ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

RESULTS OF THE PROJECT OF AGEING AND REHABILITATION ENGINEERING

RESULTS OF THE PATIENT

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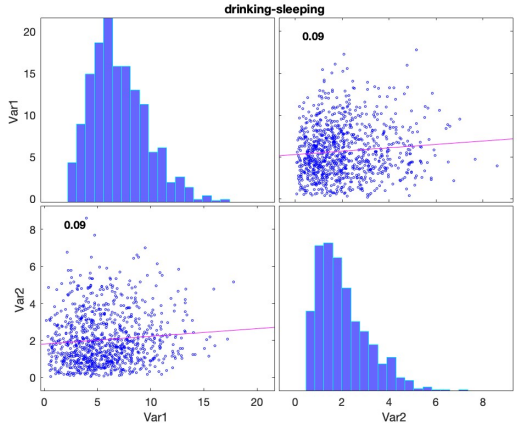
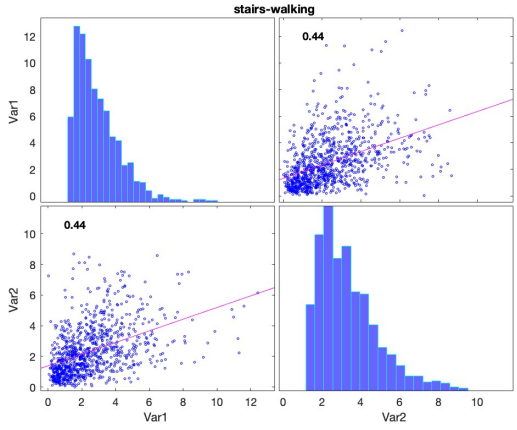
Tutor: Sicbaldi Marcello

Capitolo 1. Correlation Coefficient of ECG signal

Results of the patient

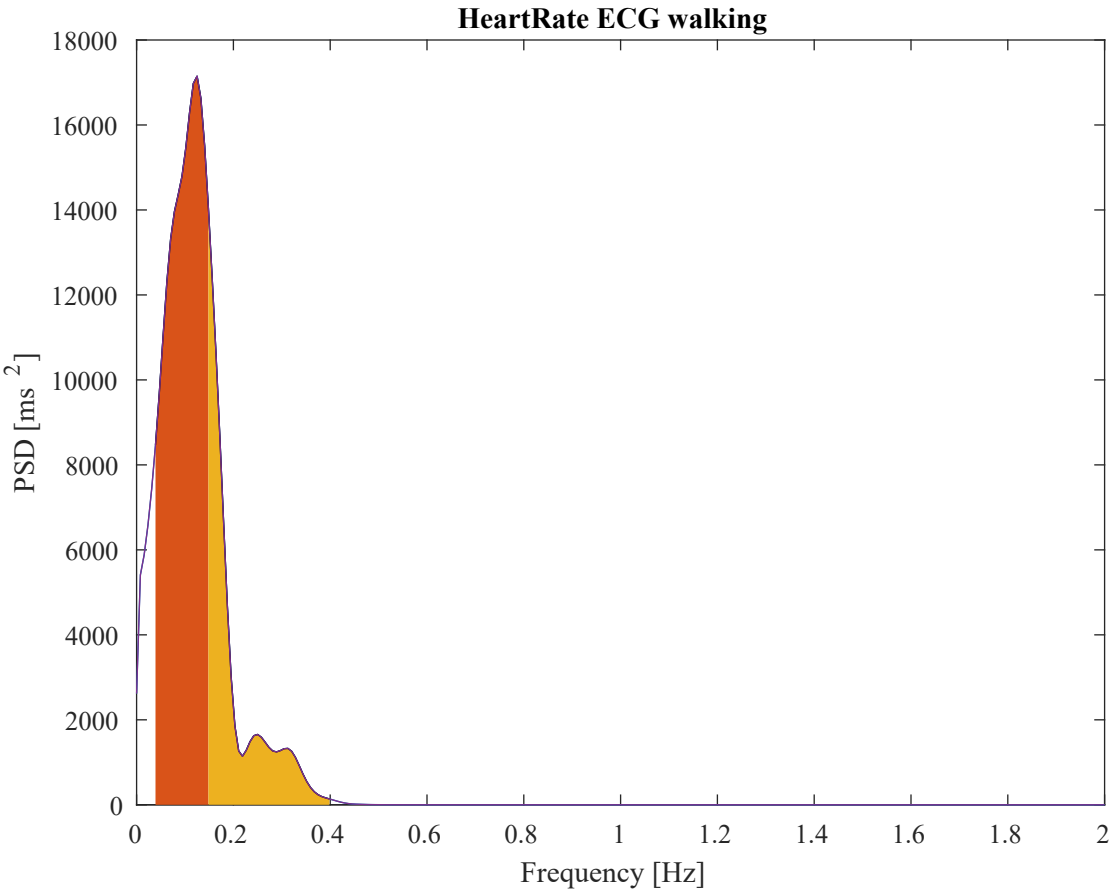


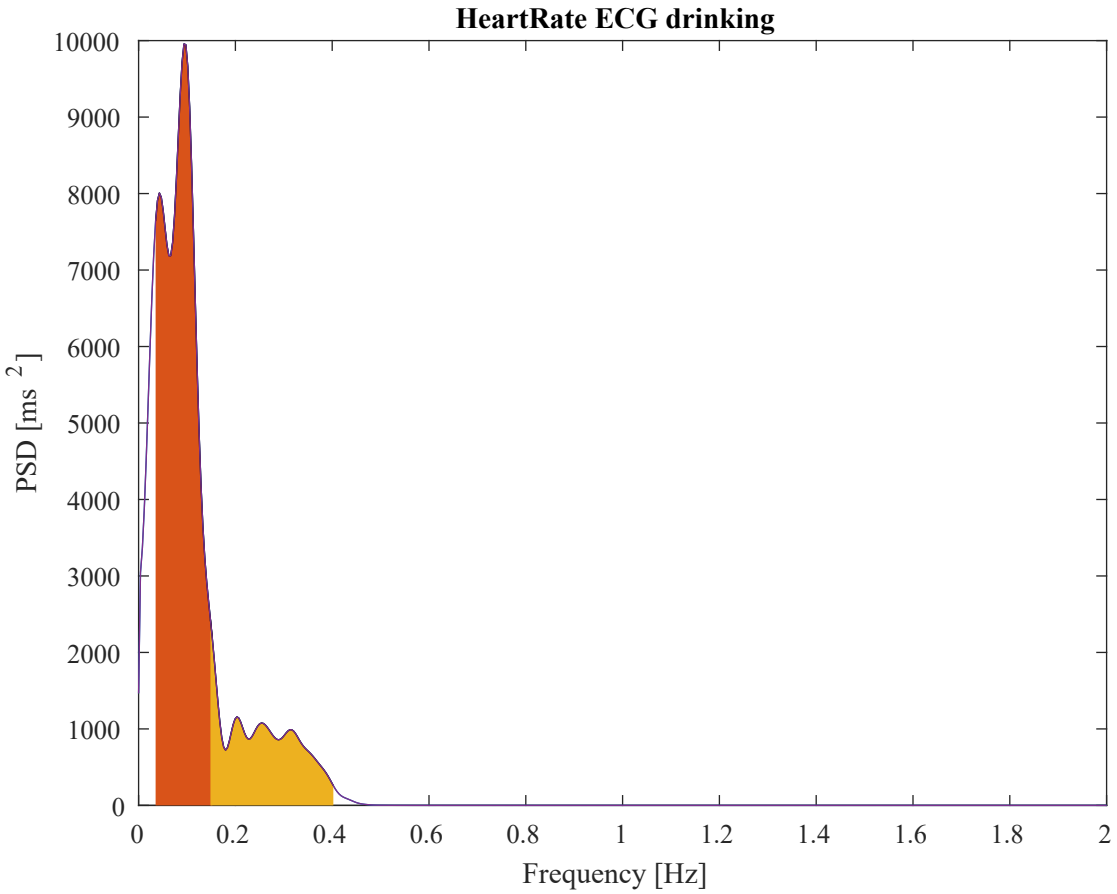


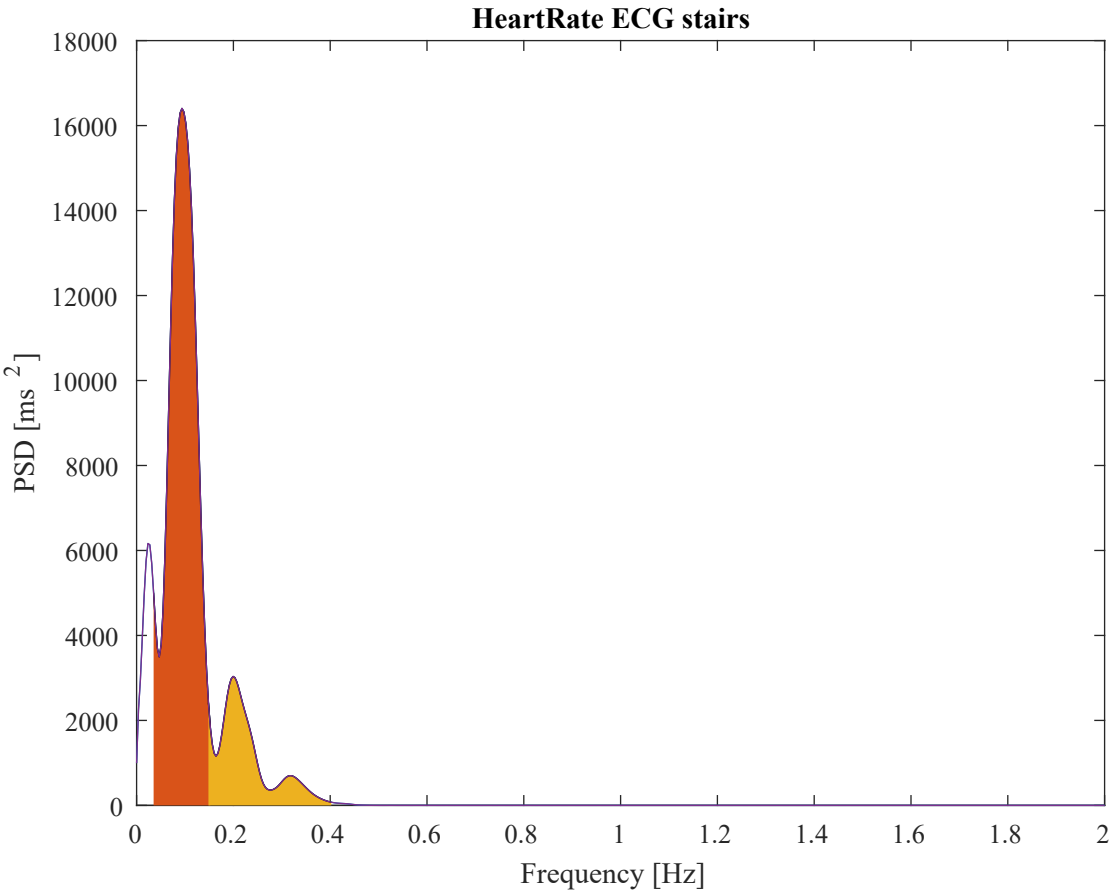
Capitolo 2. ECG

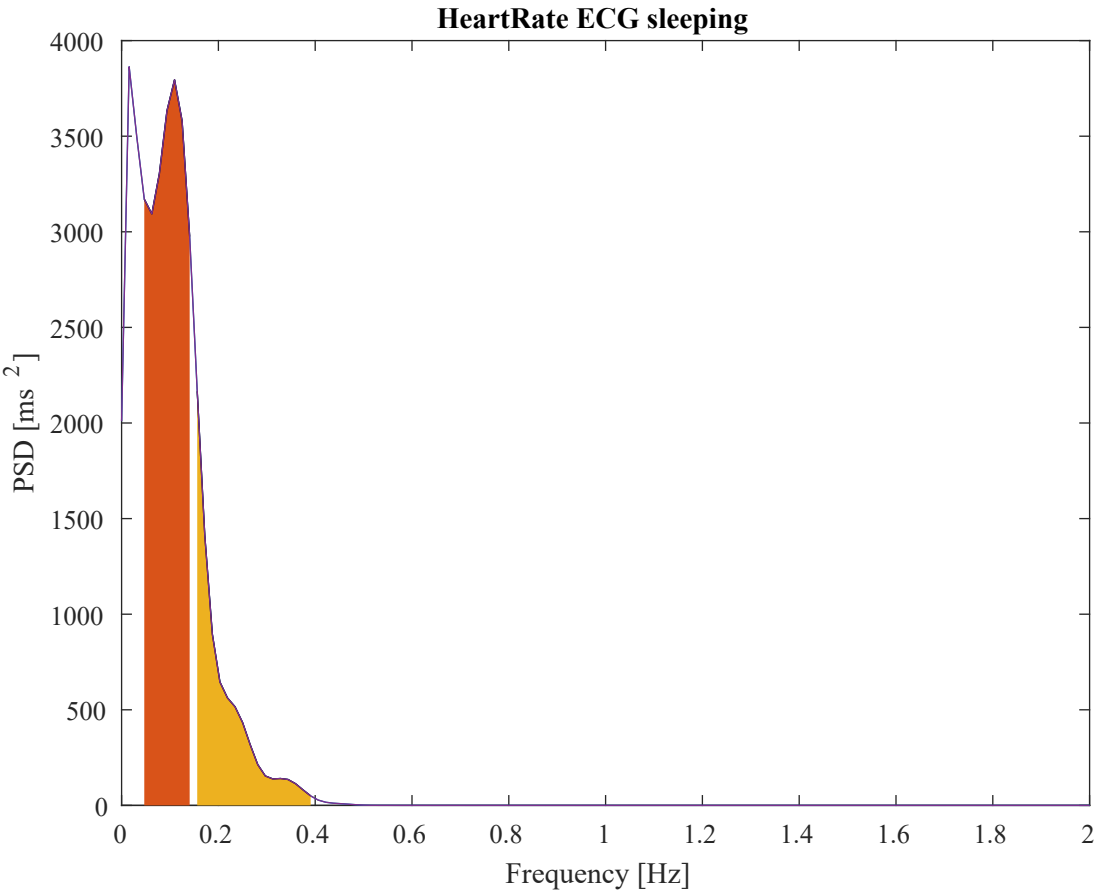
2.1. study of ECG

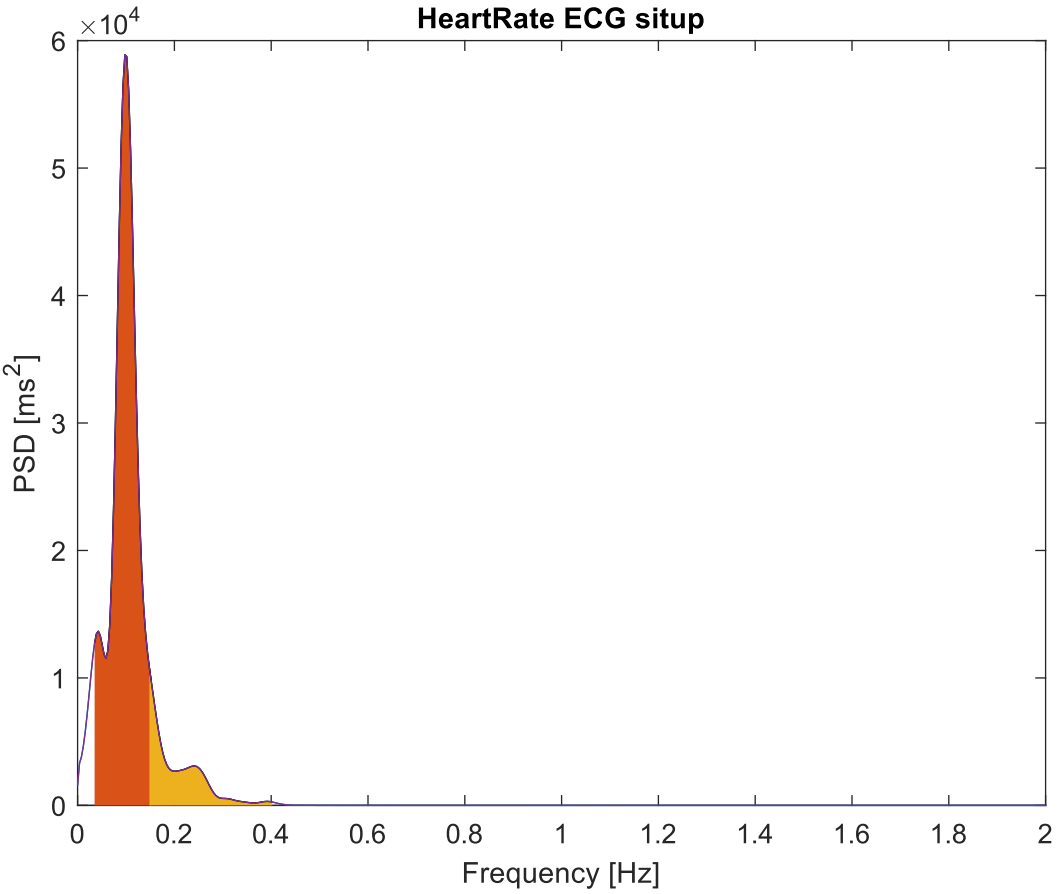
ECG Heartrate




HeartRate ECG drinking
PSD [ms 2]
Frequency [Hz]
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2


HeartRate ECG stairs
PSD [ms 2]
Frequency [Hz]
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2

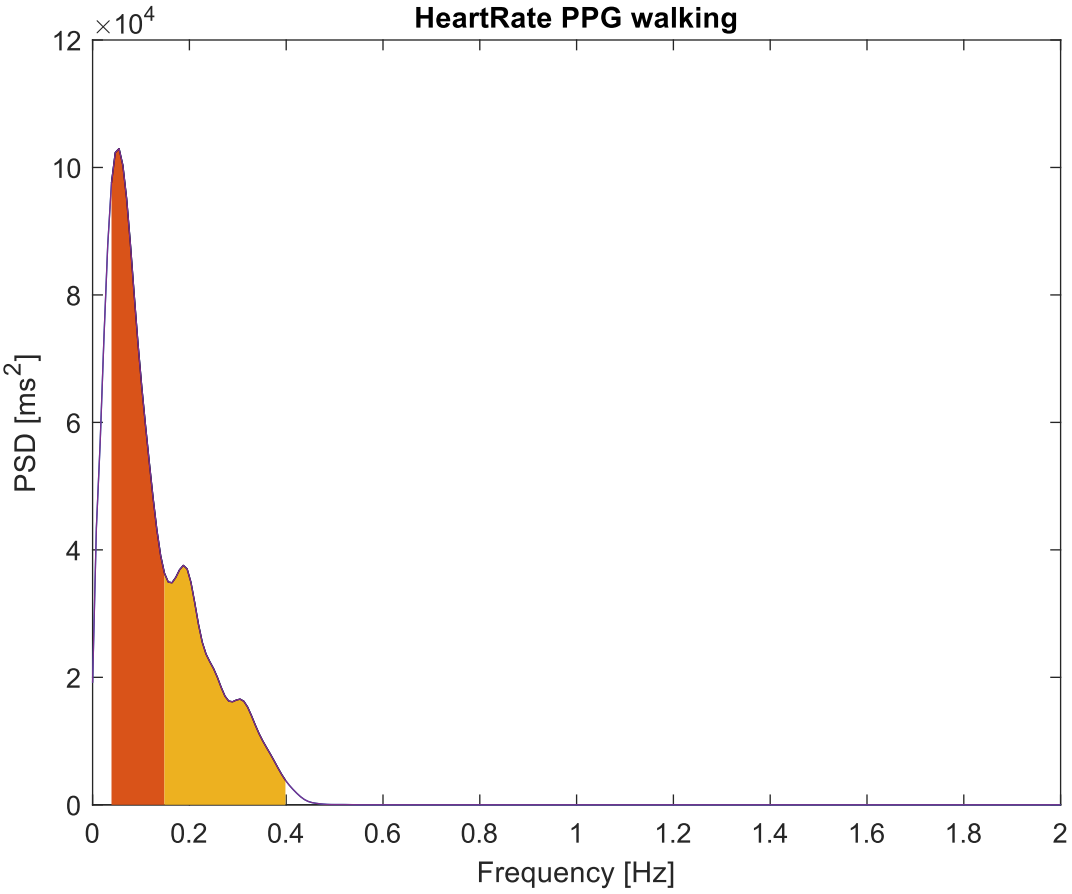

HeartRate ECG sleeping
PSD [ms 2]
Frequency [Hz]
4000
3500
3000
2500
2000
1500
1000
500
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2

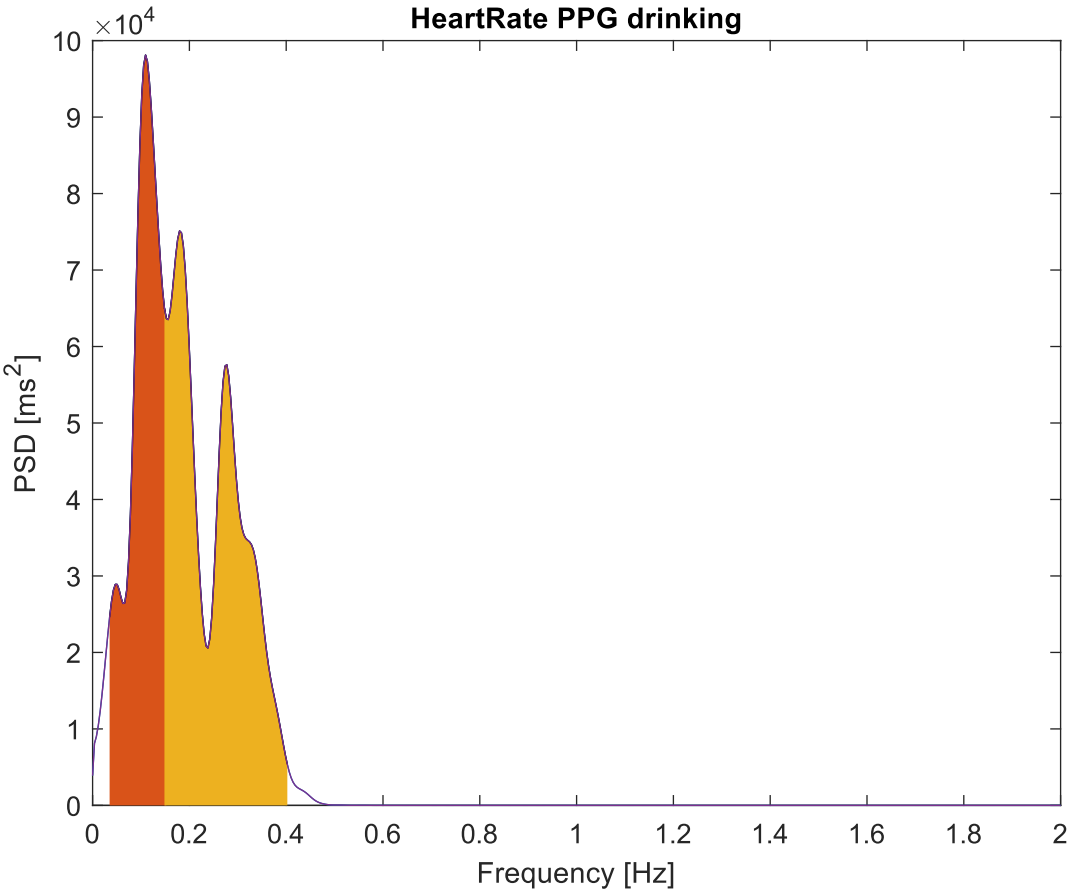

HeartRate ECG situp
×10^4
6
5
4
3
2
1
0
PSD [ms^2]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Frequency [Hz]

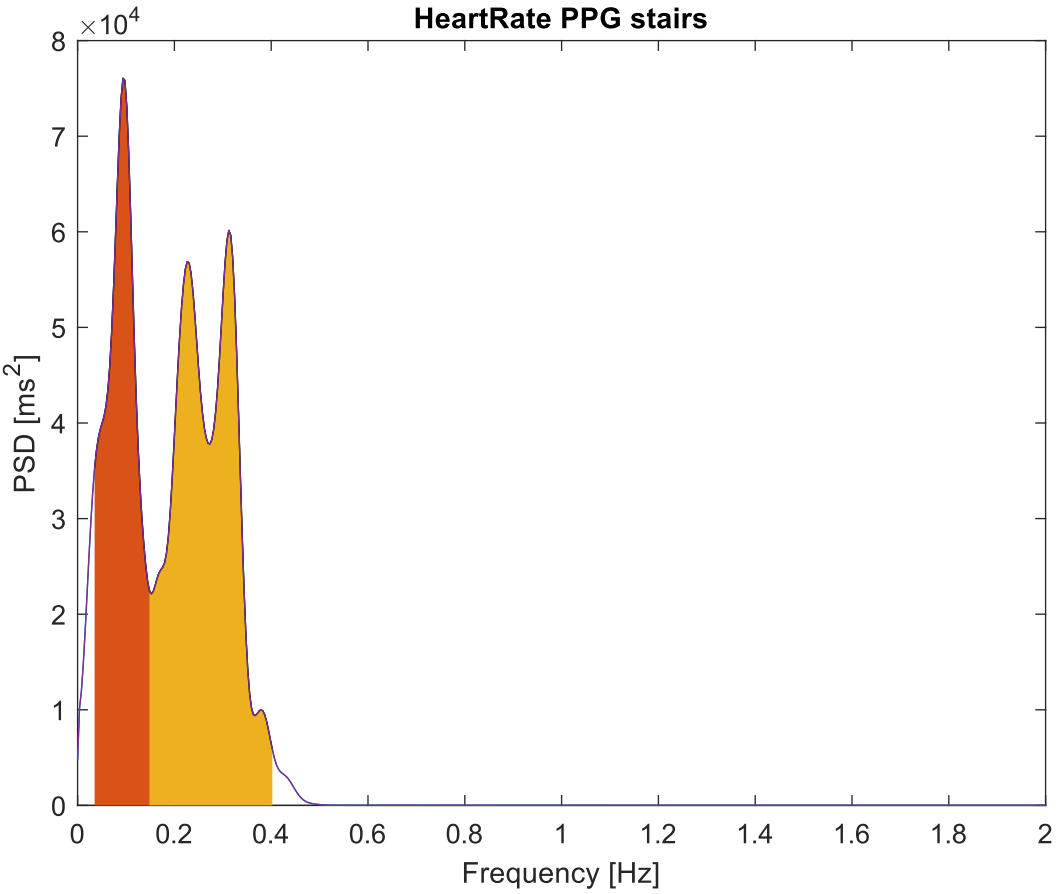
Capitolo 3. PPG

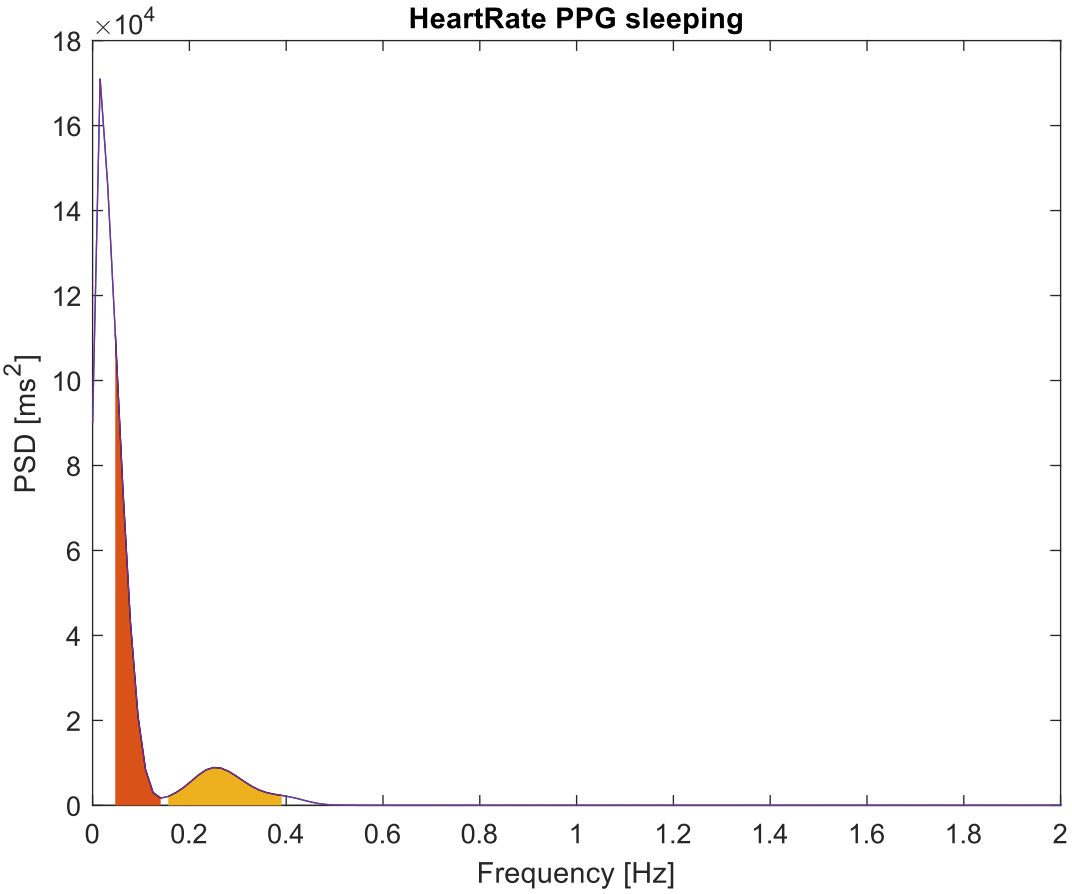
3.1. study of PPG

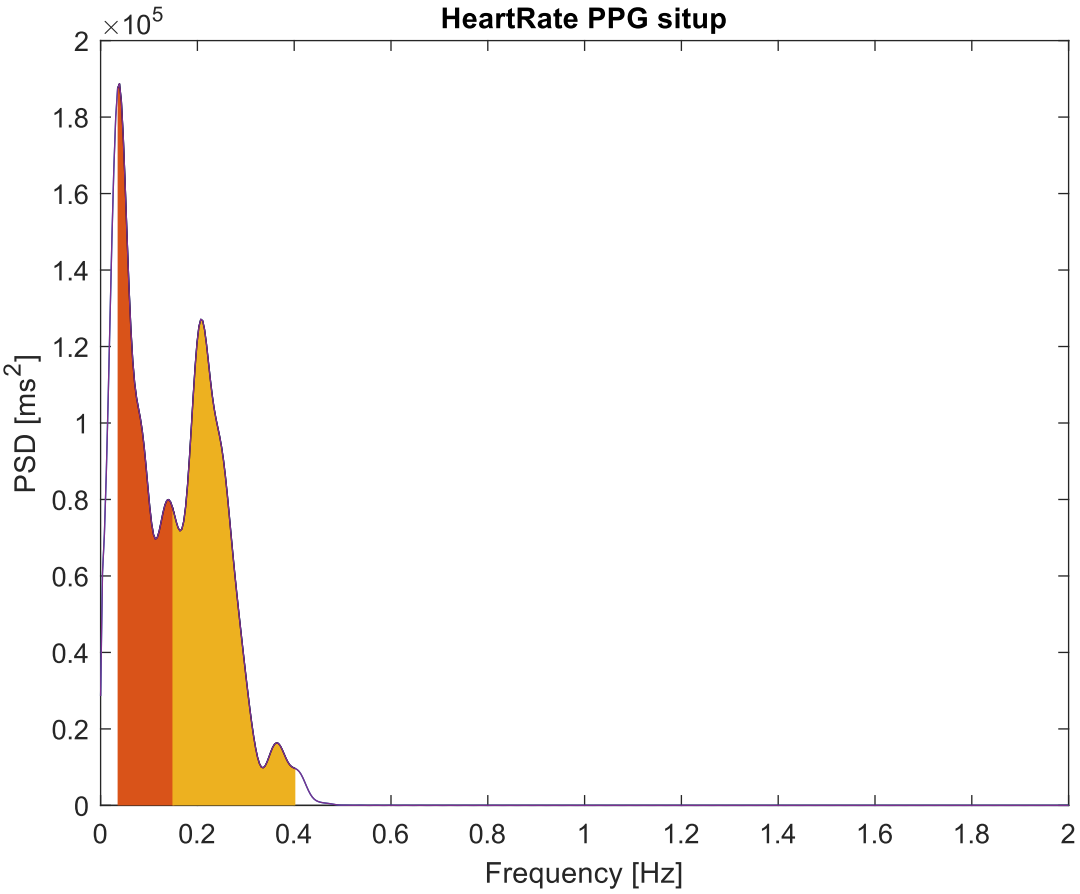
PPG Heartrate




HeartRate PPG drinking
×10^4
10
9
8
7
6
5
4
3
2
1
0
PSD [ms^2]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Frequency [Hz]

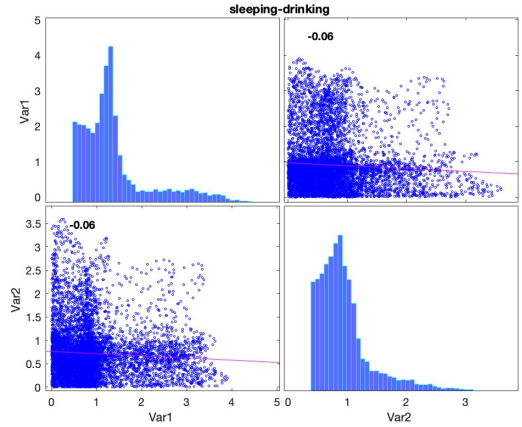

HeartRate PPG stairs
×10^4
8
7
6
5
4
3
2
1
0
PSD [ms^2]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Frequency [Hz]

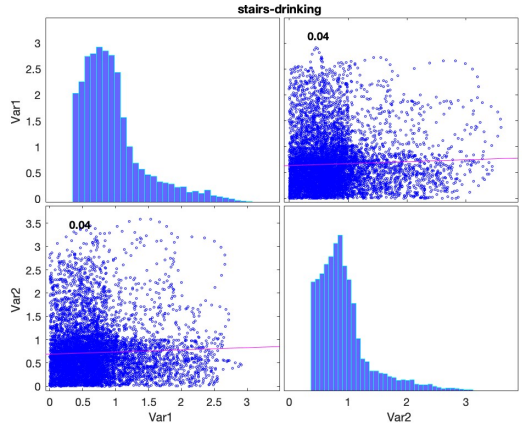

HeartRate PPG sleeping
×10^4
18
16
14
12
10
8
6
4
2
0
PSD [ms^2]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Frequency [Hz]


HeartRate PPG situp
×10^5
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
PSD [ms^2]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Frequency [Hz]

Capitolo 4. Correlation Coefficient of PPG signal

Correlation





Capitolo 5. Frequency Analysis of ECG signal

5.1. Frequency Analysis of PPG

PPG Signal of various task with it's respective Scalogram of frequency

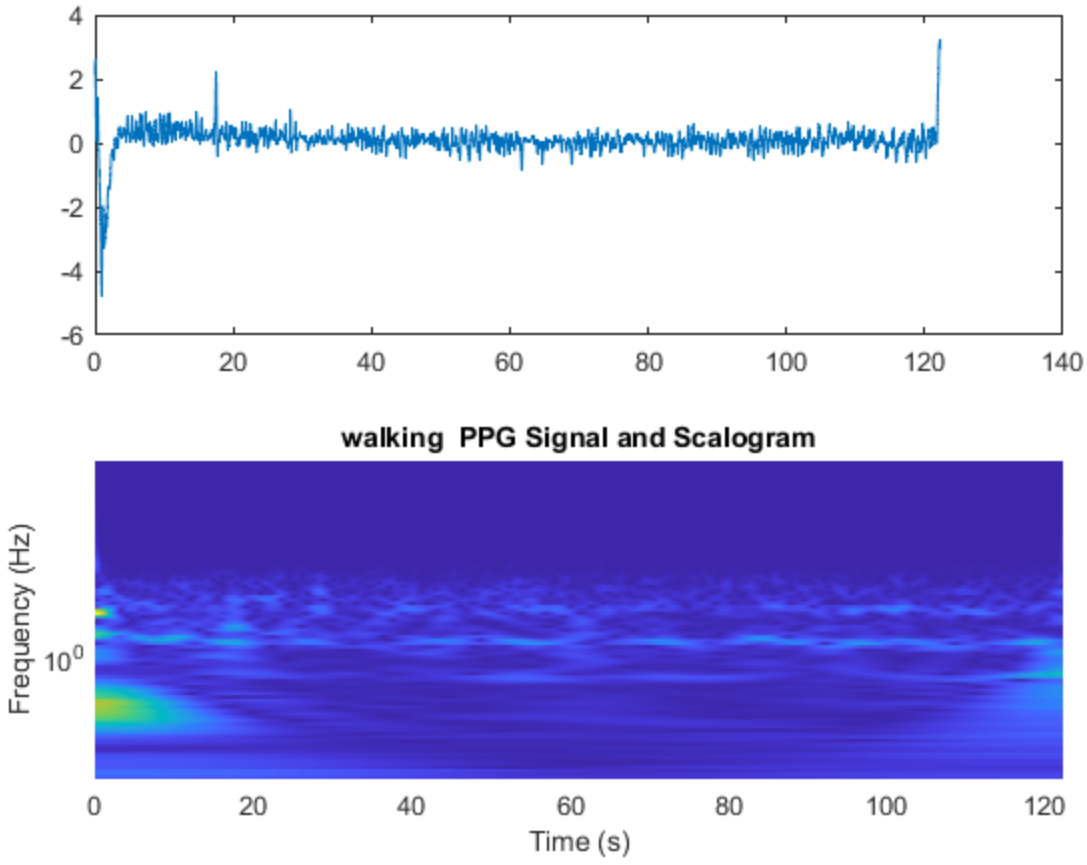


Figura 5.1.

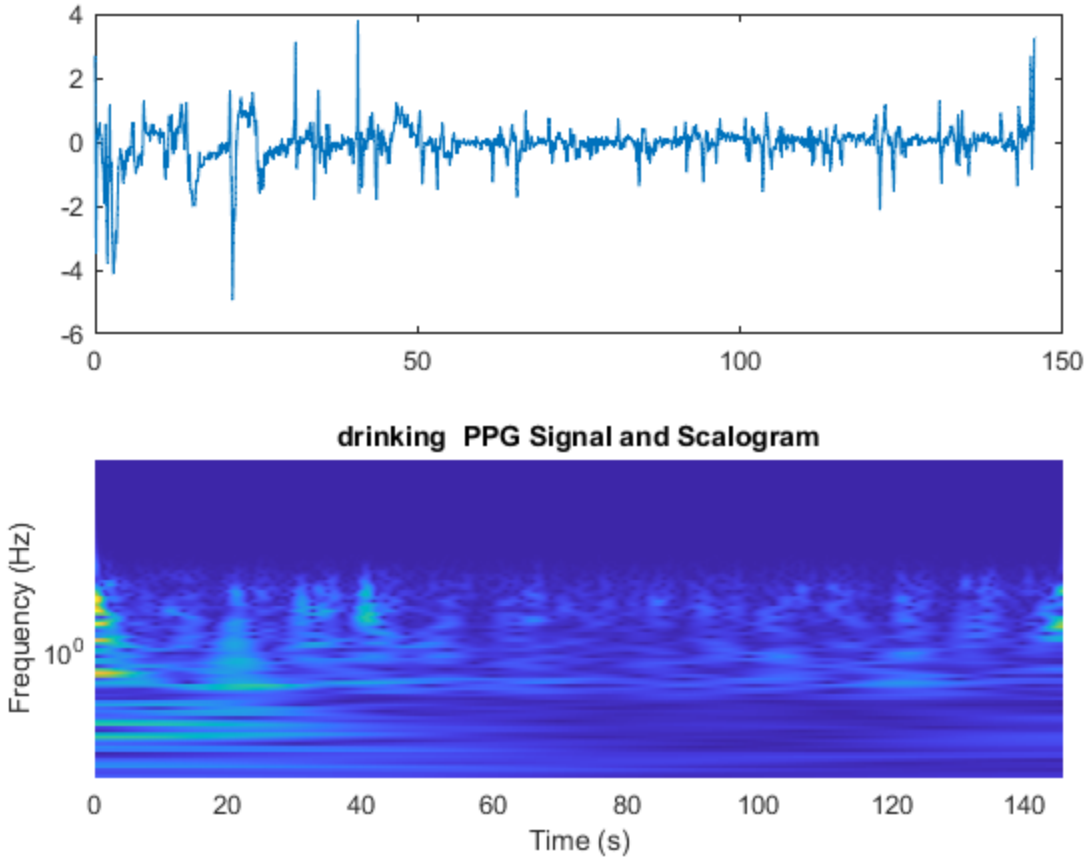

4
2
0
-2
-4
-6
0
50
100
150
drinking PPG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)

Figura 5.2.

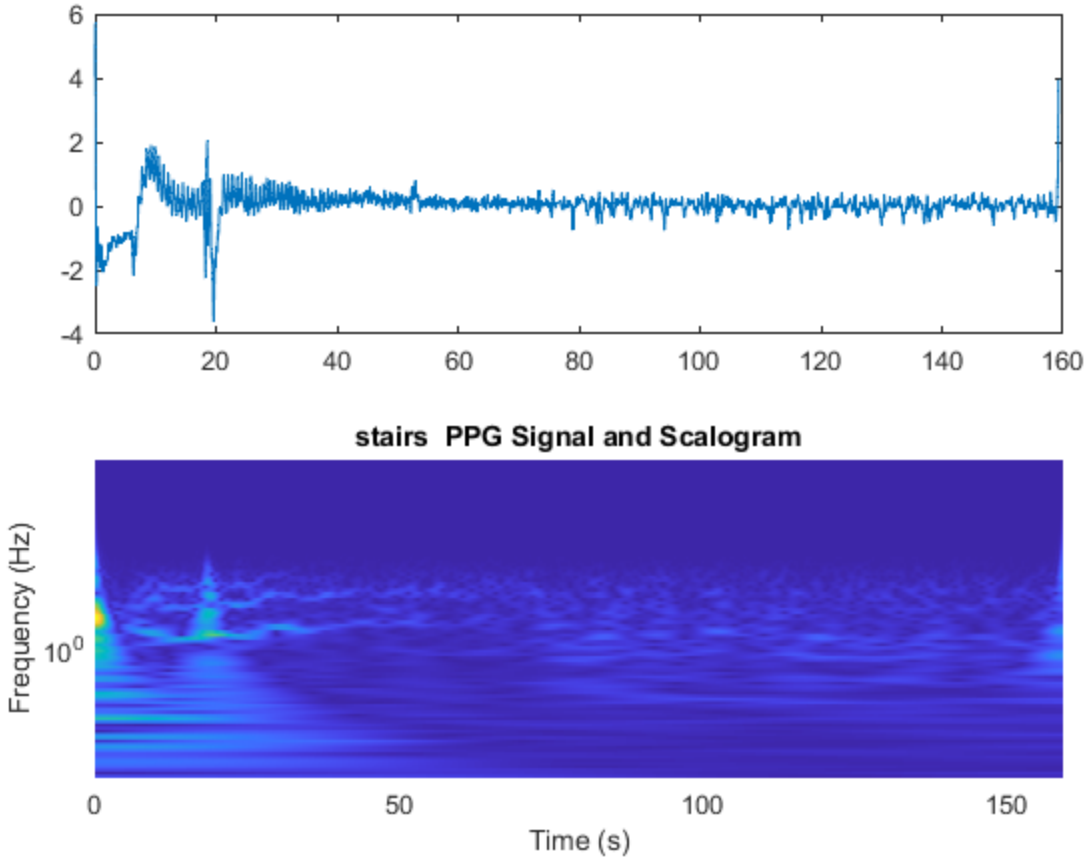

6
4
2
0
-2
-4
0
20
40
60
80
100
120
140
160
stairs PPG Signal and Scalogram
Frequency (Hz)
10^0
0
50
100
150
Time (s)

Figura 5.3.

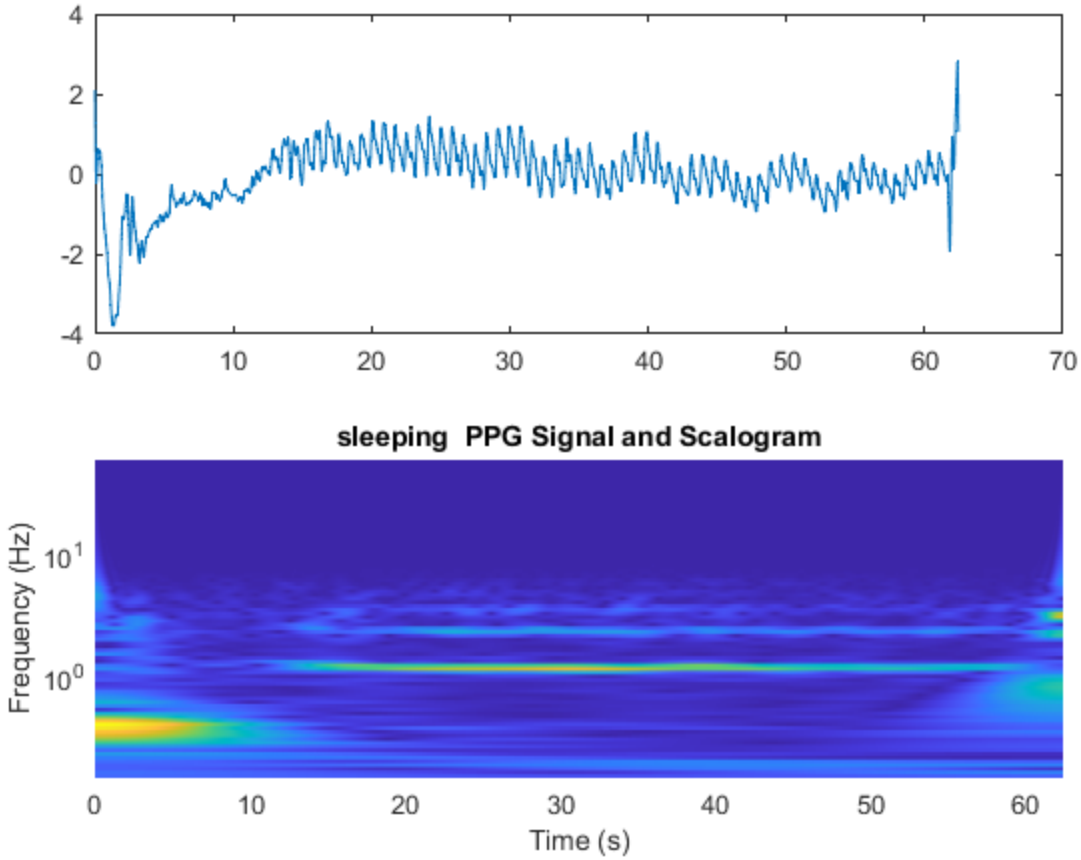

4
2
0
-2
-4
0
10
20
30
40
50
60
70
sleeping PPG Signal and Scalogram
Frequency (Hz)
10^1
10^0
0
10
20
30
40
50
60
Time (s)

Figura 5.4.

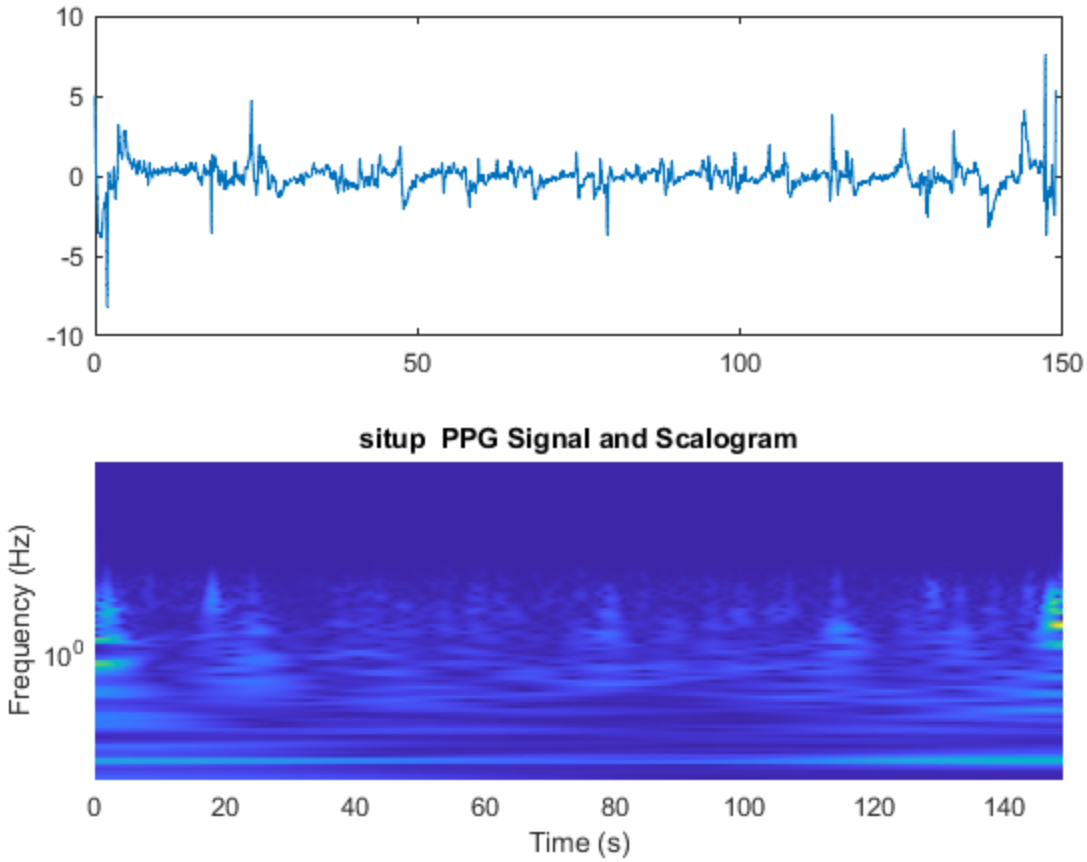


Figura 5.5.

5.2. Frequency Analysis of ECG

ECG Signal of various task with it's respective Scalogram of frequency

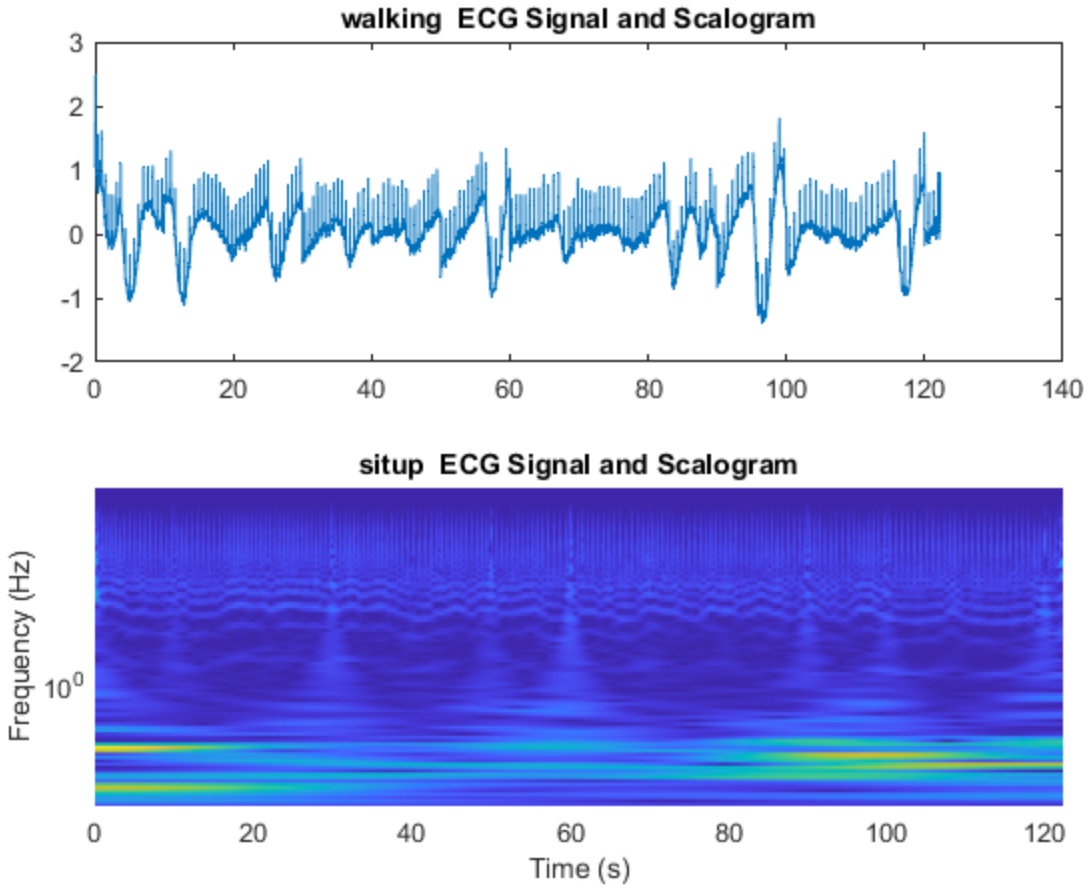

walking ECG Signal and Scalogram
3
2
1
0
-1
-2
0
20
40
60
80
100
120
140
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
Time (s)

Figura 5.6.

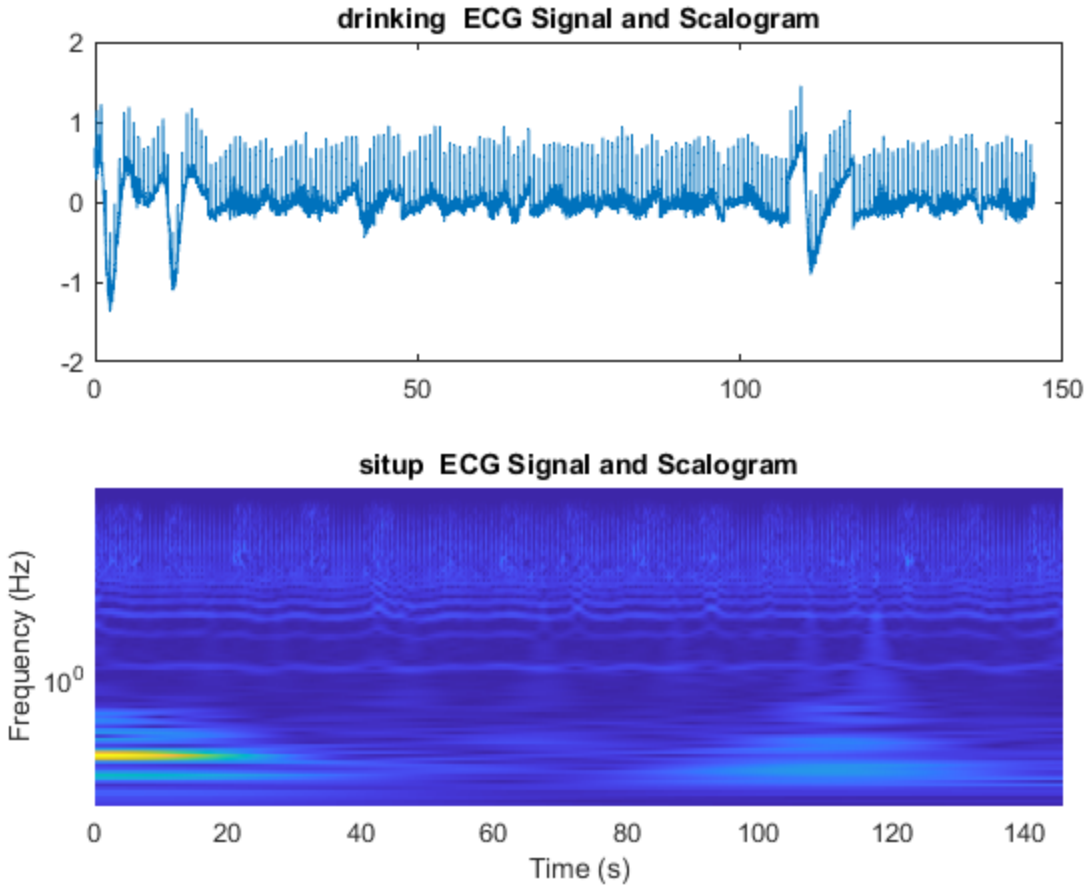

drinking ECG Signal and Scalogram
2
1
0
-1
-2
0
50
100
150
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)

Figura 5.7.

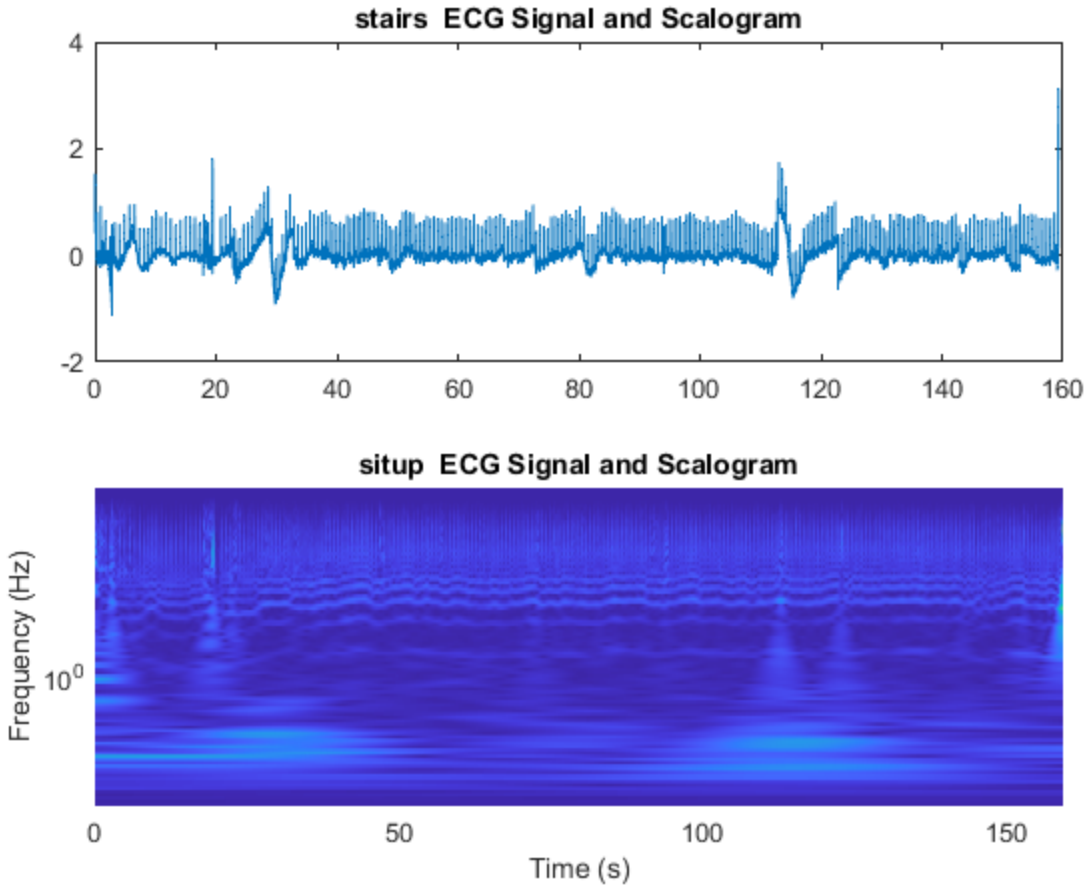

stairs ECG Signal and Scalogram
4
2
0
-2
0
20
40
60
80
100
120
140
160
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
50
100
150
Time (s)

Figura 5.8.

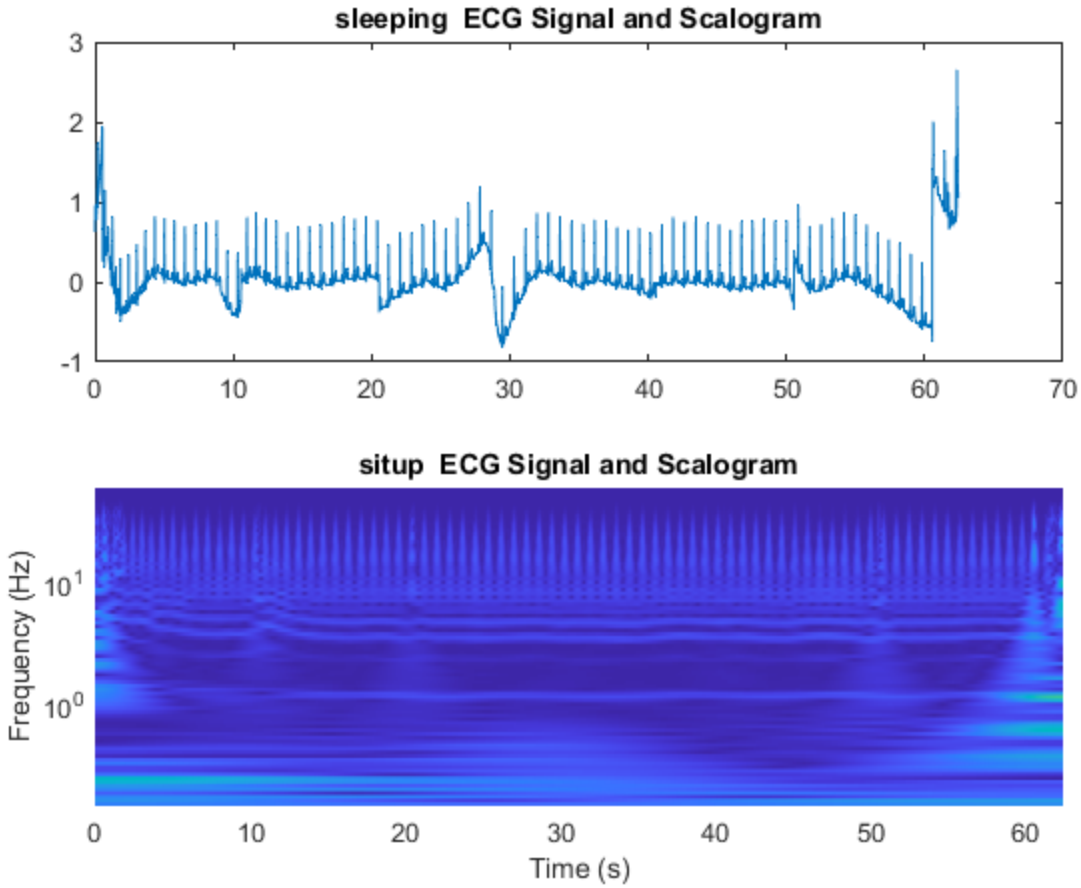

sleeping ECG Signal and Scalogram
3
2
1
0
-1
0
10
20
30
40
50
60
70
situp ECG Signal and Scalogram
Frequency (Hz)
10^1
10^0
0
10
20
30
40
50
60
Time (s)

Figura 5.9.

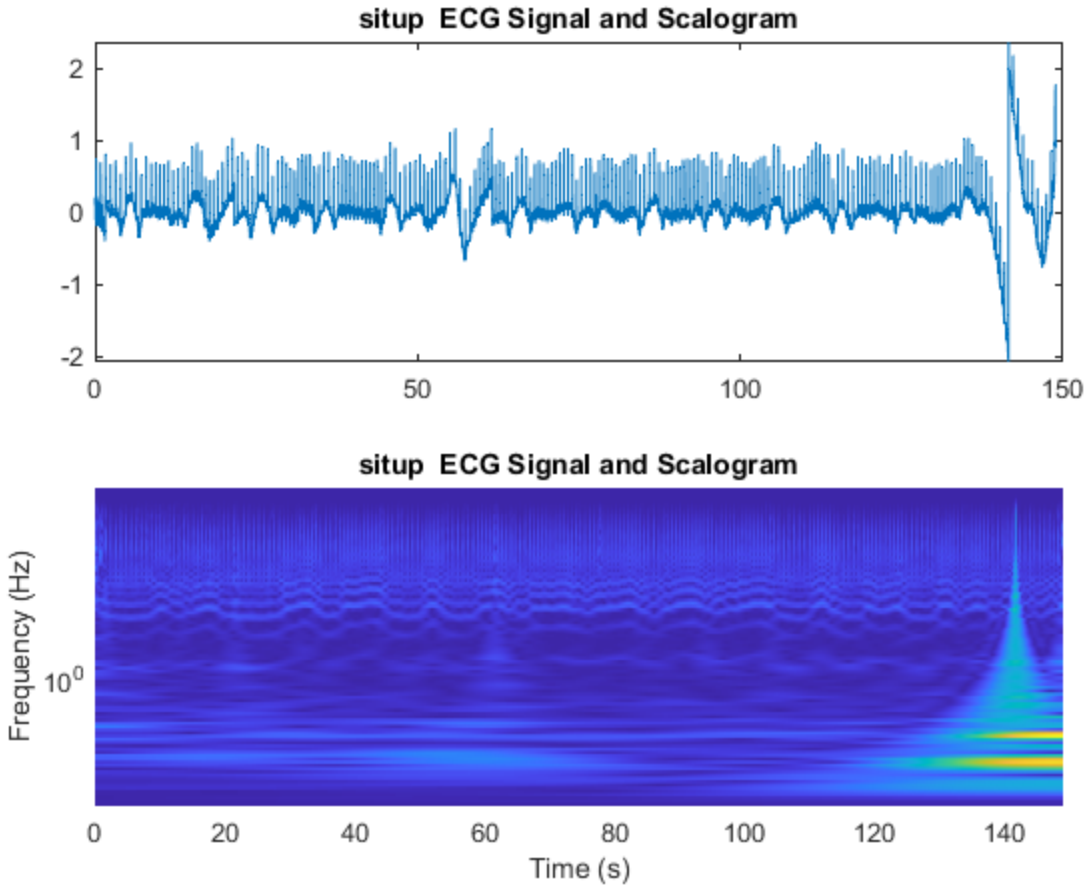
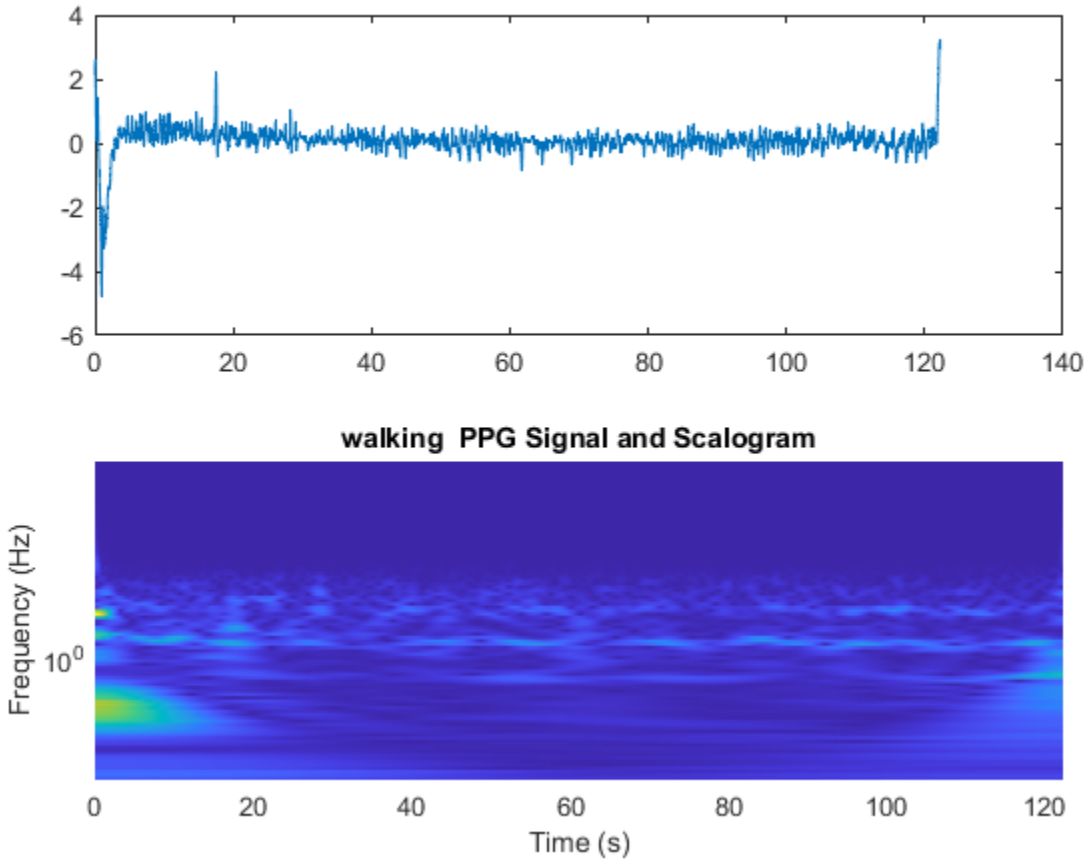
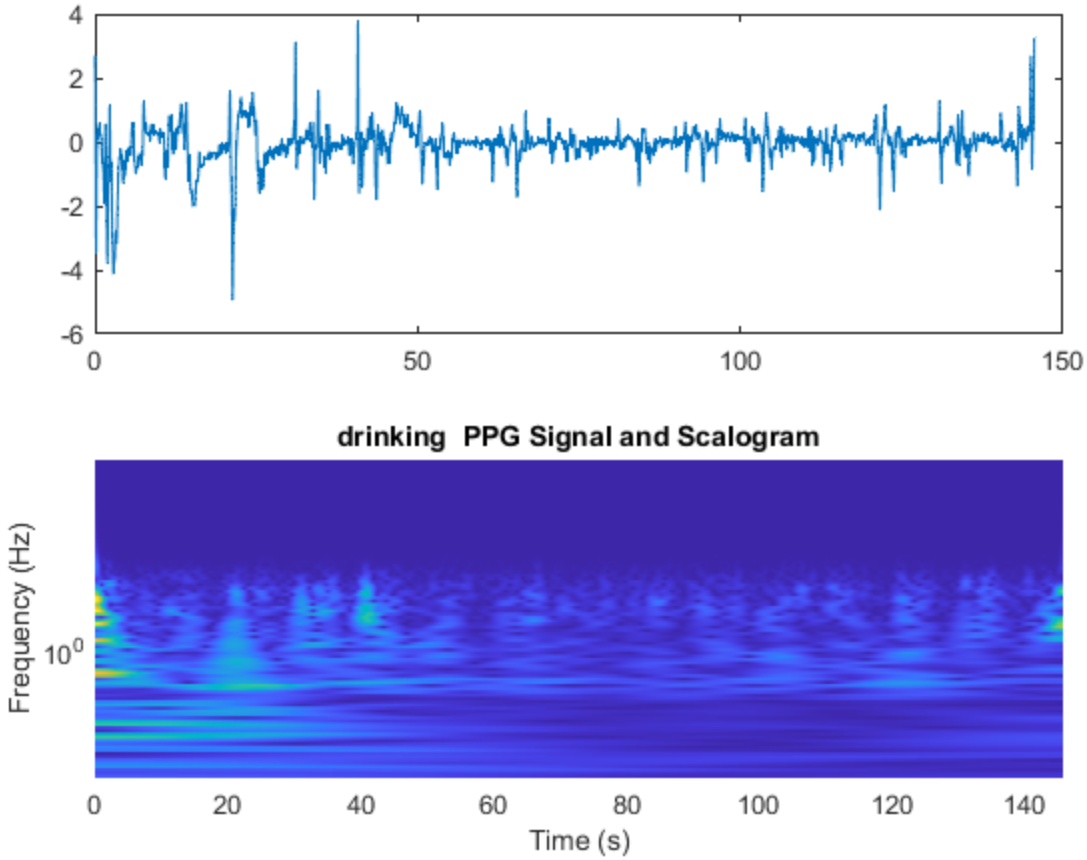
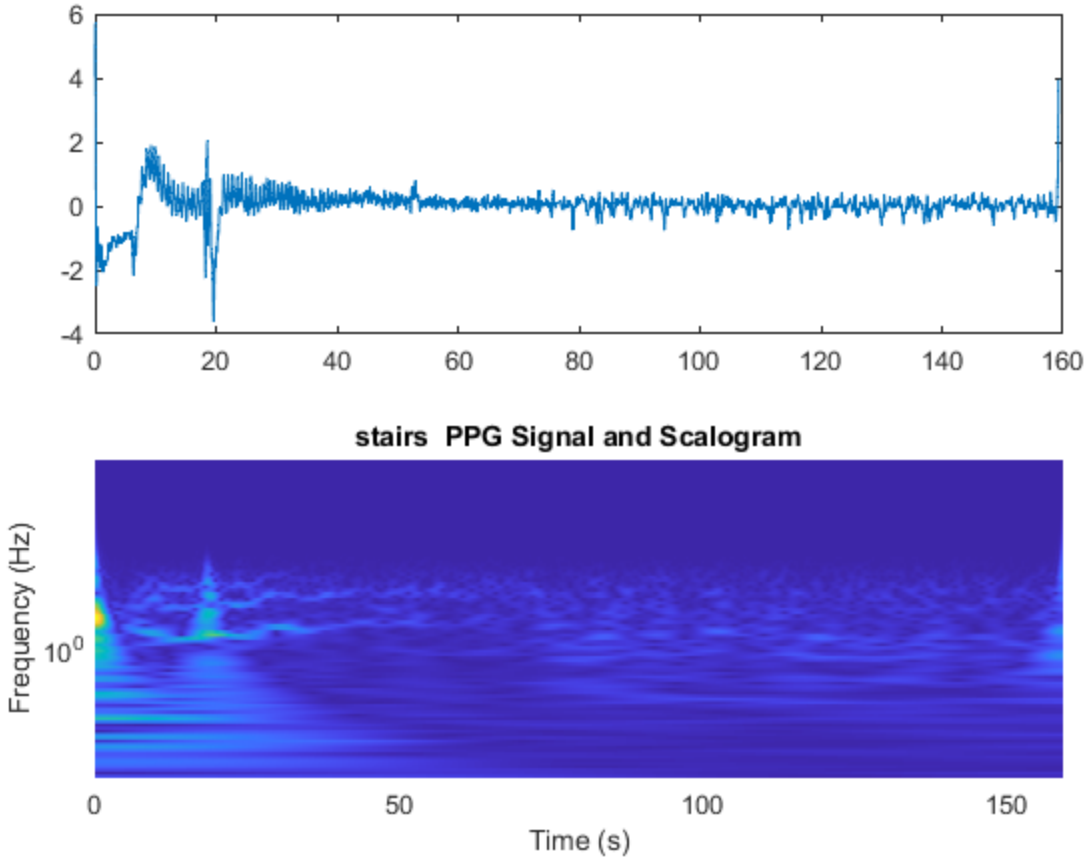

situp ECG Signal and Scalogram
2
1
0
-1
-2
0
50
100
150
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)

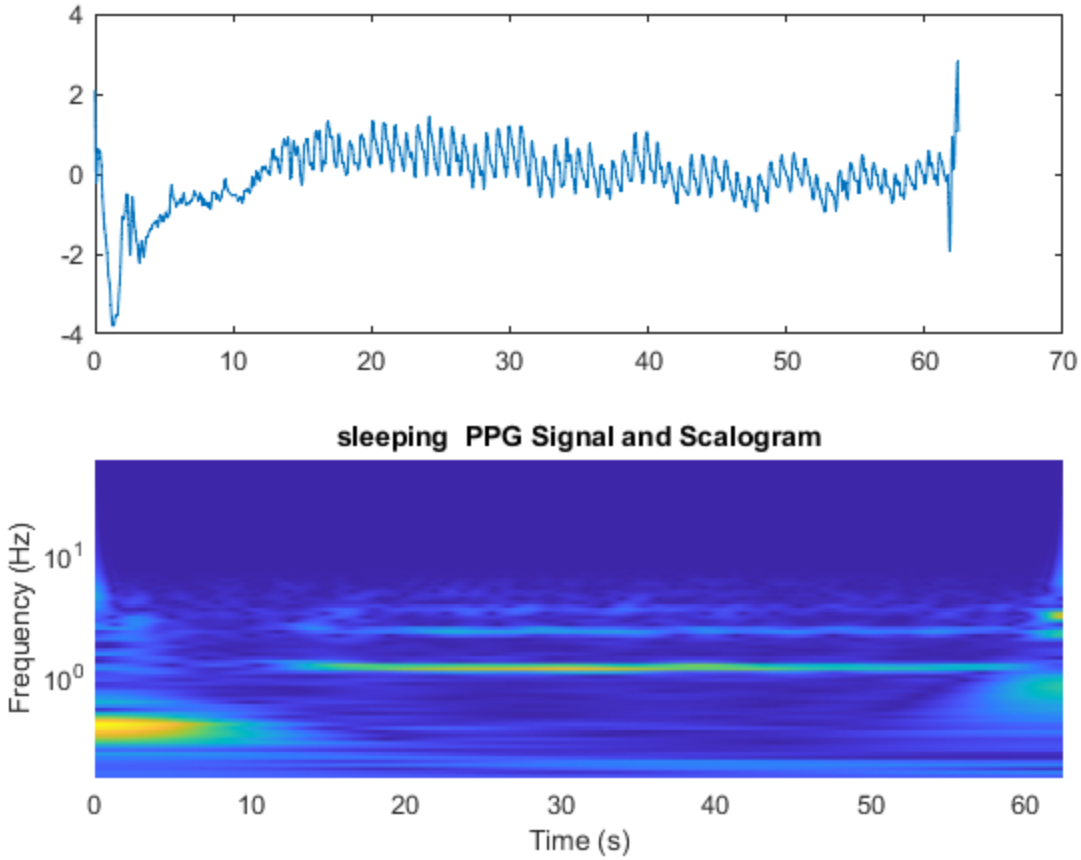
Figura 5.10.

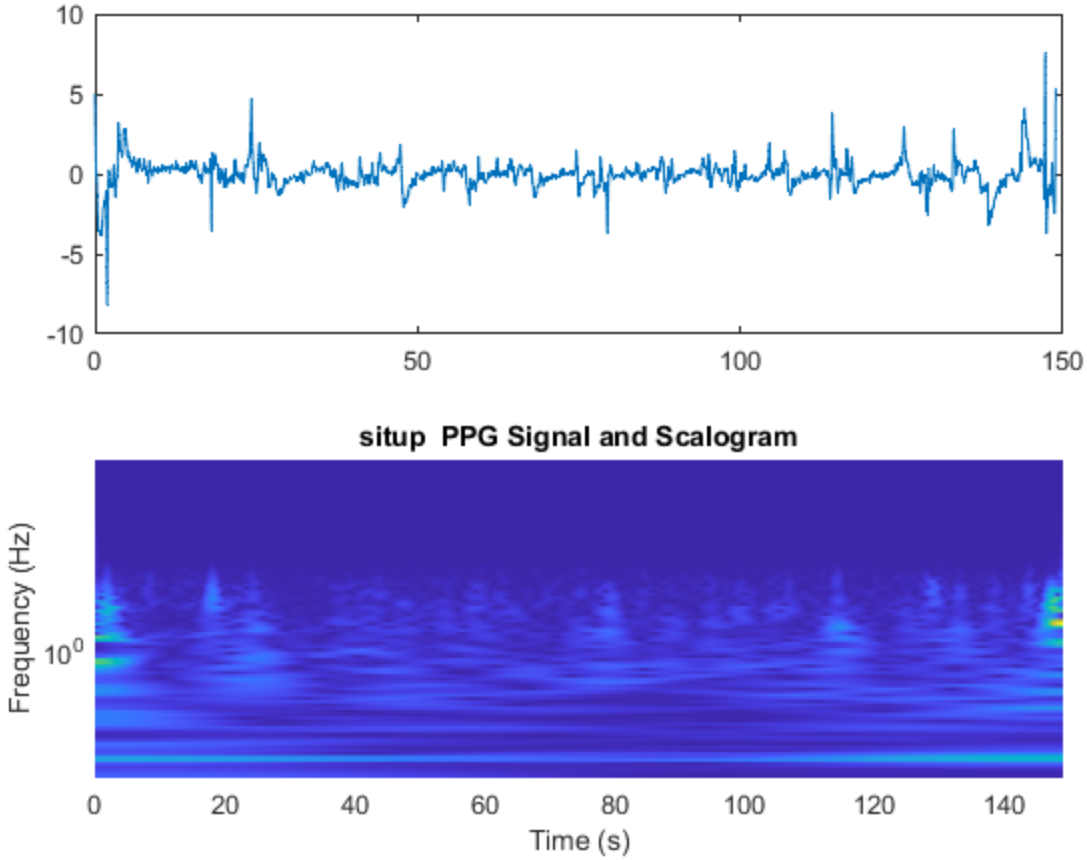
5.3. FREQ_ANA_SCAL



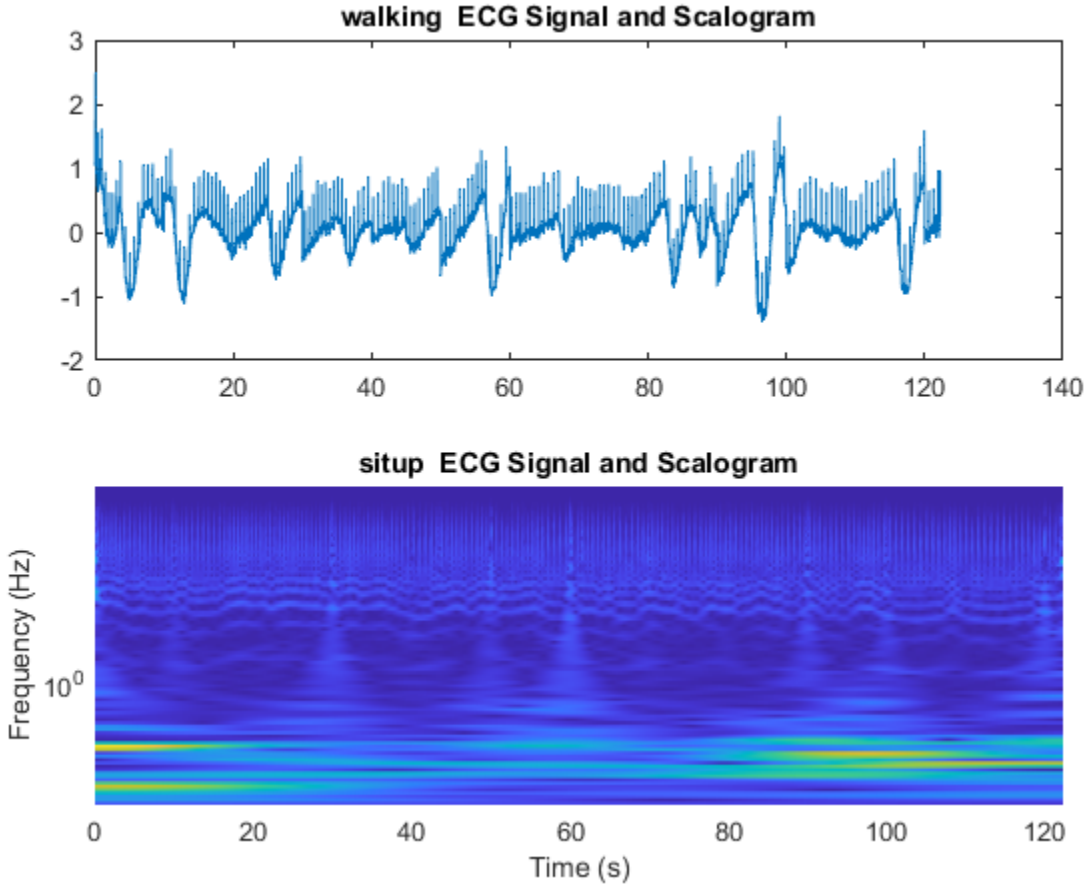

4
2
0
-2
-4
-6
0
50
100
150
drinking PPG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)

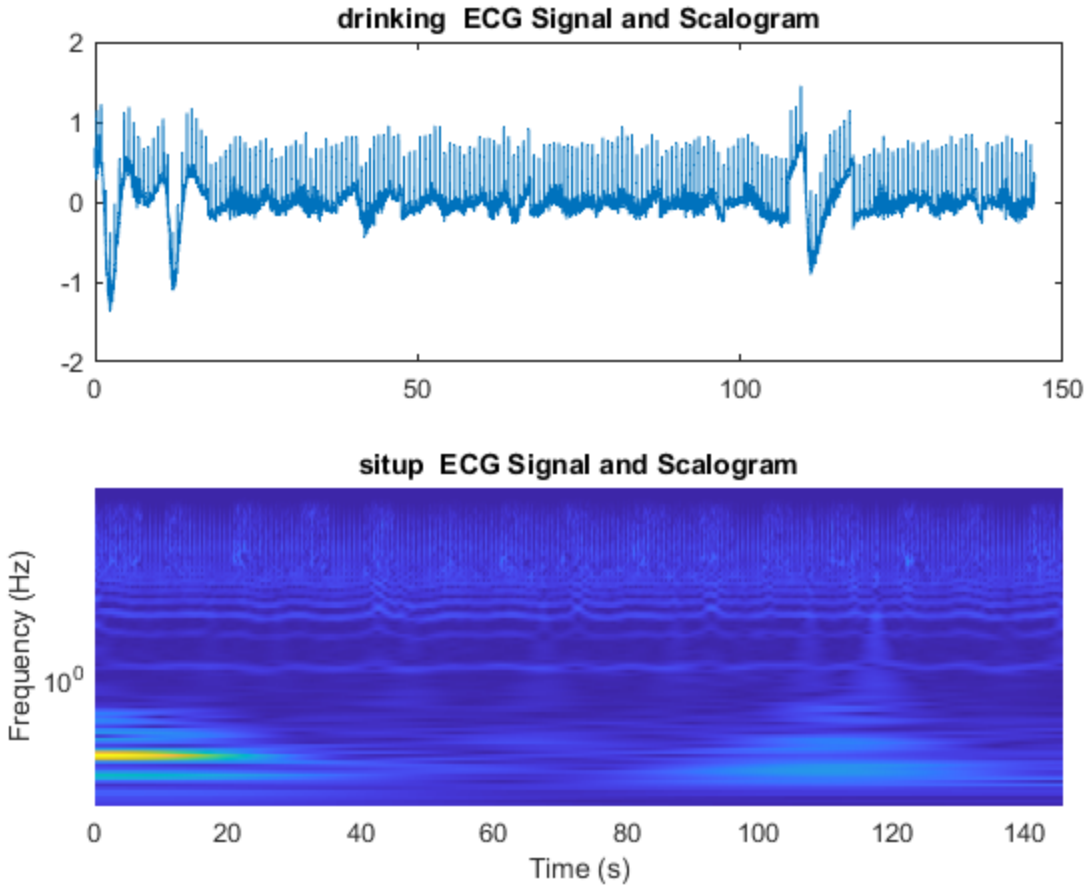

6
4
2
0
-2
-4
0
20
40
60
80
100
120
140
160
stairs PPG Signal and Scalogram
Frequency (Hz)
10^0
0
50
100
150
Time (s)

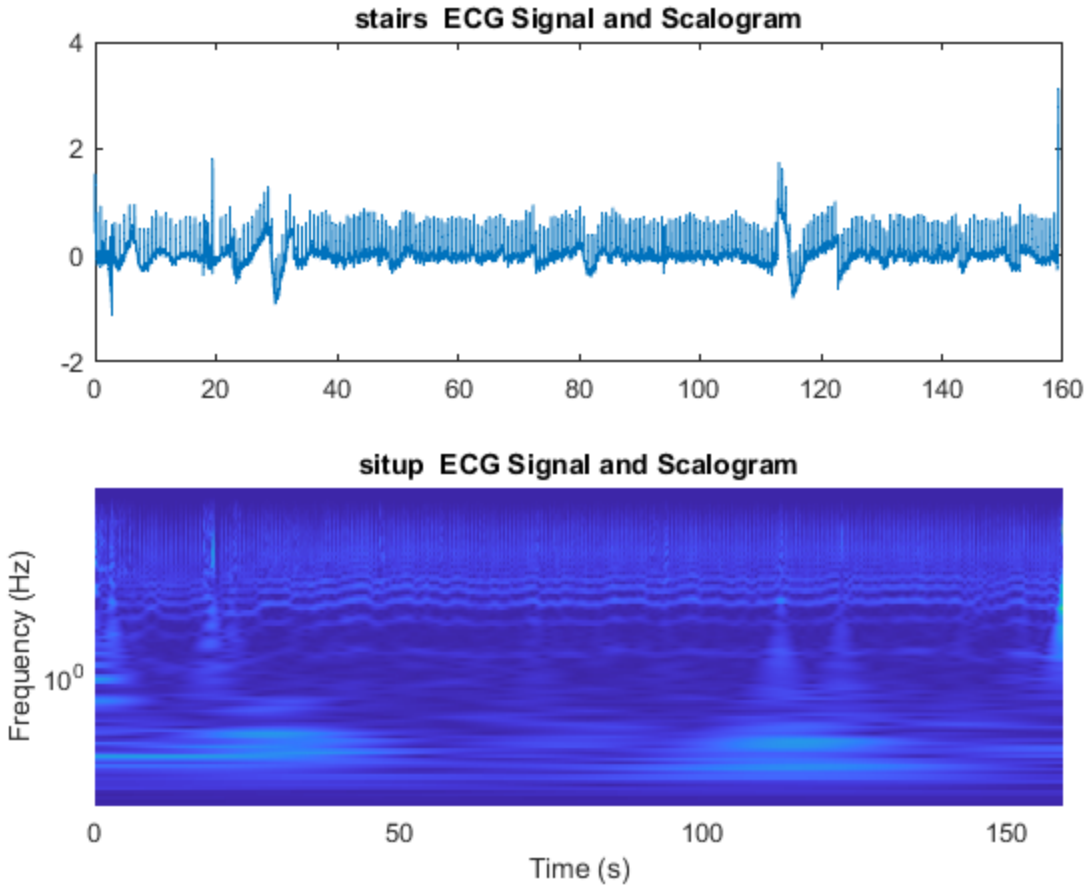

sleeping PPG Signal and Scalogram
Frequency (Hz)
Time (s)

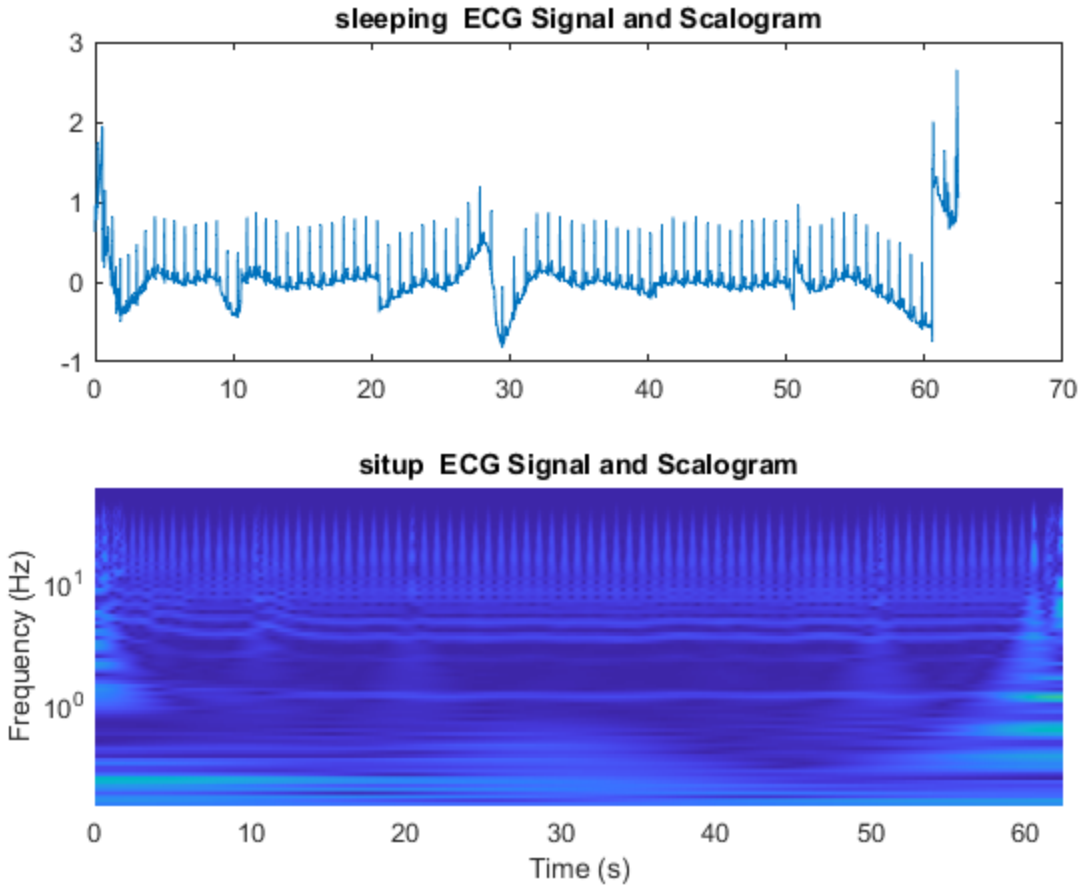

10
5
0
-5
-10
0
50
100
150
situp PPG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)

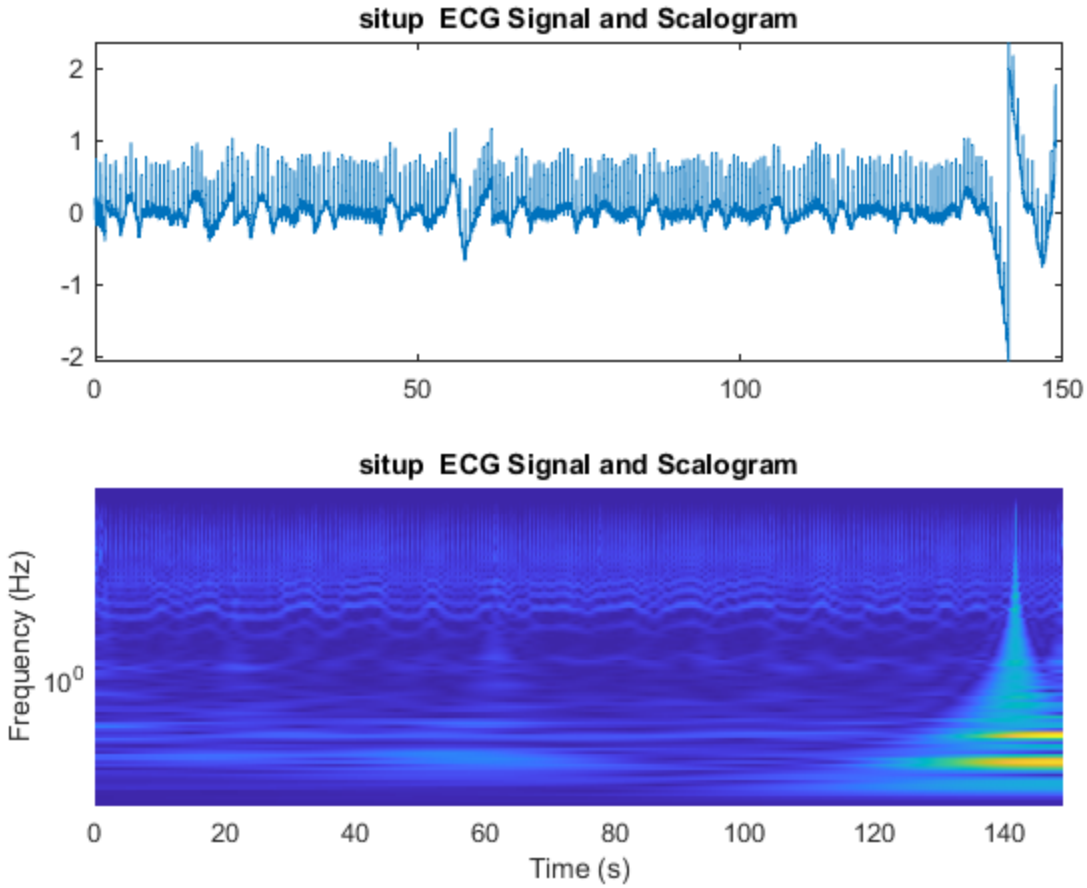
5.4. FREQ_ANA_SCAL




drinking ECG Signal and Scalogram
2
1
0
-1
-2
0
50
100
150
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)


stairs ECG Signal and Scalogram
4
2
0
-2
0
20
40
60
80
100
120
140
160
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
50
100
150
Time (s)


sleeping ECG Signal and Scalogram
3
2
1
0
-1
0
10
20
30
40
50
60
70
situp ECG Signal and Scalogram
Frequency (Hz)
10^1
10^0
0
10
20
30
40
50
60
Time (s)


situp ECG Signal and Scalogram
2
1
0
-1
-2
0
50
100
150
situp ECG Signal and Scalogram
Frequency (Hz)
10^0
0
20
40
60
80
100
120
140
Time (s)