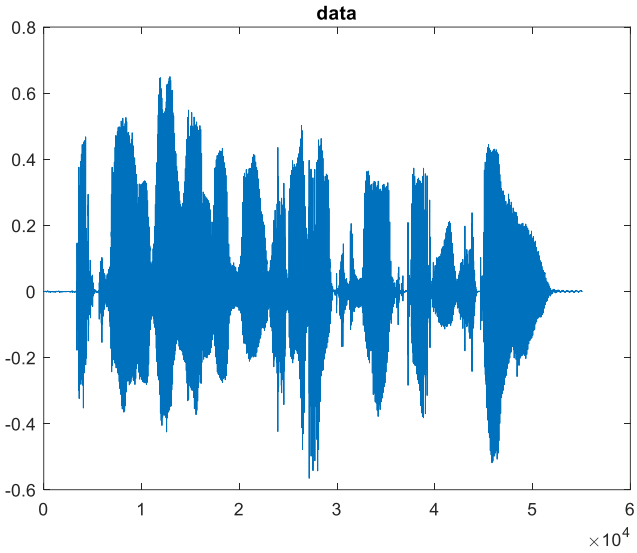
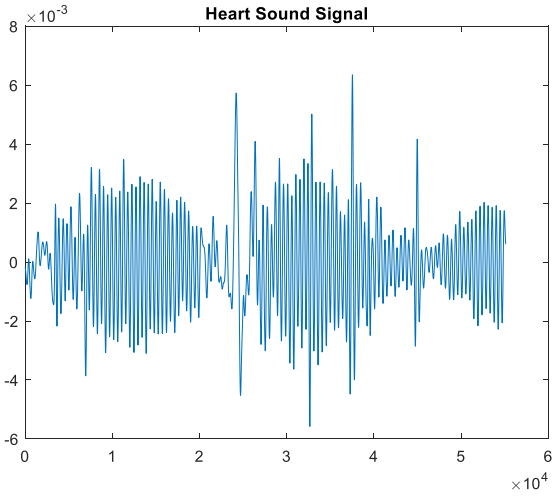
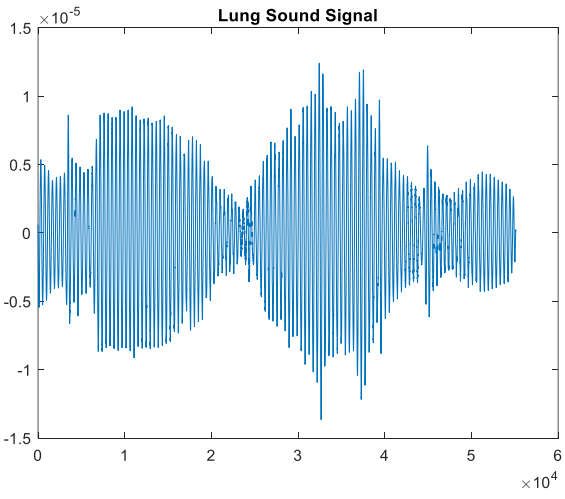
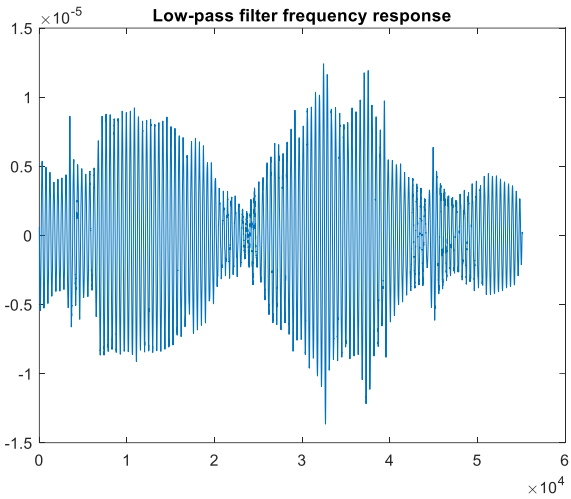
Week 2 Results

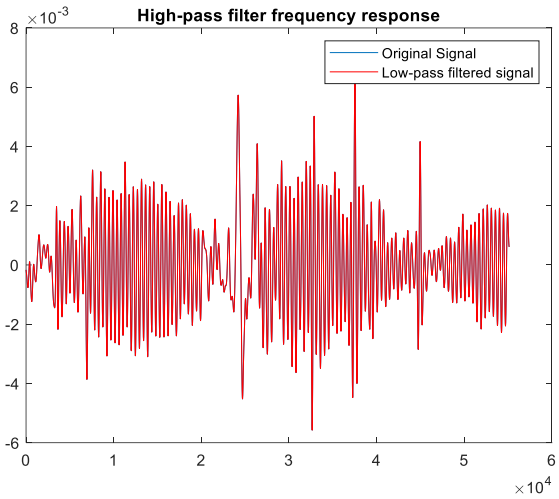
female:

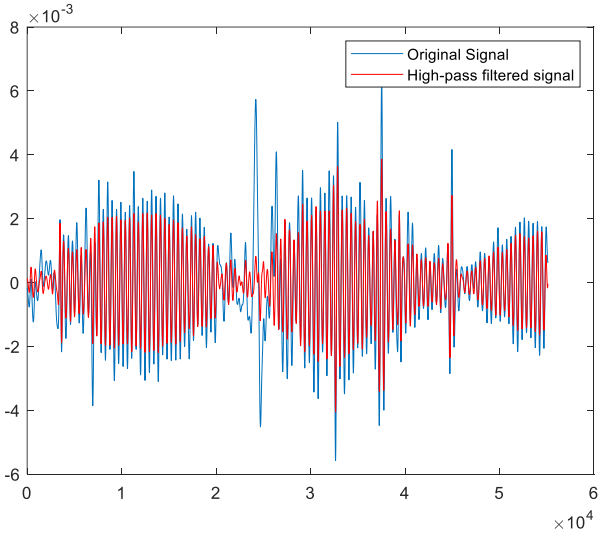


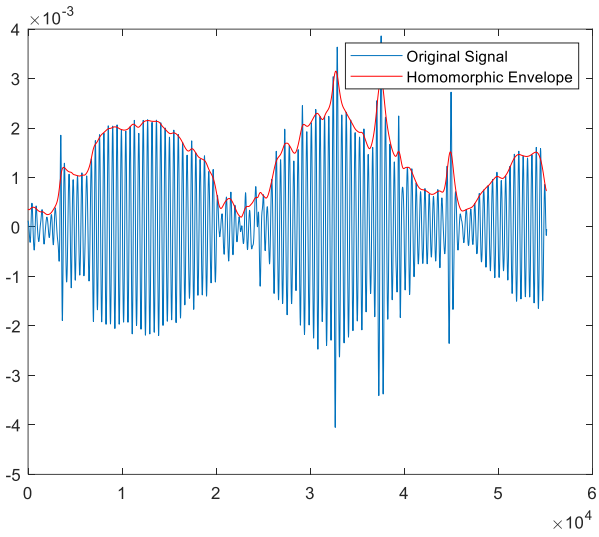


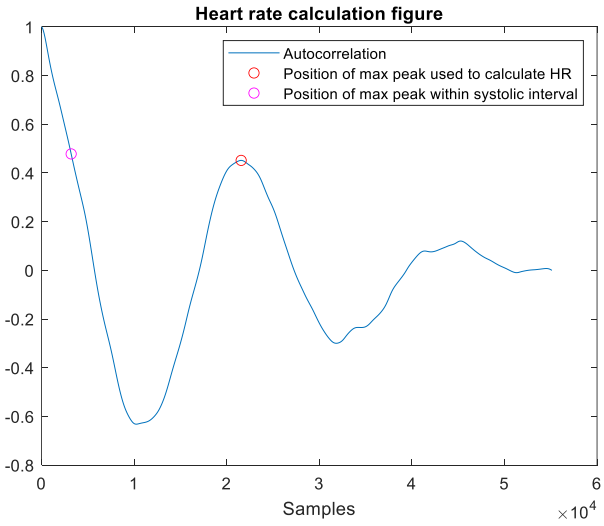






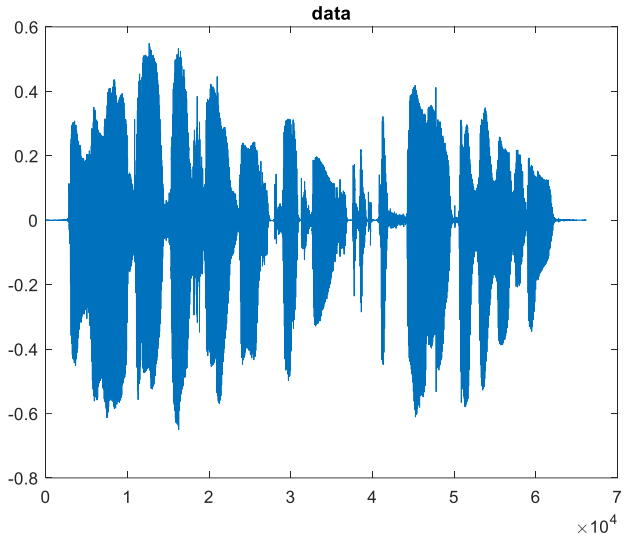


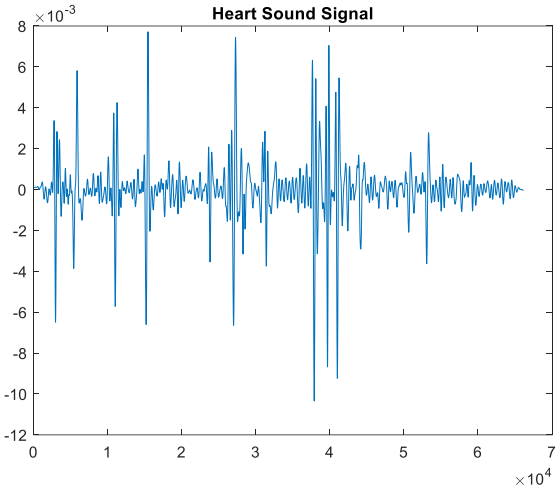


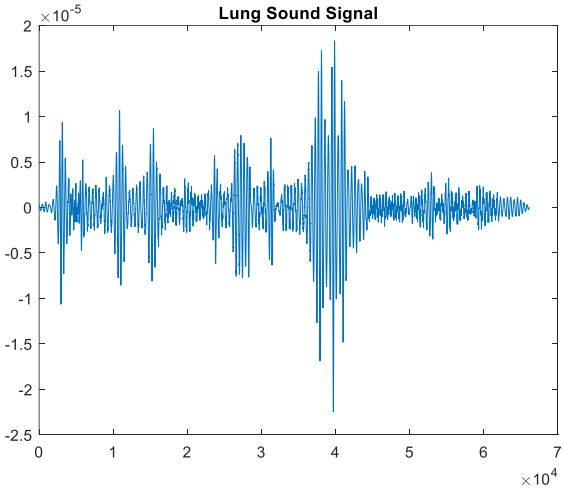


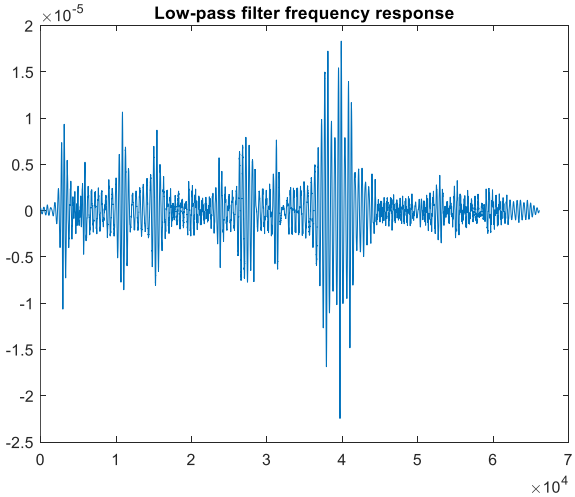
Heart Rate =44.5248

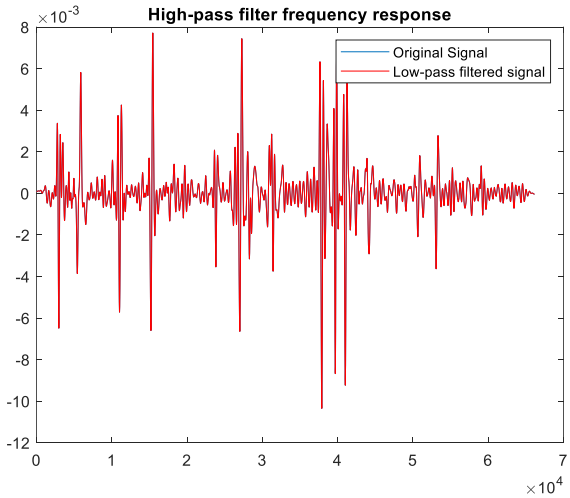
female2:

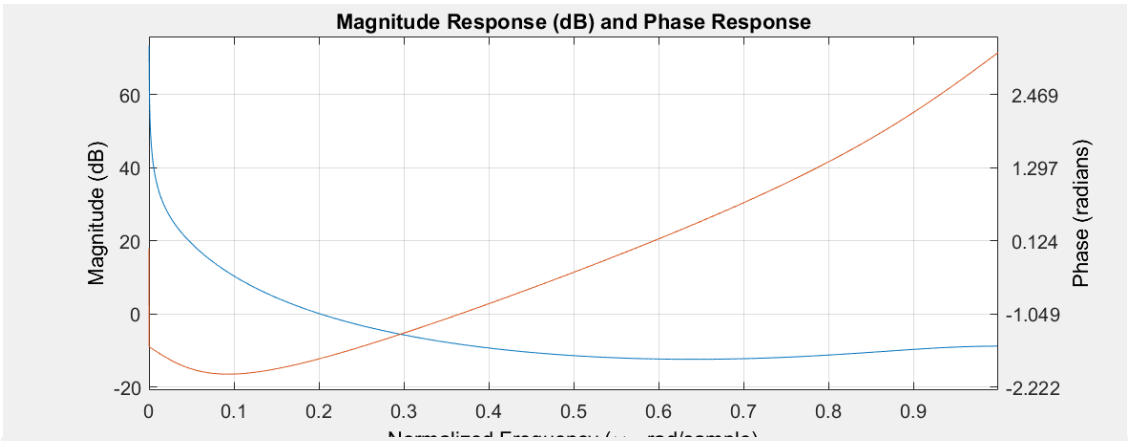

data
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
0 1 2 3 4 5 6 7
×10^4

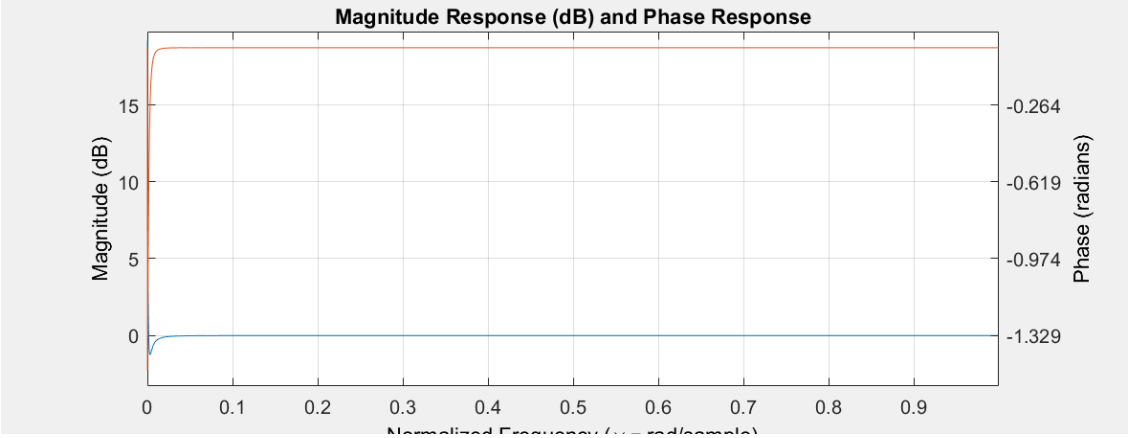

Heart Sound Signal
×10^-3
8 6 4 2 0 -2 -4 -6 -8 -10 -12
0 1 2 3 4 5 6 7
×10^4

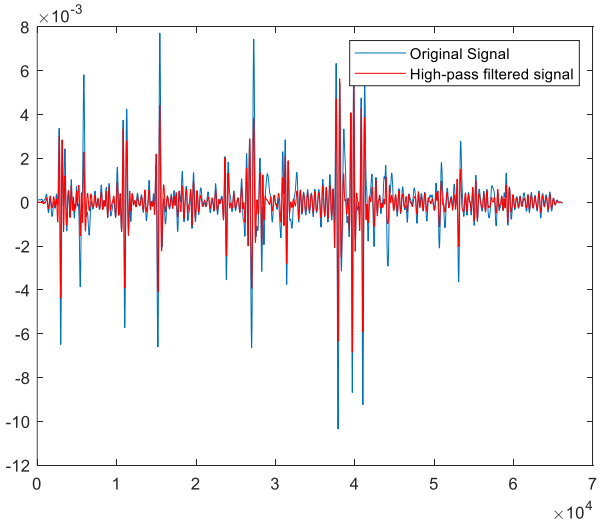

Lung Sound Signal
×10^-5
2 1.5 1 0.5 0 -0.5 -1 -1.5 -2 -2.5
0 1 2 3 4 5 6 7
×10^4

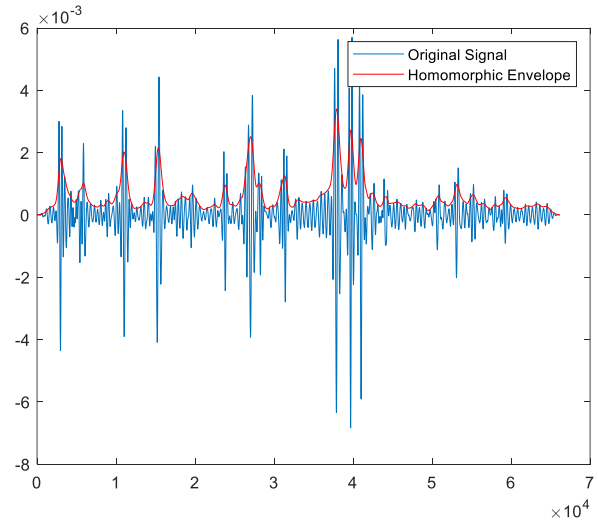

Low-pass filter frequency response
×10^-5
2 1.5 1 0.5 0 -0.5 -1 -1.5 -2 -2.5
0 1 2 3 4 5 6 7
×10^4

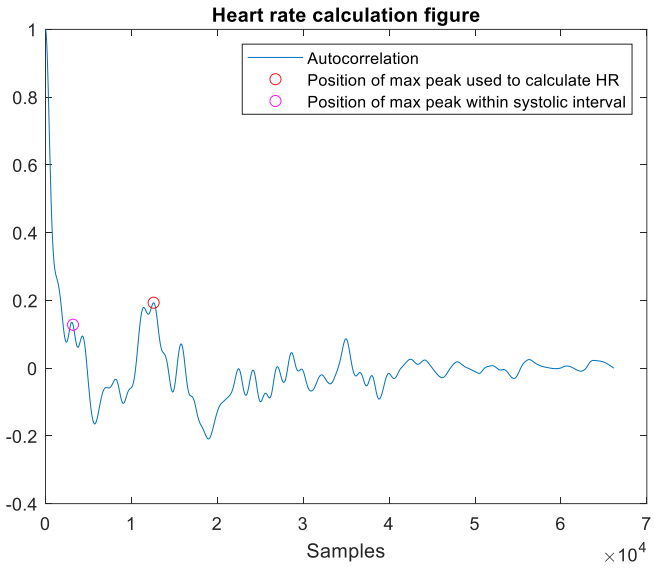

High-pass filter frequency response
×10^-3
8 6 4 2 0 -2 -4 -6 -8 -10 -12
0 1 2 3 4 5 6 7
×10^4
Original Signal
Low-pass filtered signal


Magnitude Response (dB) and Phase Response
Magnitude (dB)
Phase (radians)
60
40
20
0
-20
2.469
1.297
0.124
-1.049
-2.222
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9


Magnitude Response (dB) and Phase Response
Magnitude (dB)
Phase (radians)
15
10
5
0
-0.264
-0.619
-0.974
-1.329
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

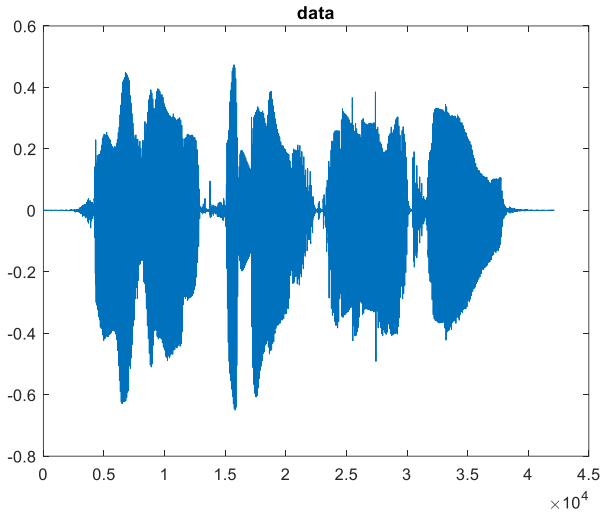

×10^-3
Original Signal
High-pass filtered signal
8
6
4
2
0
-2
-4
-6
-8
-10
-12
0
1
2
3
4
5
6
7
×10^4

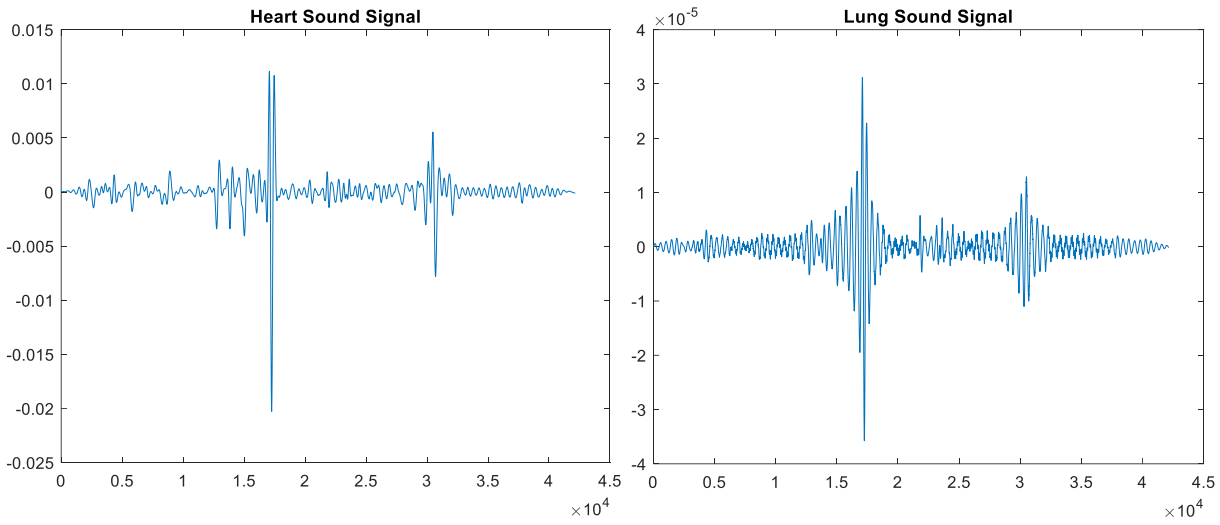

×10^-3
Original Signal
Homomorphic Envelope
6
4
2
0
-2
-4
-6
-8
0
1
2
3
4
5
6
7
×10^4

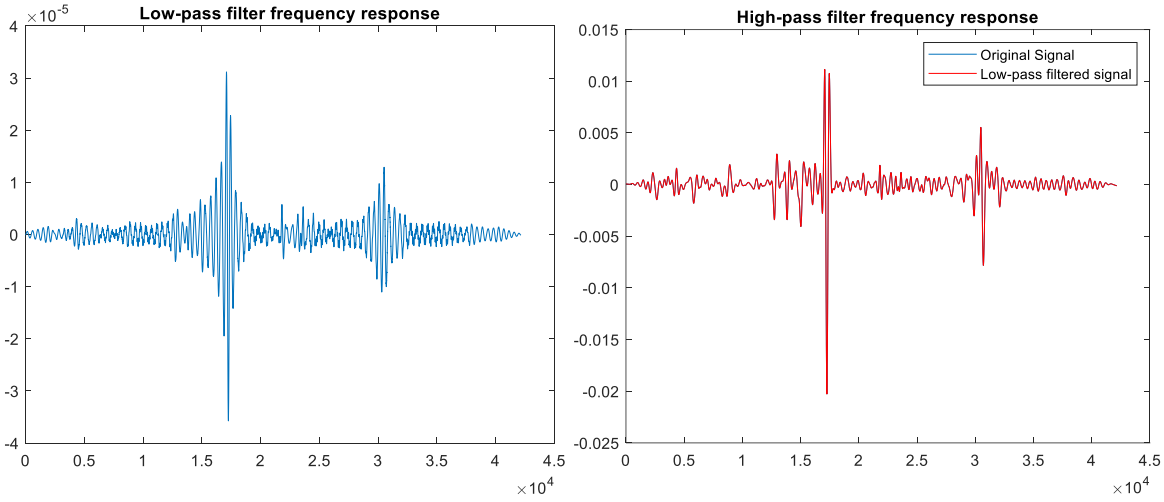


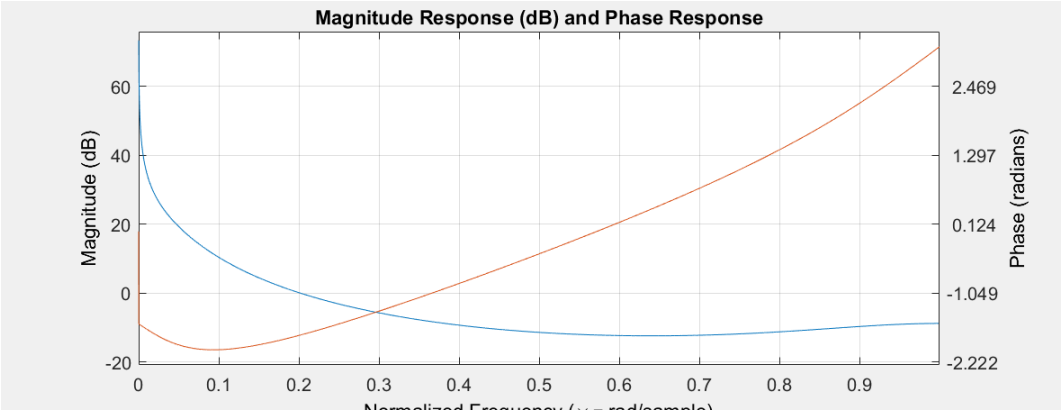

```
Heart Rate =76.2631
```

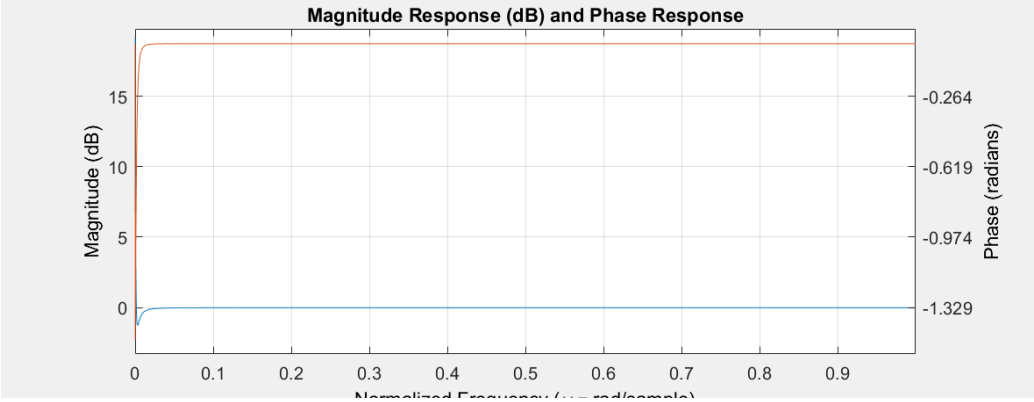
female3:

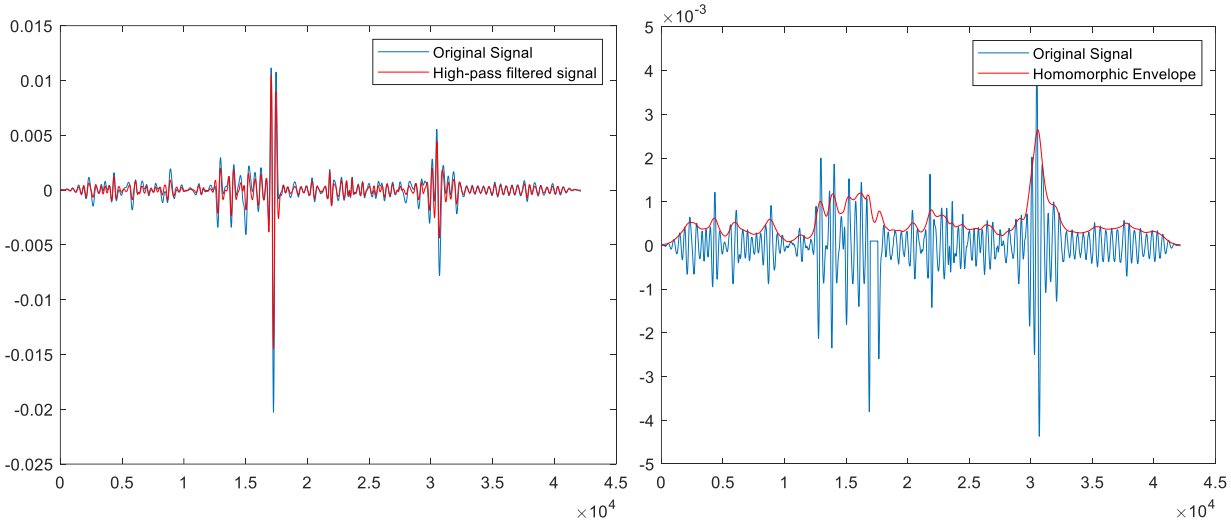


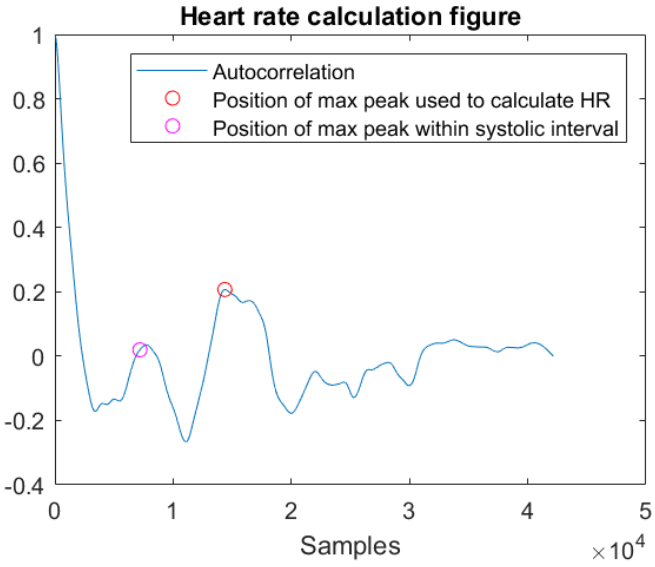

Heart Sound Signal
Lung Sound Signal
×10^-5
×10^4


Low-pass filter frequency response
High-pass filter frequency response
Original Signal
Low-pass filtered signal
×10^-5
×10^4


Magnitude Response (dB) and Phase Response
Magnitude (dB)
Phase (radians)

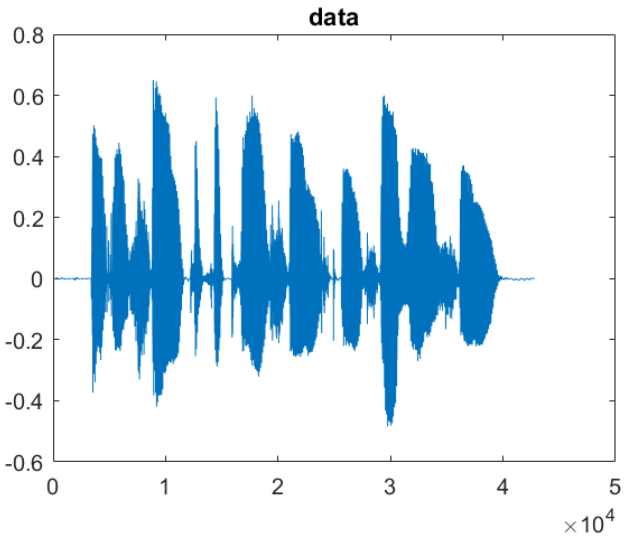


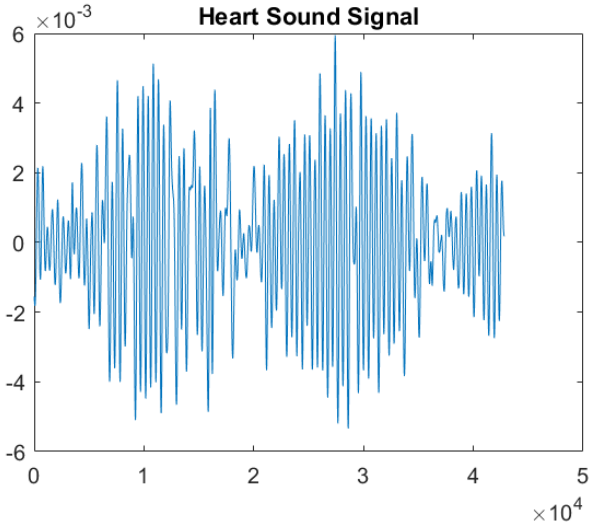


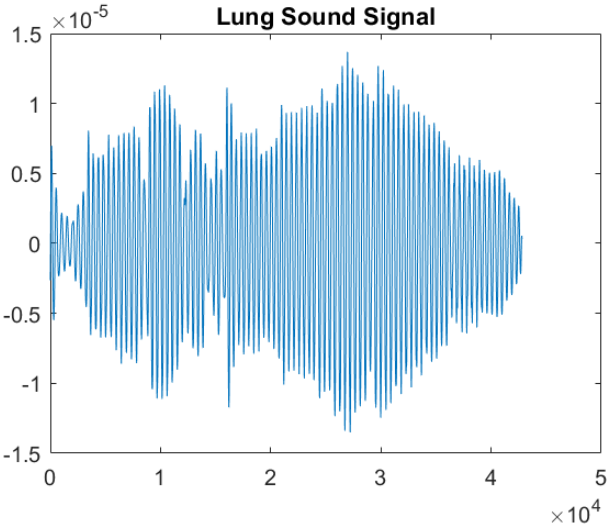


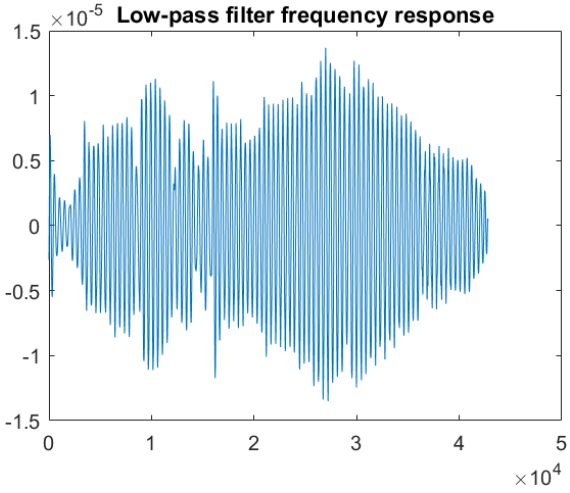

```
Heart Rate =66.7826
```

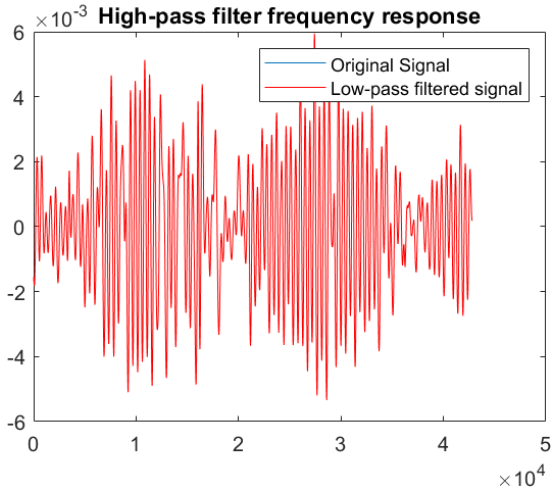
female4:

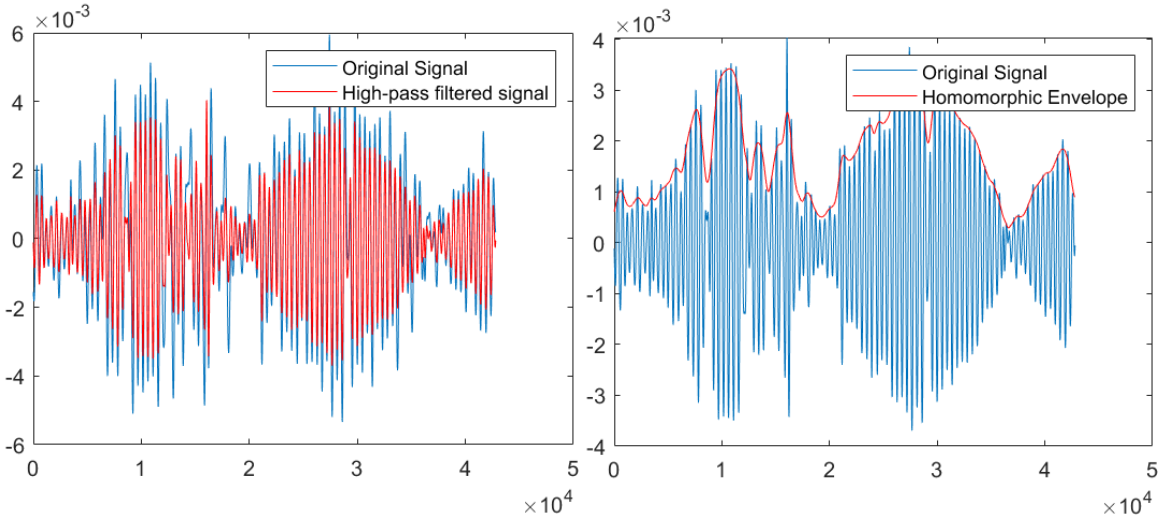

data
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
0
1
2
3
4
5
×10^4

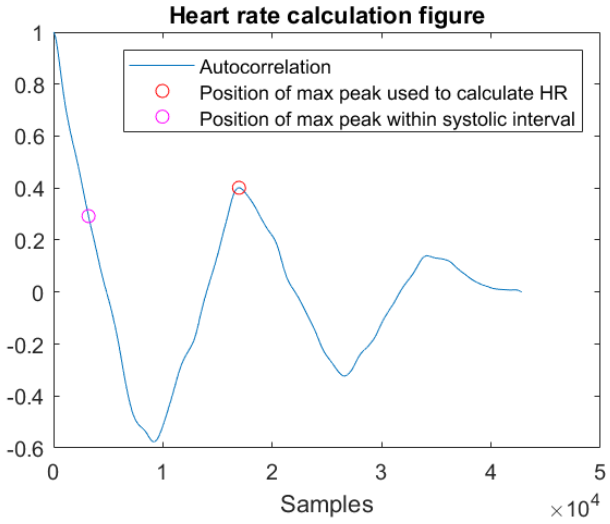

Heart Sound Signal
×10^-3
6
4
2
0
-2
-4
-6
0
1
2
3
4
5
×10^4


Lung Sound Signal
×10^-5
1.5
1
0.5
0
-0.5
-1
-1.5
0
1
2
3
4
5
×10^4


Low-pass filter frequency response
×10^-5
1.5
1
0.5
0
-0.5
-1
-1.5
0
1
2
3
4
5
×10^4

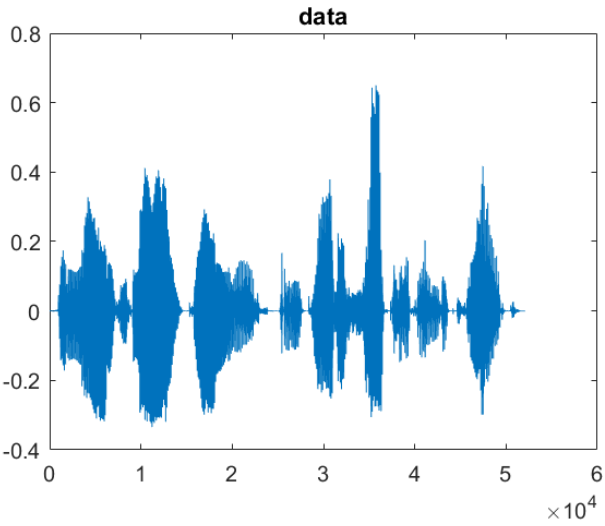

High-pass filter frequency response
×10^-3
Original Signal
Low-pass filtered signal
6
4
2
0
-2
-4
-6
0
1
2
3
4
5
×10^4

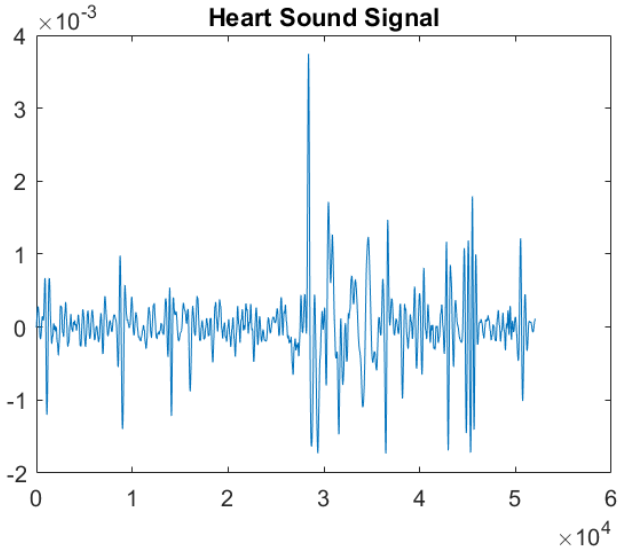


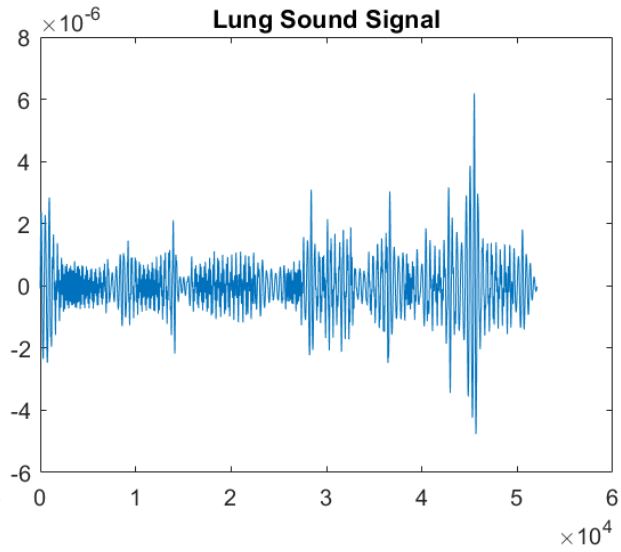


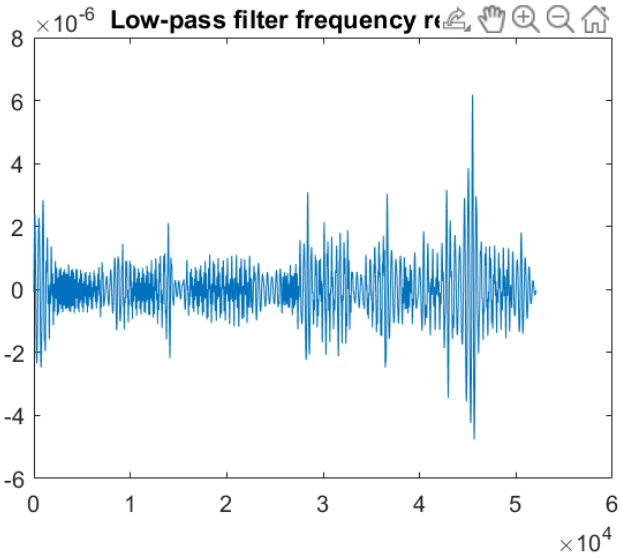

```
Heart Rate =56.6205
```

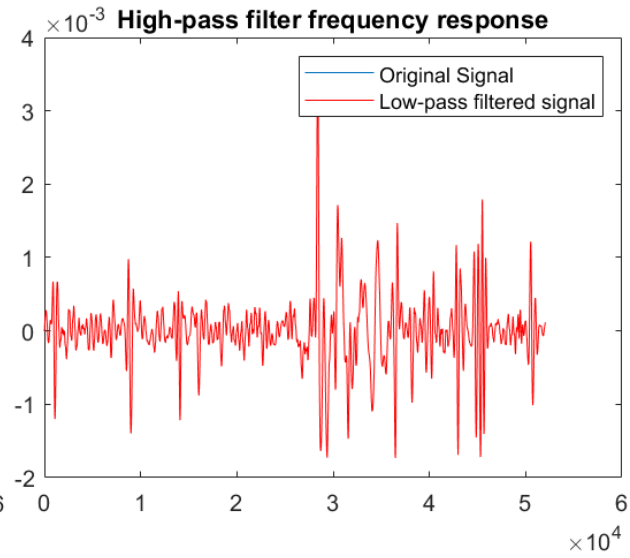
male:

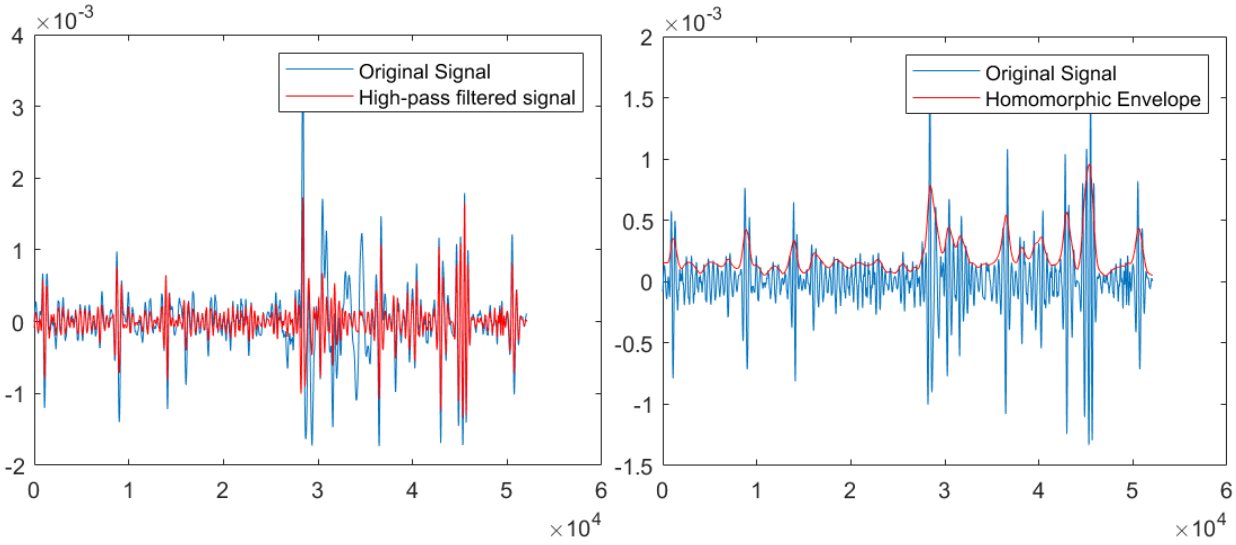

data
0.8
0.6
0.4
0.2
0
-0.2
-0.4
0 1 2 3 4 5 6
×10^4

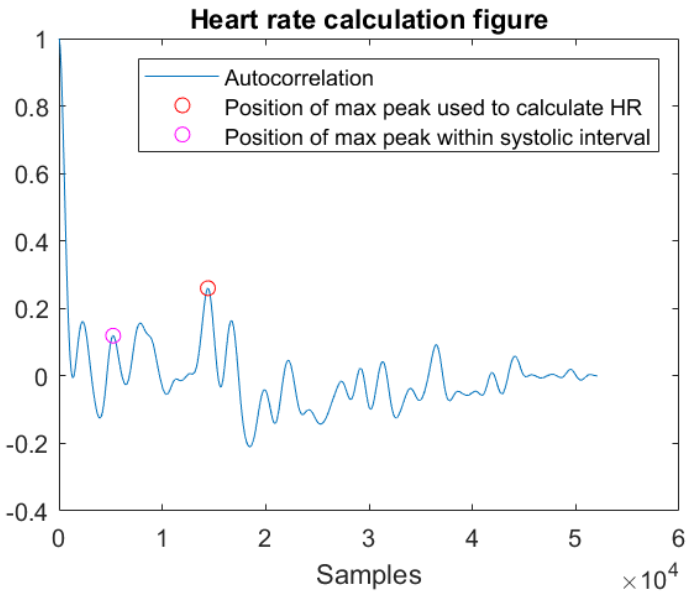

Heart Sound Signal
×10^-3
4 3 2 1 0 -1 -2
0 1 2 3 4 5 6
×10^4


Lung Sound Signal
×10^-6
8 6 4 2 0 -2 -4 -6
0 1 2 3 4 5 6
×10^4


×10^-6
Low-pass filter frequency re
8 6 4 2 0 -2 -4 -6
0 1 2 3 4 5 6
×10^4

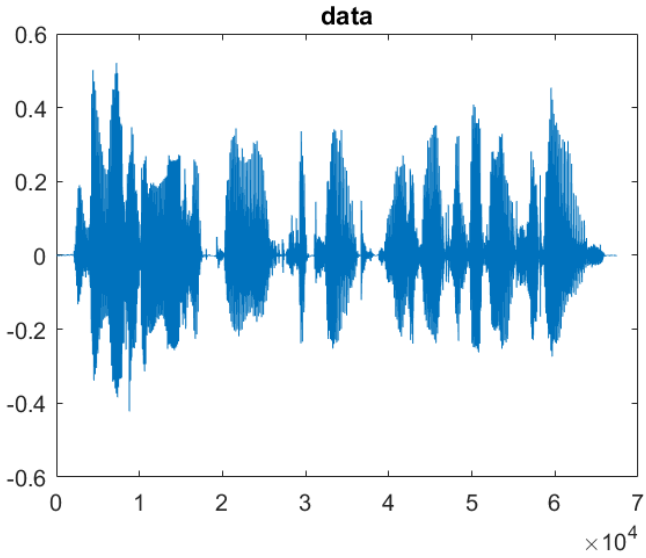

×10^-3
High-pass filter frequency response
Original Signal
Low-pass filtered signal
4 3 2 1 0 -1 -2
0 1 2 3 4 5 6
×10^4

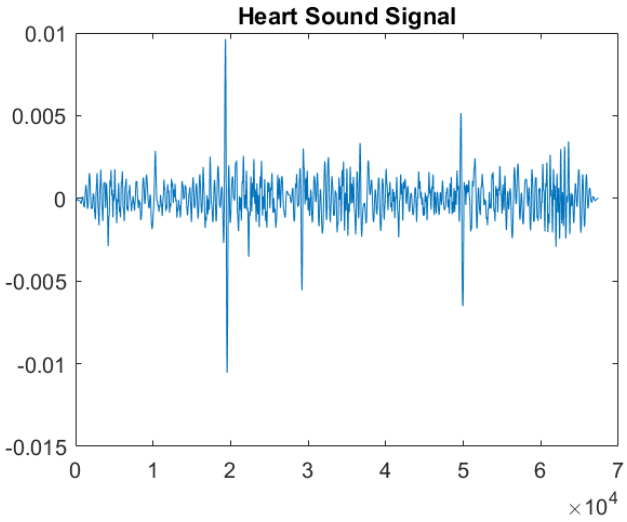


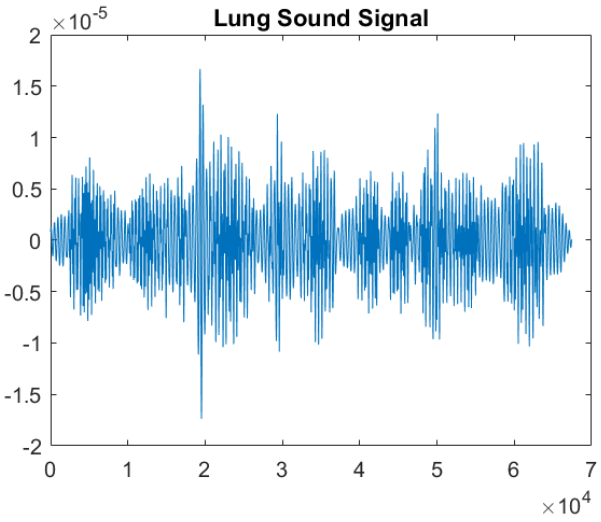


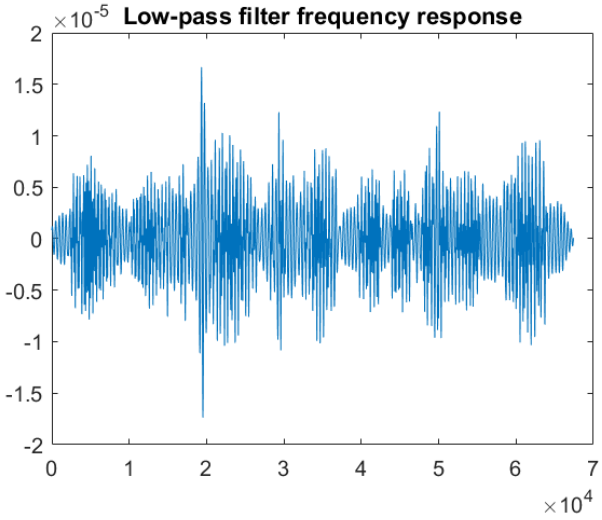

```
Heart Rate =66.6112
```

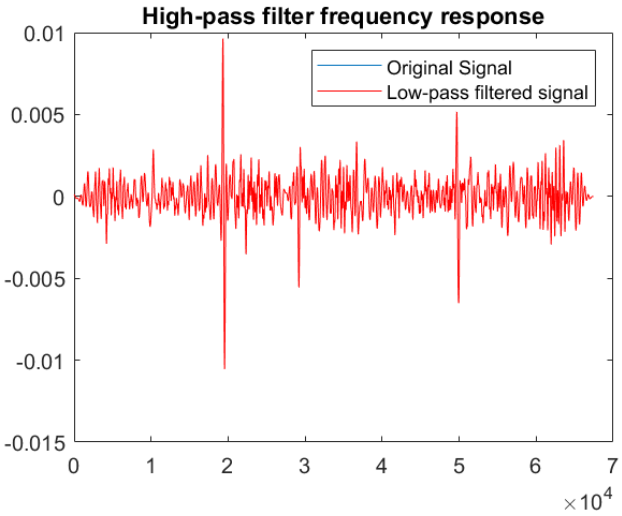
male2:

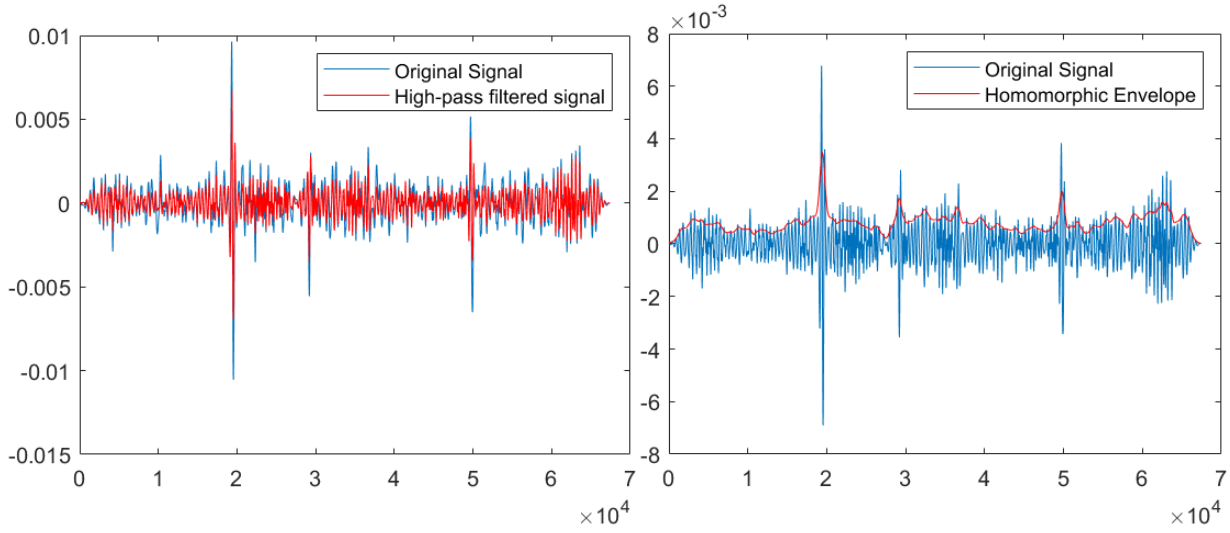

data
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
0 1 2 3 4 5 6 7
×10^4

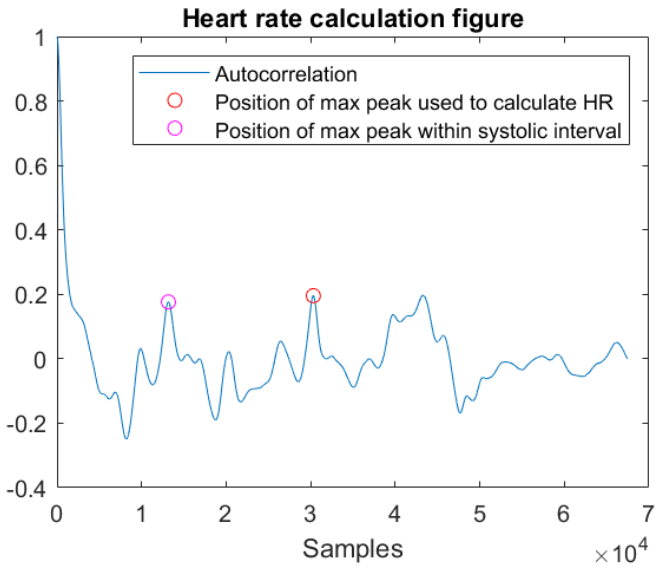

Heart Sound Signal
0.01
0.005
0
-0.005
-0.01
-0.015
0 1 2 3 4 5 6 7
×10^4


Lung Sound Signal
×10^-5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0 1 2 3 4 5 6 7
×10^4


Low-pass filter frequency response
×10^-5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0 1 2 3 4 5 6 7
×10^4


High-pass filter frequency response
Original Signal
Low-pass filtered signal
0.01
0.005
0
-0.005
-0.01
-0.015
0 1 2 3 4 5 6 7
×10^4

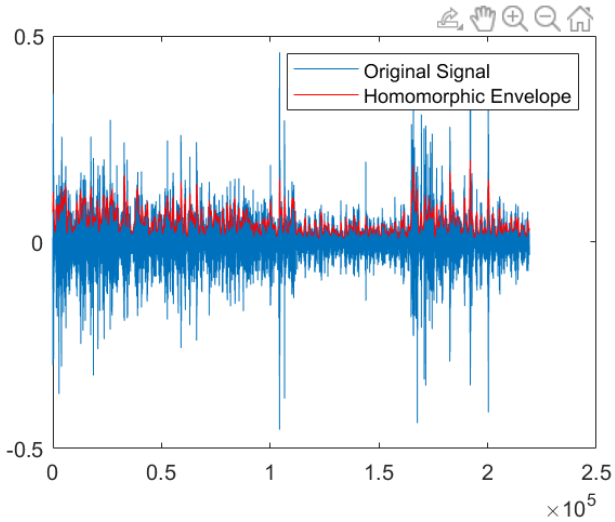


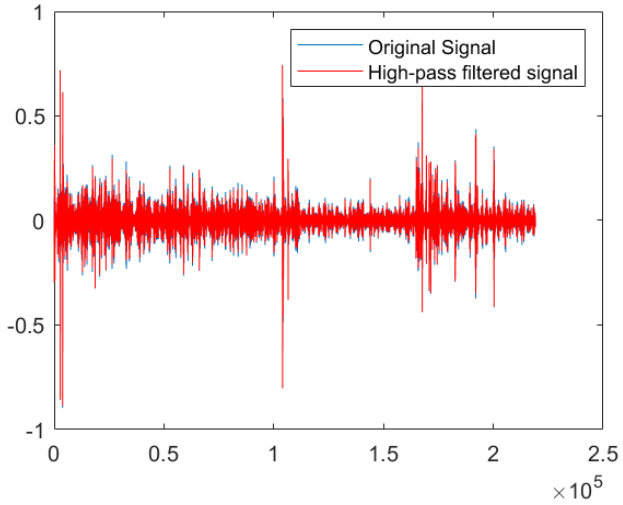


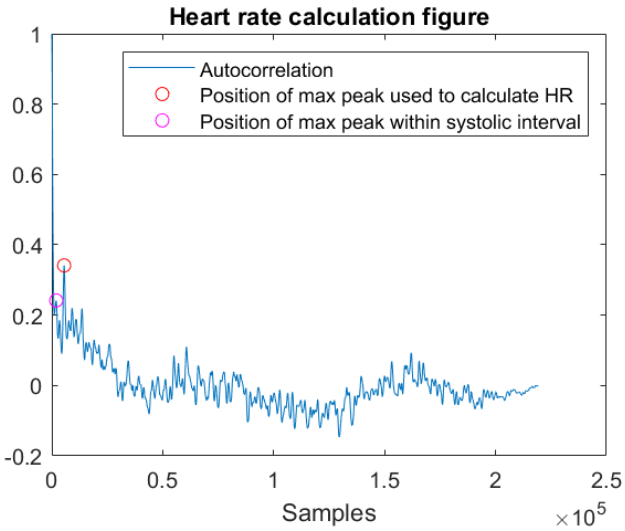

```
Heart Rate =31.6748
```

From the recorded signals by Stemoscope:

Heart1:

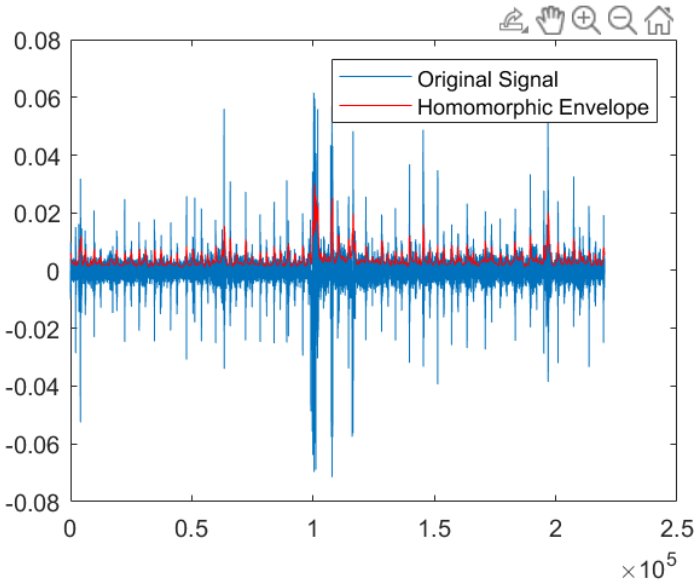


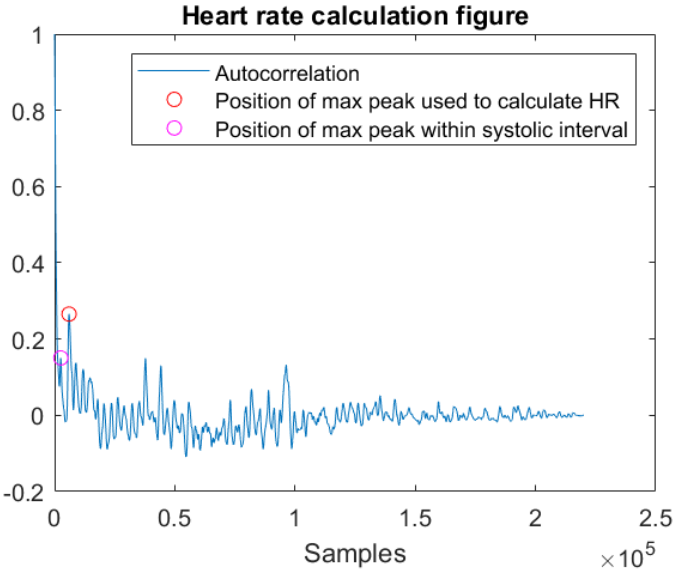





```
Heart Rate =86.4709
```

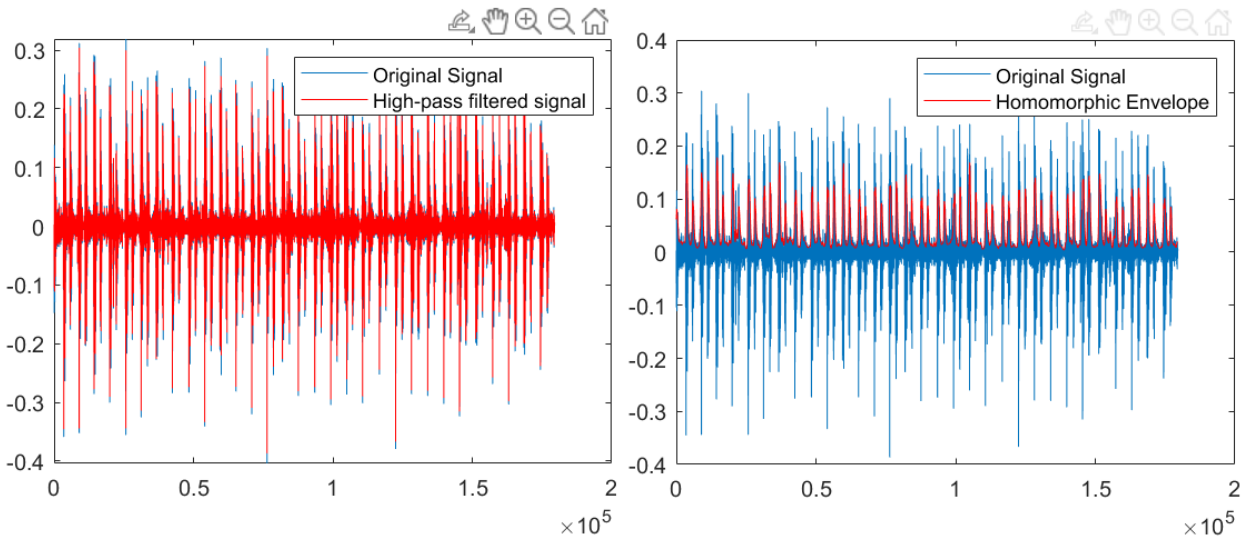
Heart2:

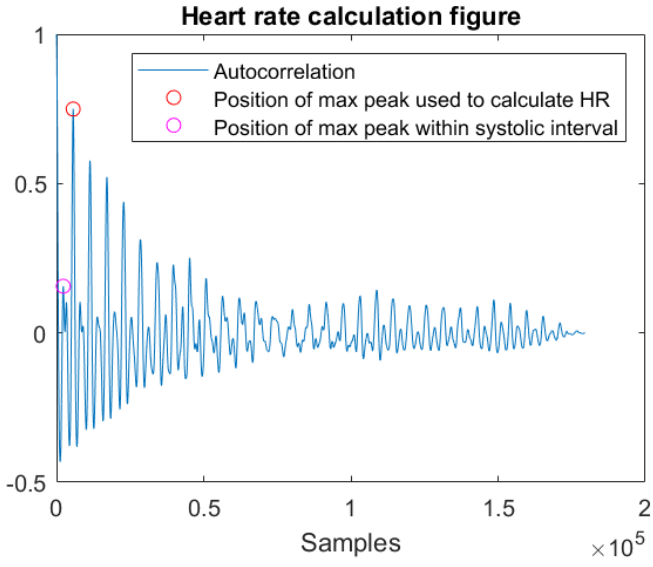





```
Heart Rate =79.8536
```

Heart3:



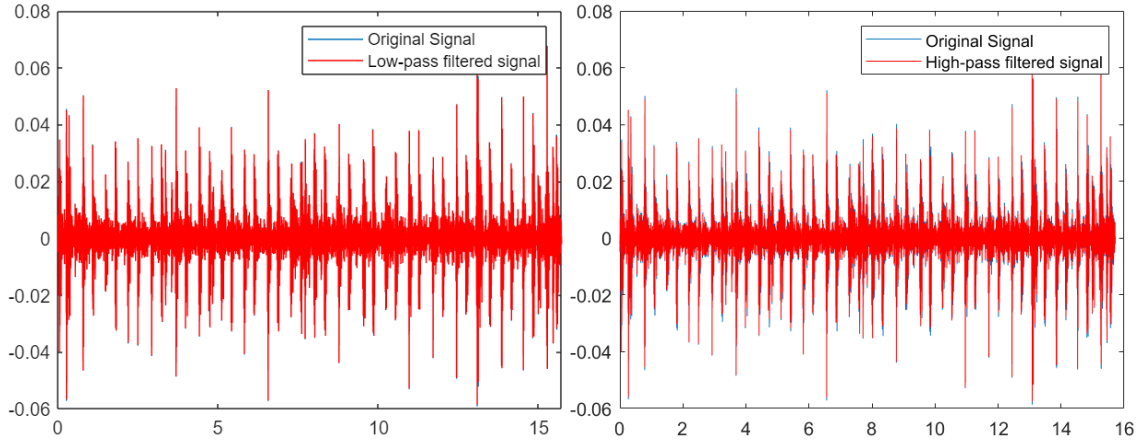


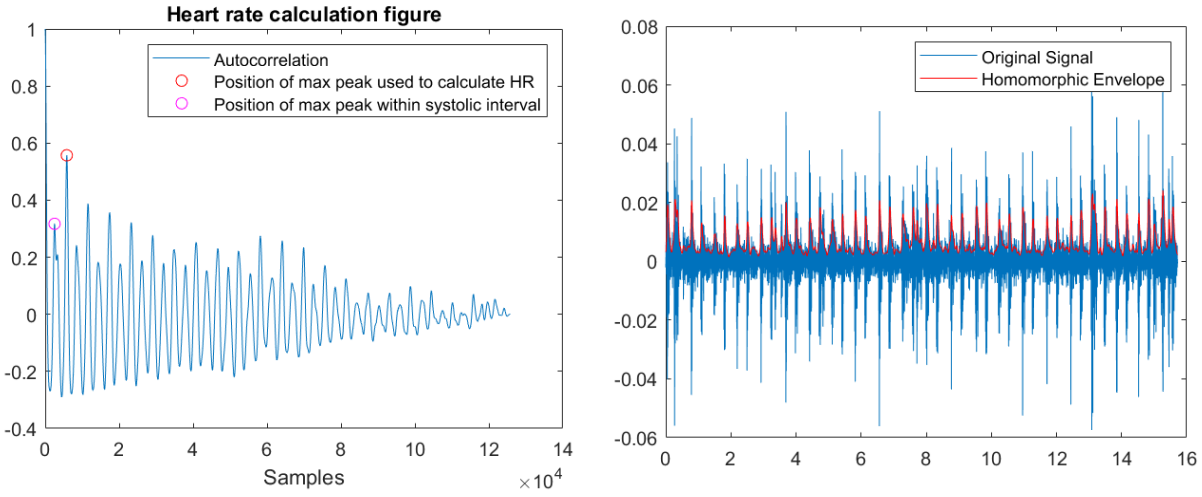

```
Heart Rate =84.7158
```

Week 3 Results

Checking the correctness of heart rate calculation:

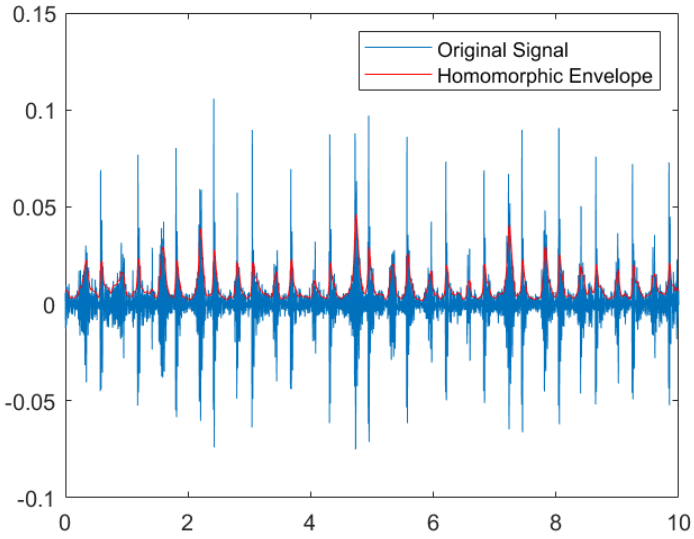
heart (85_88):






```
Heart Rate =82.1918
```

heart (95_98):




```
Heart Rate =97.6007
```

heart (75):

```
Heart Rate =74.0969
```

heart (65):

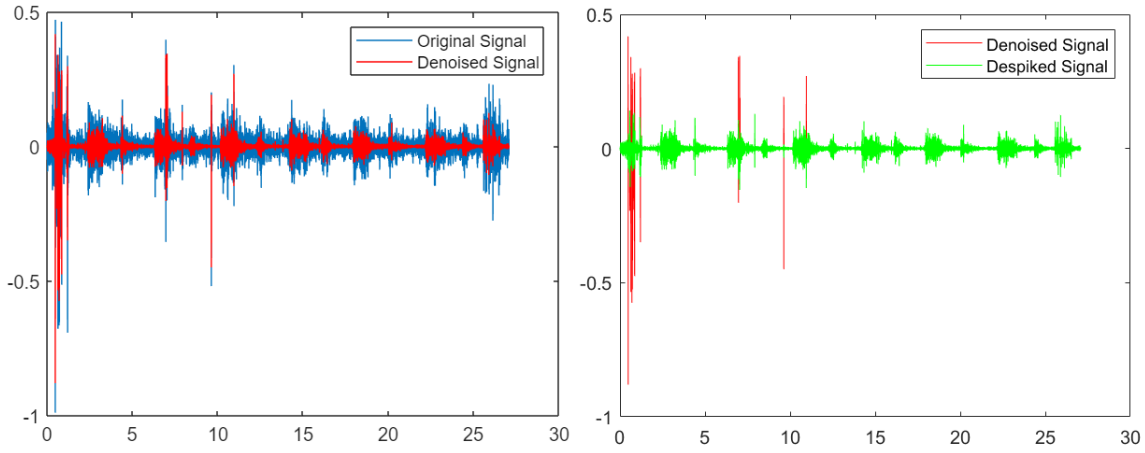
```
Heart Rate =68.9953
```

heart (70):

```
Heart Rate =69.2741
```

Respiration rate calculation:

lung1:

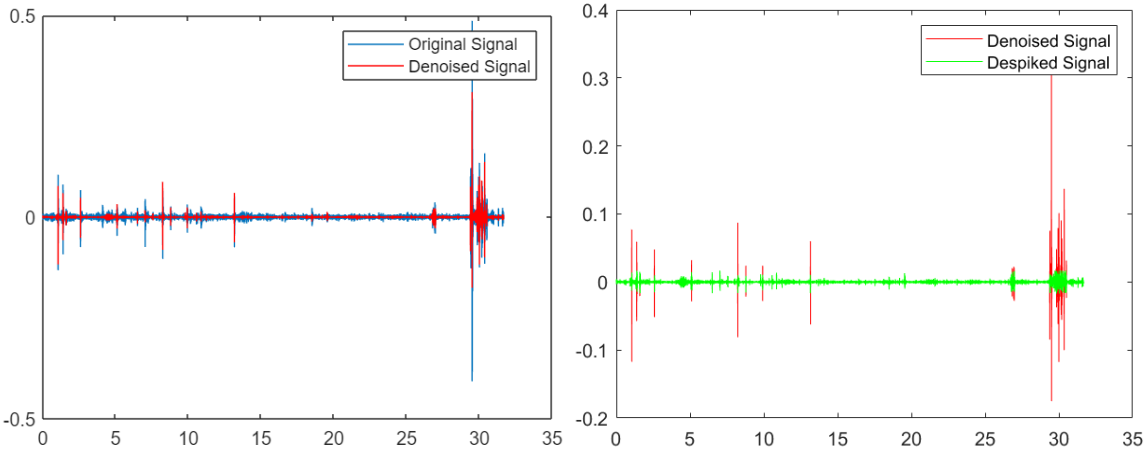



```
RR = 15.5096
```

$t = 27.08s\,, beats = 7$

$$\frac{t}{1min} = \frac{beats}{RR} \rightarrow \frac{27.08}{60} = \frac{7}{RR} \rightarrow RR = 15.5\ breaths\ per\ min$$

lung2:

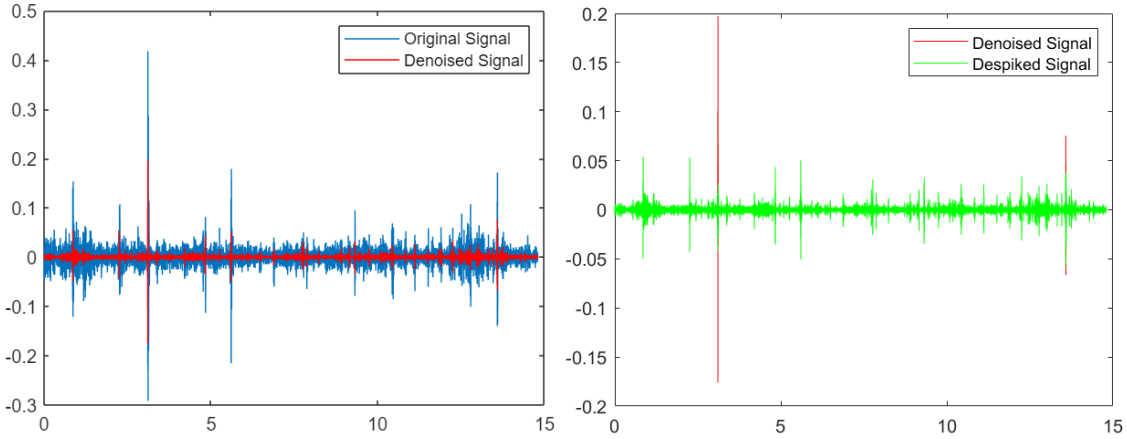



```
RR = 15.1515
```

$t = 31.68s\,, beats = 9$

$$\frac{t}{1min} = \frac{beats}{RR} \rightarrow \frac{31.68}{60} = \frac{9}{RR} \rightarrow RR = 17.04\ breaths\ per\ min$$

lung_down_right:

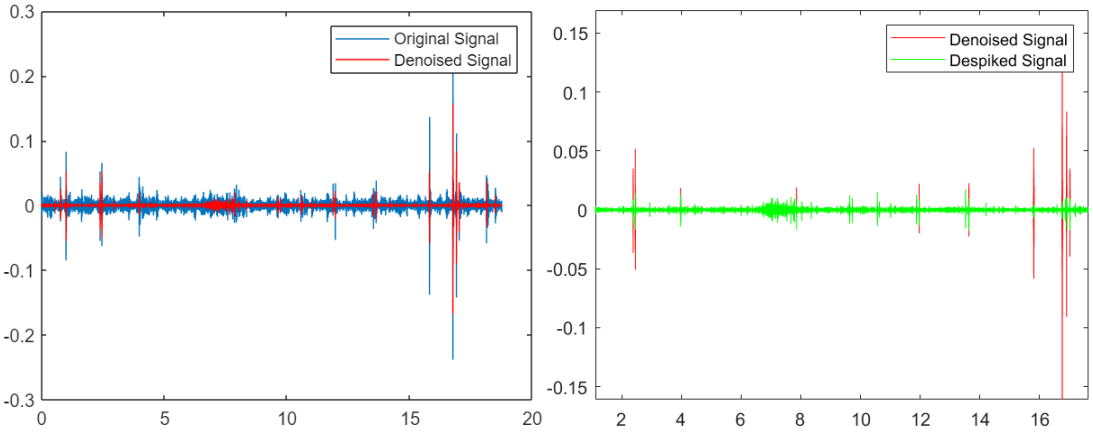



```
RR = 16.2162
```

$t = 14.8s\,, beats = 4$

$$\frac{t}{1min} = \frac{beats}{RR} \rightarrow \frac{14.8}{60} = \frac{4}{RR} \rightarrow RR = 16.3\ breaths\ per\ min$$

lung_left_mid:

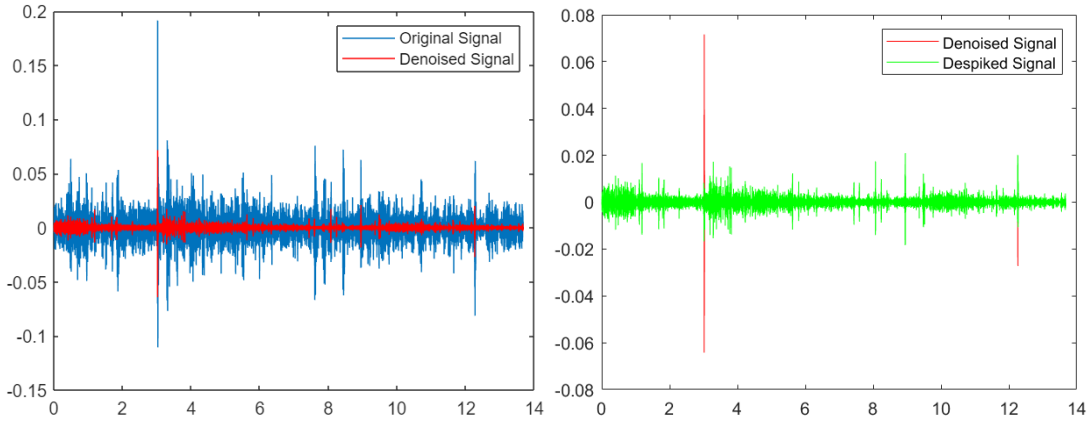



```
RR = 15.9915
```

$t = 18.76s\,, beats = 5$

$$\frac{t}{1min} = \frac{beats}{RR} \rightarrow \frac{18.76}{60} = \frac{5}{RR} \rightarrow RR = 16\ breaths\ per\ min$$

lung_up_right:




```
RR = 17.5439
```

$t = 13.68s\ , beats = 5$

$$\frac{t}{1min} = \frac{beats}{RR} \rightarrow \frac{13.68}{60} = \frac{4}{RR} \rightarrow RR = 17.5\ breaths\ per\ min$$