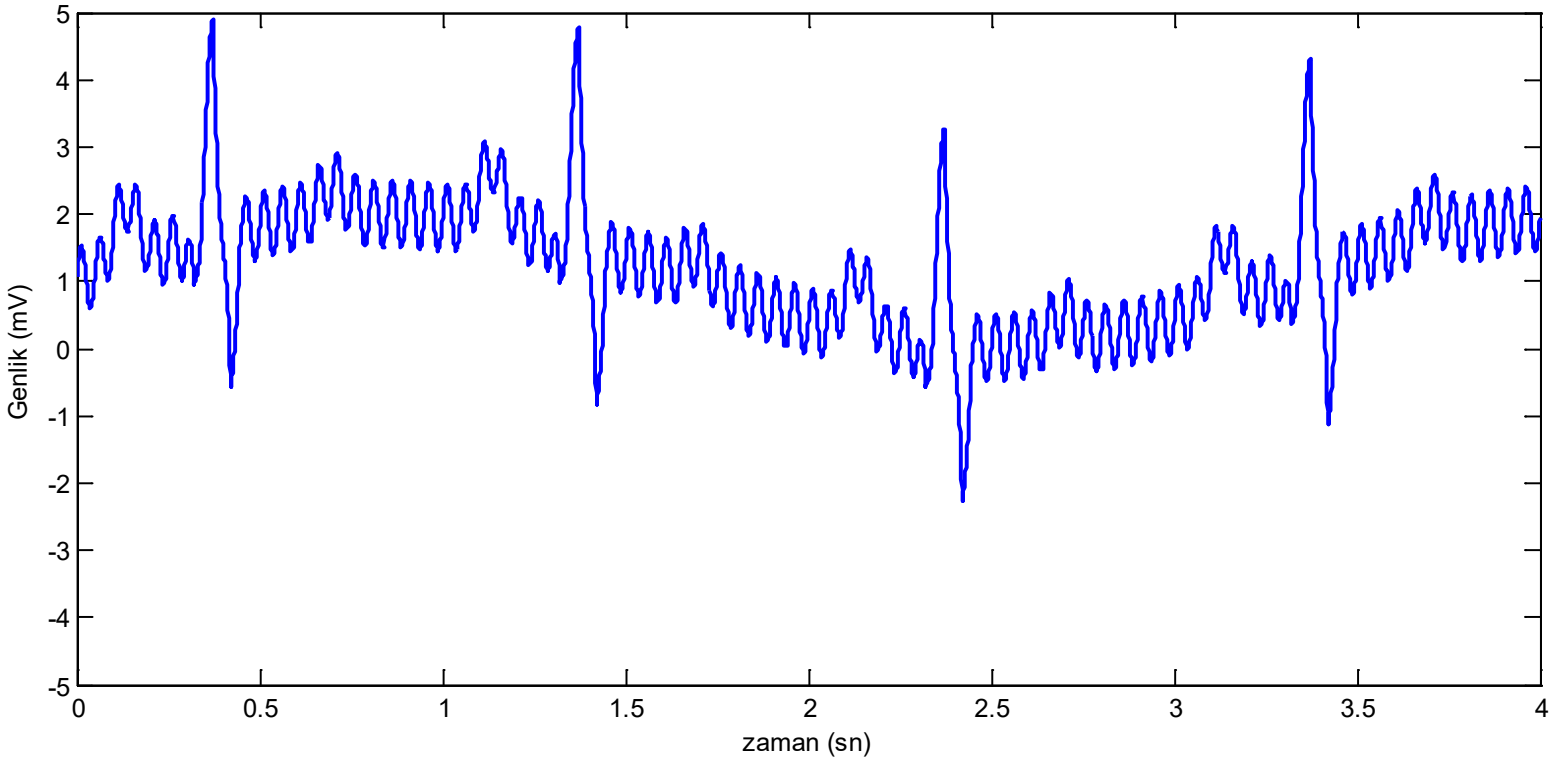
BME 311 Biomedical Instrumentation I

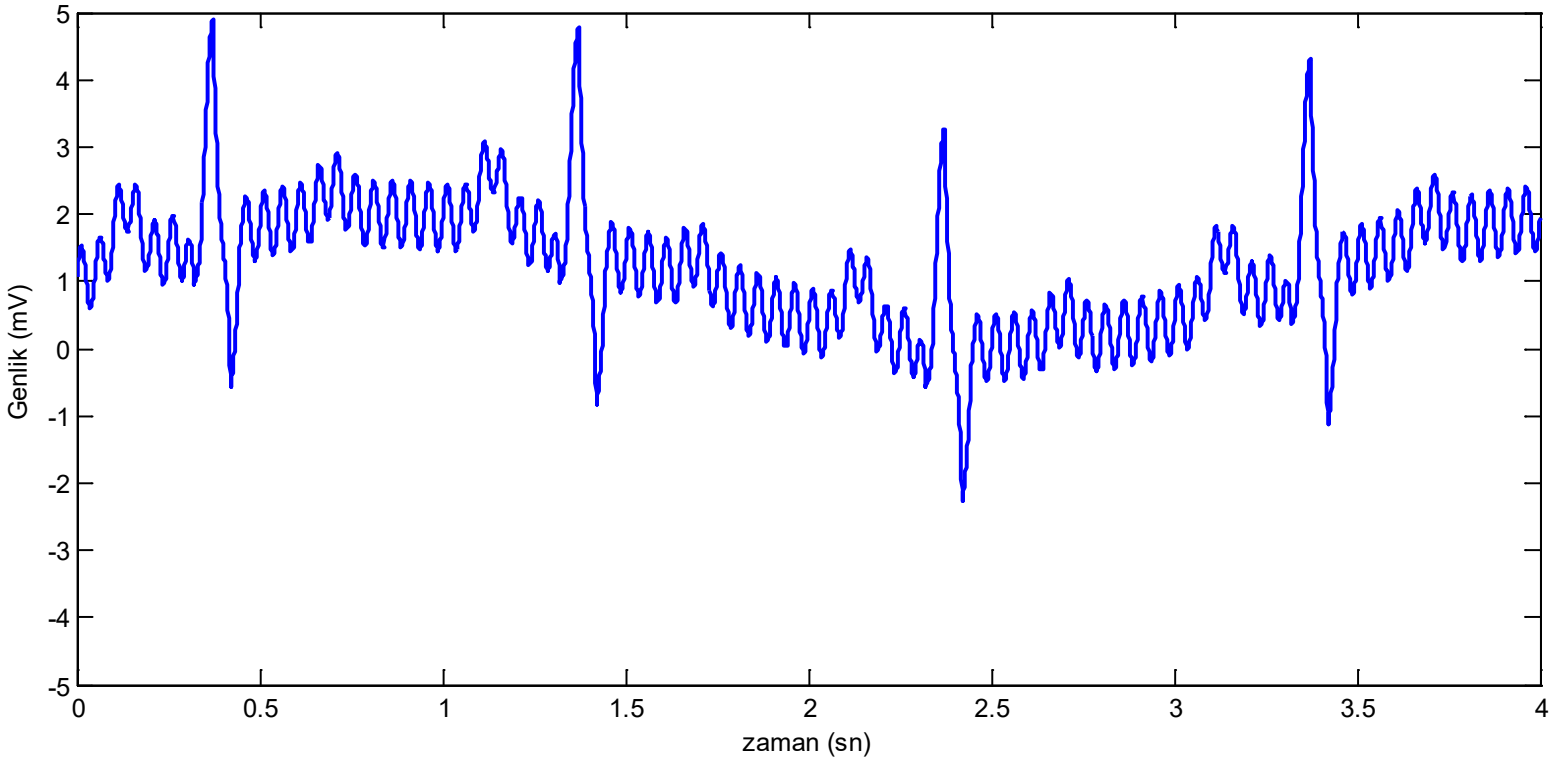
11-Active Filters

Mehmet YÜKSEKKAYA

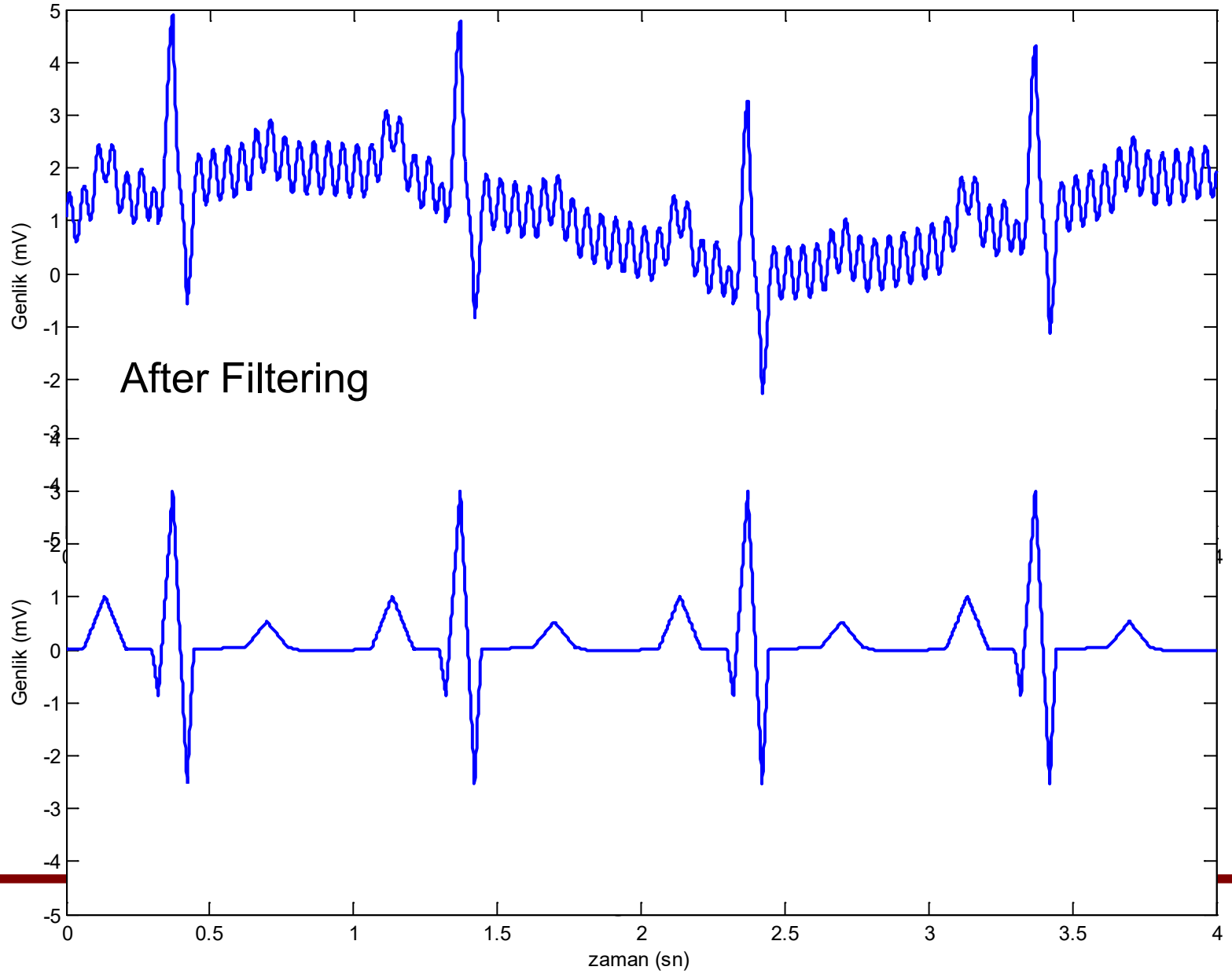
ECG Example



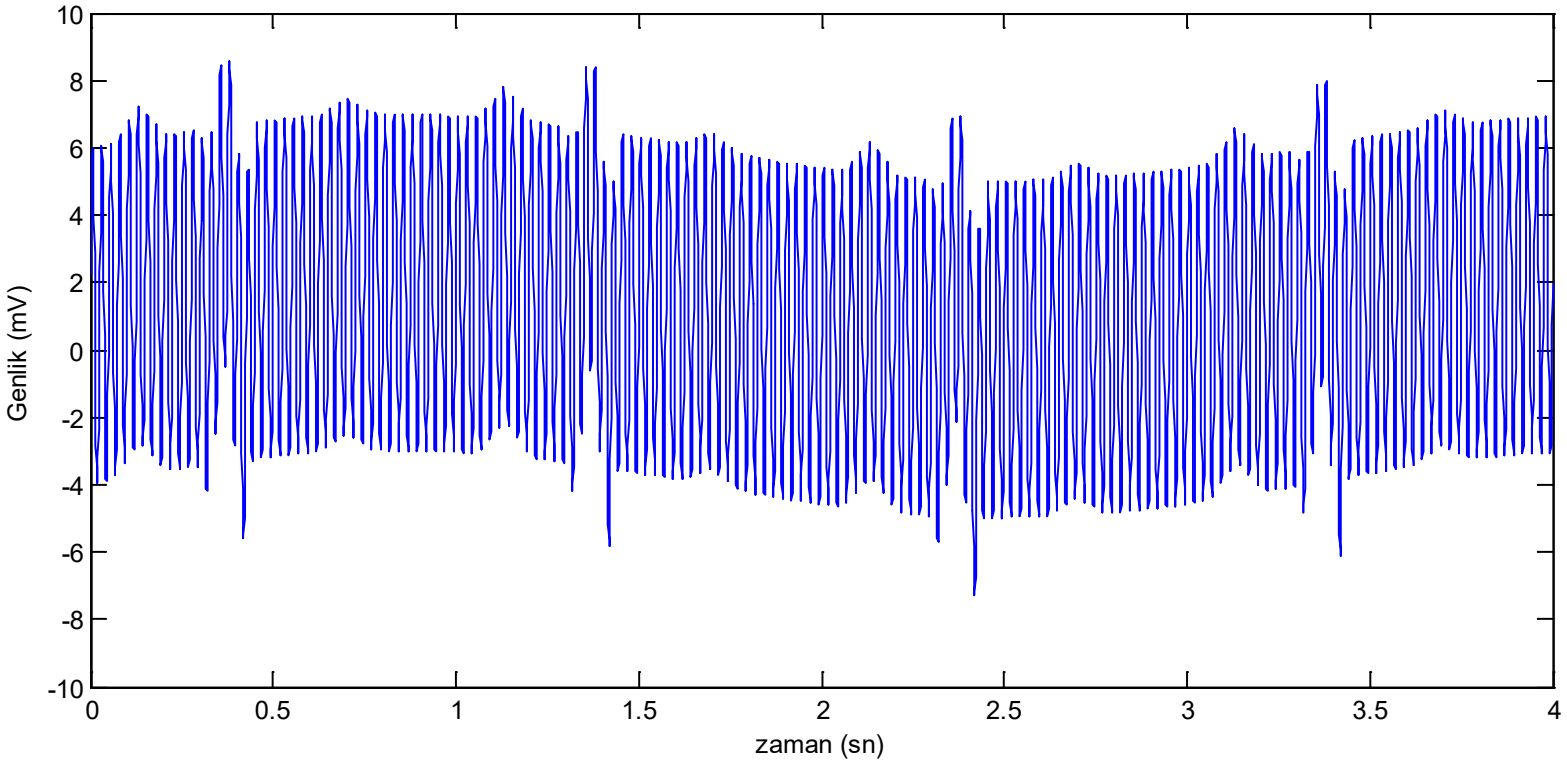
ECG Example



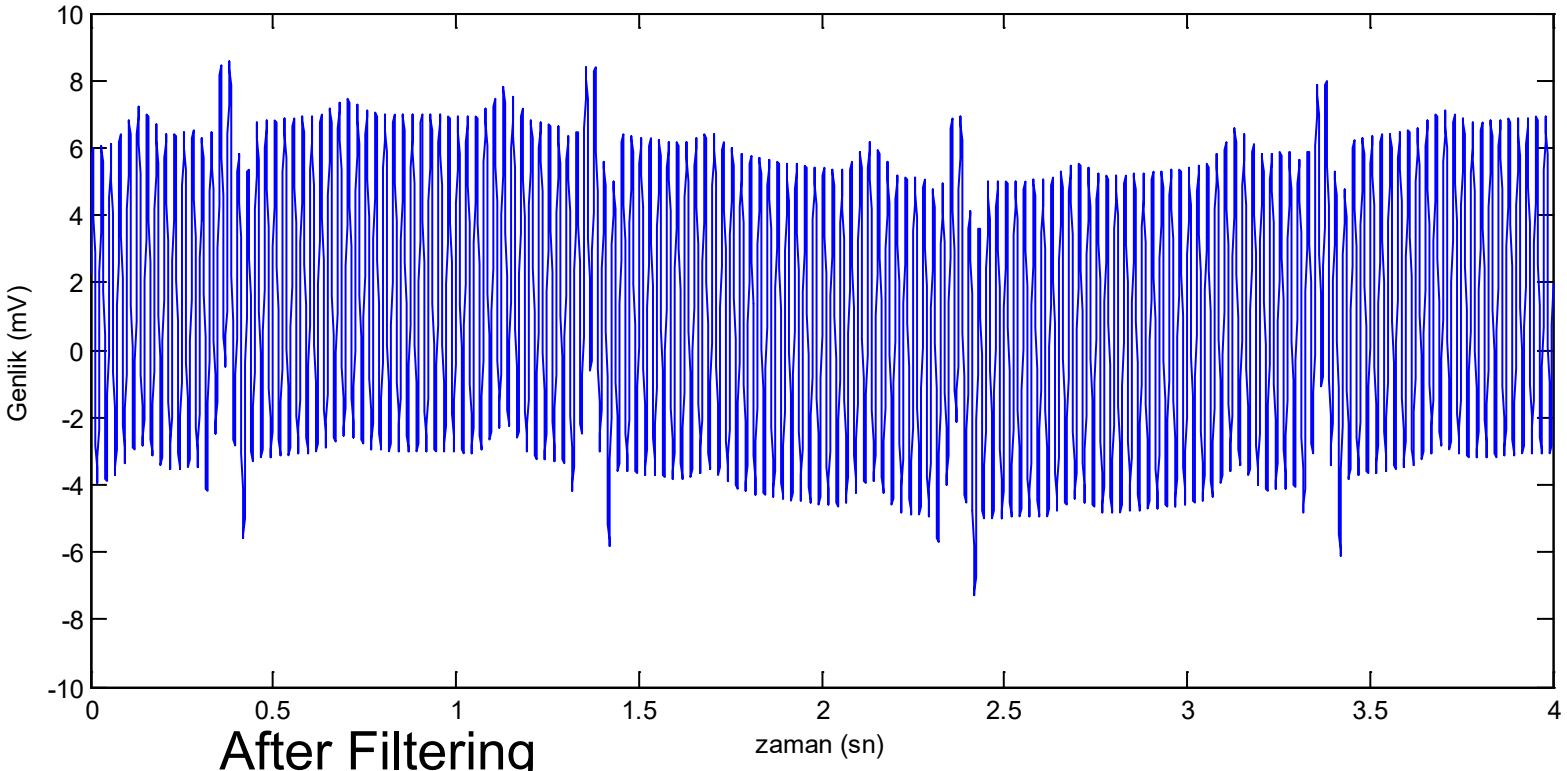
ECG Example


After Filtering
Genlik (mV)
Genlik (mV)
zaman (sn)
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
0.5
1
1.5
2
2.5
3
3.5
4

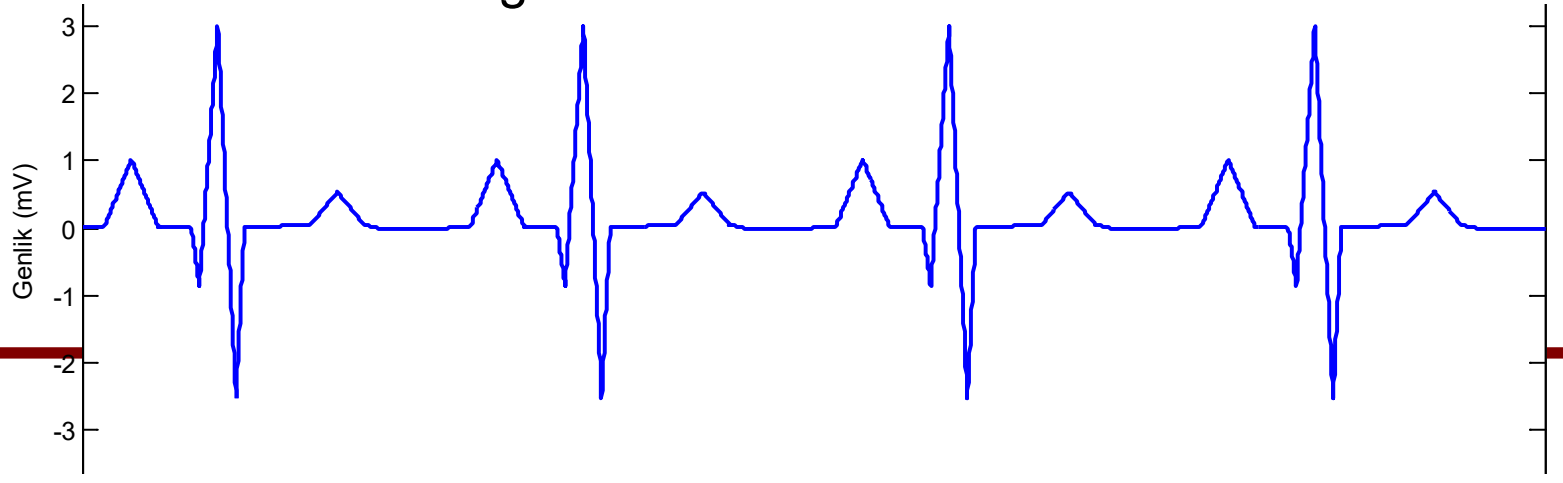
ECG Example



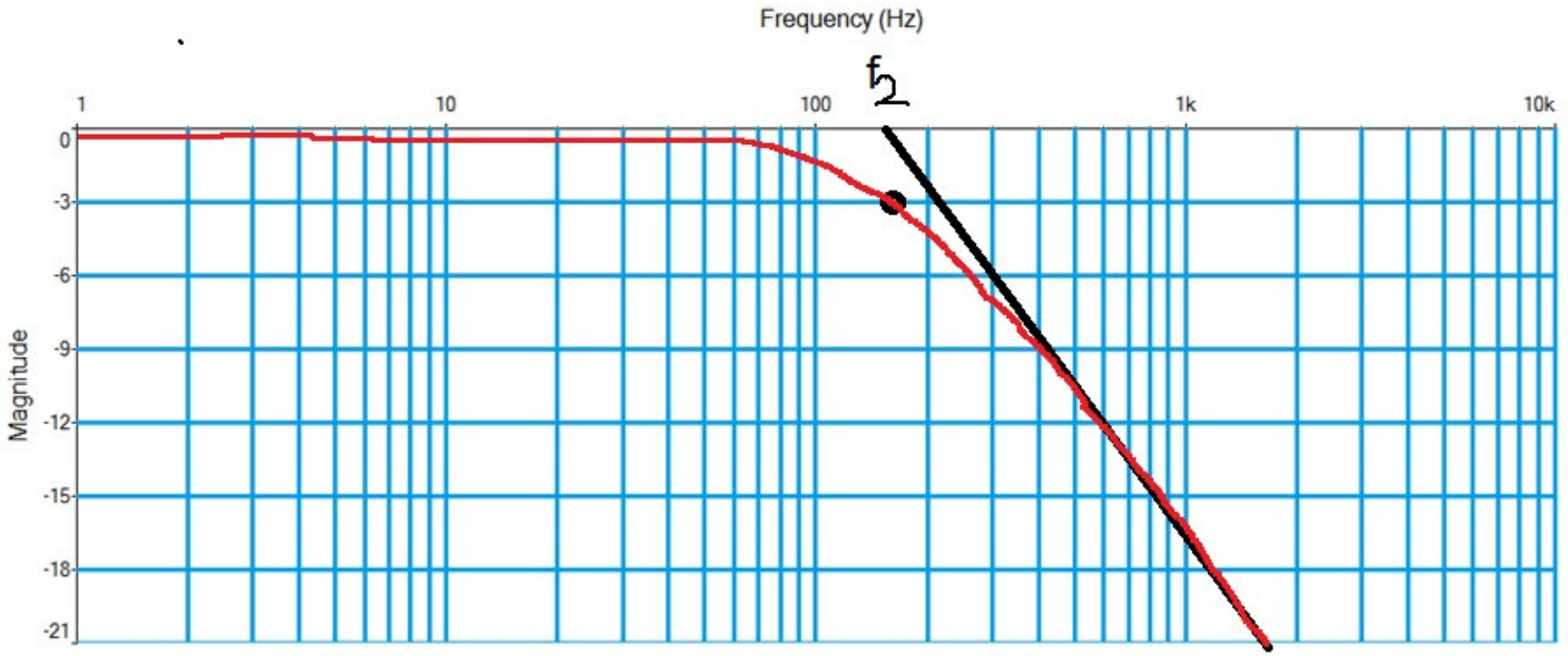
ECG Example



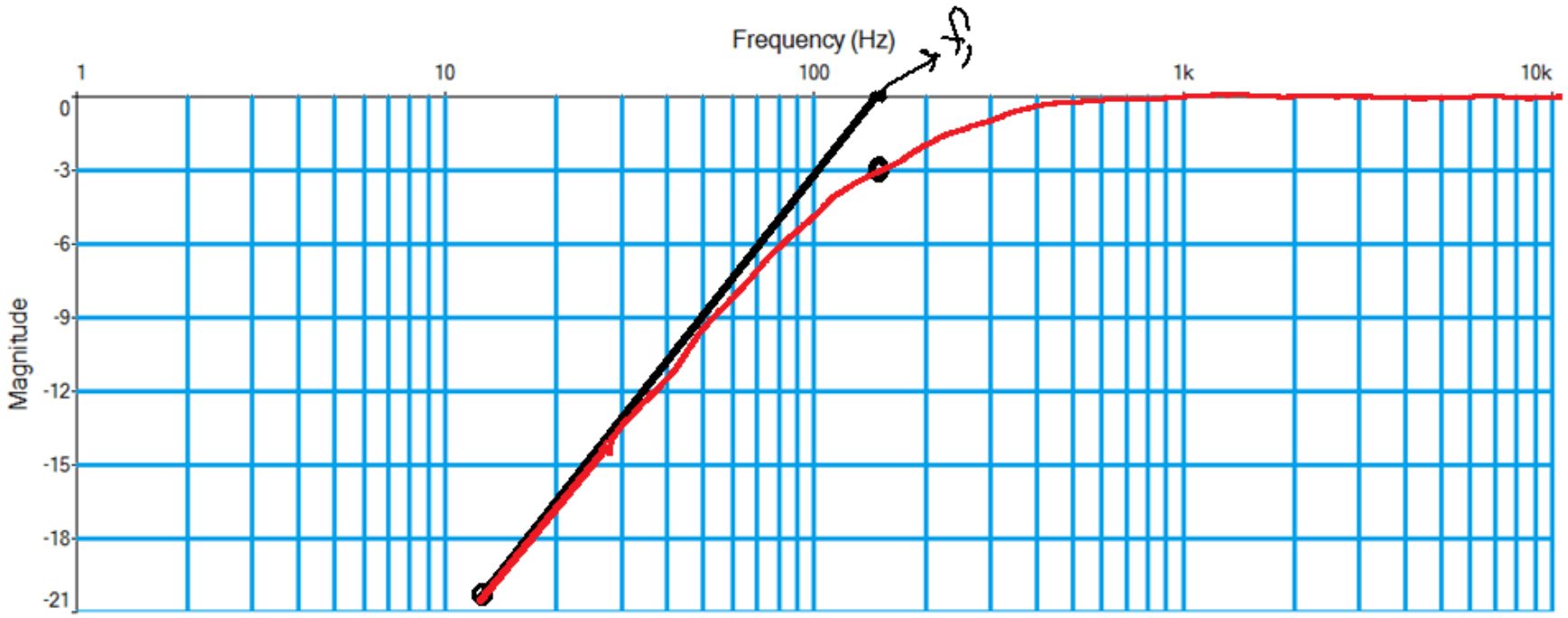
After Filtering



High Frequency Analysis



Low Frequency Analysis



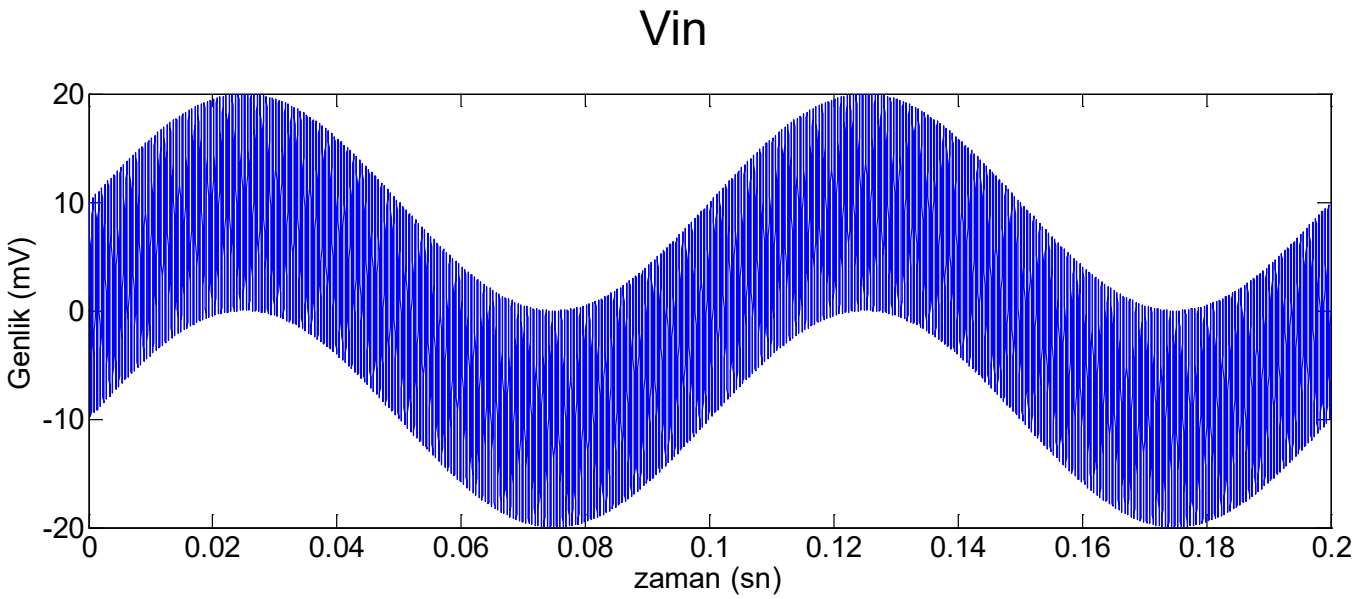
Filters

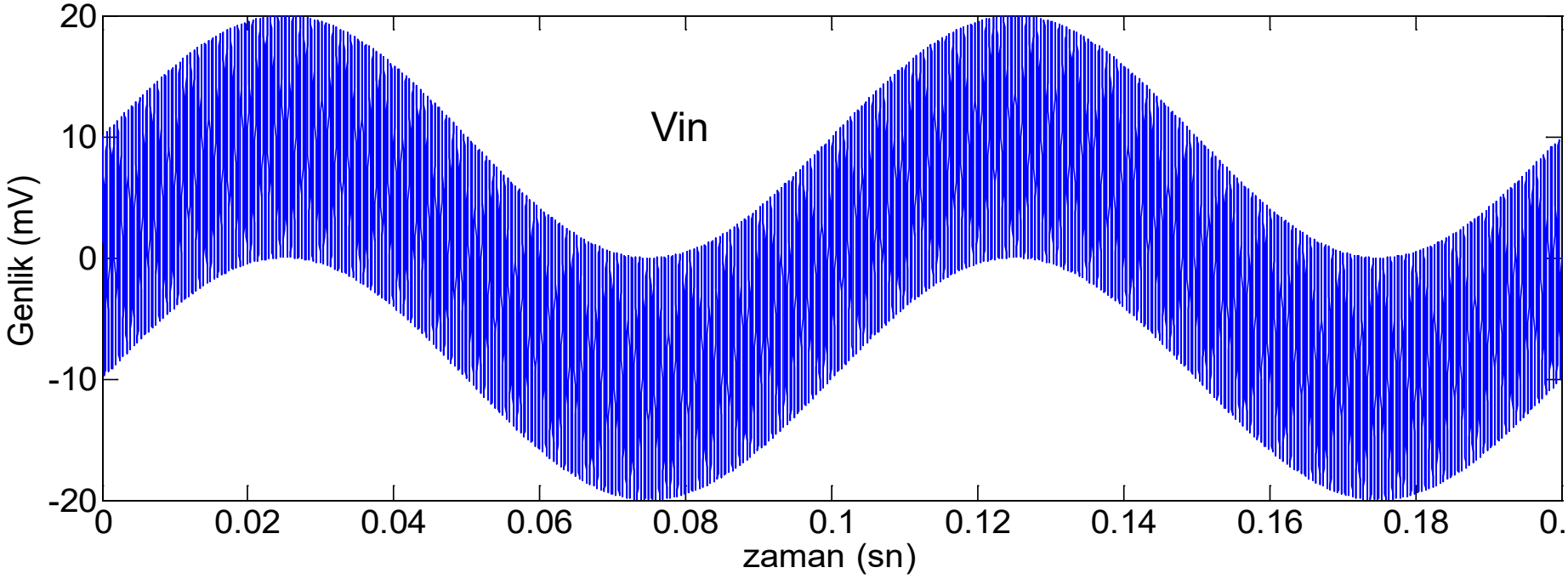
$$f_1 = \frac{1}{2\pi R_1 C_1}$$

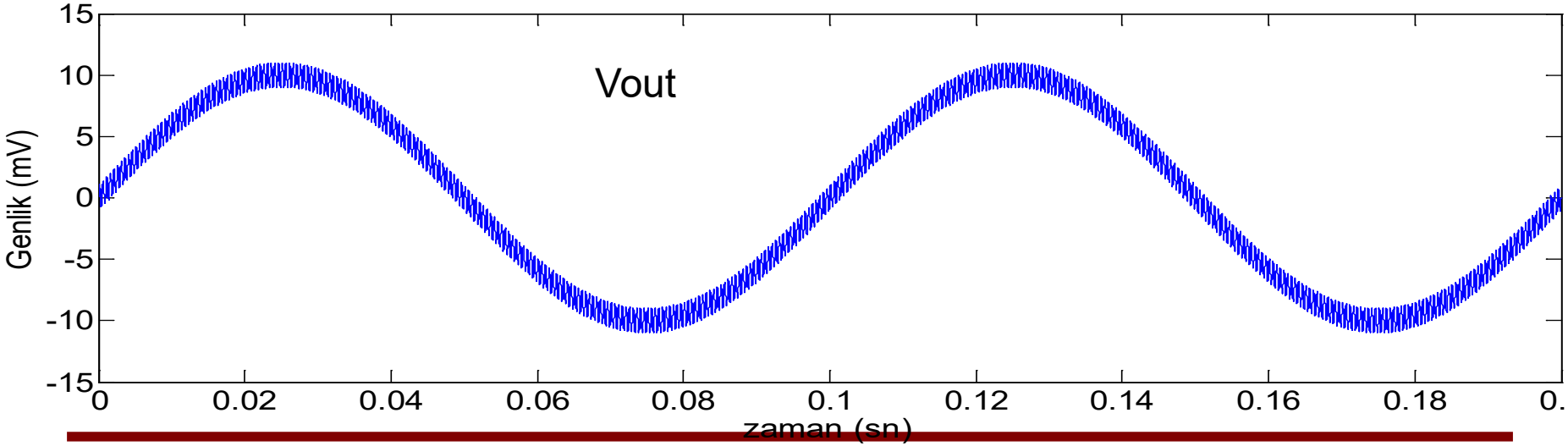
$$f_1 = \frac{1}{2\pi \cdot 1 \cdot 79.577\square \cdot 1 \cdot 10^{-6} F}$$

$$f_1 = 2000Hz = 2kHz$$

Filters


Vin
Genlik (mV)
zaman (sn)
20
10
0
-10
-20
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2





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Band Pass Filter

fr = Resonans Frequency
fL = Low cut off frequency
fH = High cut off frequency
BW = Bandwidth

$$f_r = \sqrt{f_L \cdot f_H}$$

$$BW = f_H - f_L$$

$$f_L = \sqrt{\frac{BW^2}{4} + {f_r}^2} - \frac{BW}{2}$$

$$f_H = f_L + BW$$