|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MATLAB File Name** | **Sensors Utilized** | **Acc Placement Aclarations** | **Subject’s Position During Measurement** | **Key Findings from Results** |
| **Test1\_Seated**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Headphones) | Plux: Left arm (deltoid)  Mobile Phone: Right shoulder | Sitting in a chair |  |
| **Test2\_Seated**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Mobile Phone+ Headphones) | Plux: Left arm (deltoid)  Mobile Phone: Right shoulder | Sitting in a chair | [Mobile Phone](#Test2_1)  [Bioplux\_Z](#Test2_2) |
| **Test3\_Standup**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Mobile Phone+ Headphones) | Plux: Left arm (deltoid)  Mobile Phone: Right shoulder | Stand up | [Mobile Phone](#Test3_1) |
| **Test4\_Seated**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Mobile Phone+ Headphones) | Plux: Left clavicle  Mobile Phone: Right shoulder | Sitting in a chair | [BioPlux](#Test4_1) |
| **Test5\_Seated**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Mobile Phone+ Headphones) | Plux: Left side of the neck (yugular)  Mobile Phone: Right shoulder | Sitting in a chair | [BioPlux](#Test5_1)  [Mobile Phone](#Test5_2) |
| **Test6\_Seated**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Mobile Phone+ Headphones) | Plux: Sternum  Mobile Phone: Right shoulder | Sitting in a chair | [Mobile Phone](#Test6_1) |
| **Test7\_Seated**  Folder: Plux\_Logger | Plux (ECG + acc)  SensorLogger (acc: Mobile Phone+ Headphones) | Plux: Sternum  Mobile Phone: Right shoulder | Sitting in a chair | [Mobile Phone](#Test7_1)  [BioPlux](#Test7_2) |
| **Bed\_near**  Folder: Bed | SensorLogger (acc: Mobile Phone) | Near my left side of the chest | Lying on the bed |  |
| **Bed\_under**  Folder: Bed | SensorLogger (acc: Mobile Phone) | Under my left side of the chest | Lying on the bed |  |
| **Mattress\_1**  Folder: Bed | SensorLogger (acc: Mobile Phone) | Plux: Sternum  Mobile Phone: Near my left side of the chest | Lying on the mattress | [BioPlux](#Mattress_1)  [Mobile Phone](#Mattress1_2) |
| **Mattress\_2**  Folder: Bed | SensorLogger (acc: Mobile Phone) | Plux: Sternum  Mobile Phone: Near my left side of the chest | Lying on the mattress | [Mobile Phone](#Mattress2_1) |

**POWER SPECTRUM IMPLEMENTATION**

* **Choosing a specific window**

Obtain specific segments of the accelerometer signals (x, y z)

window\_scg\_x=dataArrayPlux(30000:65000, 3);

* **Filtering**

Filter the windows using bpFilt, the filter that is the one configured for the accelerometer signals up in the code (band-pass filter from 1-14Hz, 4th order and the corresponding sample frequency).

scg\_x\_filtered = filtfilt(bpFilt, window\_scg\_x);

* **Module calculation**

Obtain the magnitude of the filtered signals (x, y z).

mod=sqrt(scg\_x\_filtered.^2 + scg\_y\_filtered.^2 + scg\_z\_filtered.^2);

* **Fast Fourier Transform**

Transform the filtered signals and the module to the frequency domain, best visualization of the frequency components of the signal.

fft\_scg\_x = fft(scg\_x\_filtered);

* **Unilateral Spectrum (Real Signal)**

Only compute the positive values of the FFT (floor(L/2)+1). Calculation of the magnitude of the FFT (abs) and normalize it by L, the length of the signal.

L = length(window\_scg\_x);

P1\_x = abs(fft\_scg\_x(1:floor(L/2)+1))/L;

* **Frequency vector associated with the spectral power**

This help to associate the power values back to their respective frequencies.

f\_one\_sided = Fs\*(0:(floor(L/2)))/L;

* **Only work with frequencies that are less 30 Hz**

Index that contains only frequencies that less or equal than 30 Hz (x axes in the graphic)

idx = f\_one\_sided <= 30;

* **Consider the band of 0.8-1.8 Hz, where the SCG/BCG signal should appear**

idx\_band = f\_one\_sided >= 0.8 & f\_one\_sided <= 1.8;

* **Total Spectral Power Calculation**

Calculated by summing the squares of the magnitudes of the FFT calculation, we get the total energy in the signal.

total\_power\_x = sum(P1\_x.^2);

* **Spectral Power in the Band [0.8-1.8 Hz] Calculation**

Summing up the power in just the band using the index that select this correct frequency range.

band\_power\_x = sum(P1\_x(idx\_band).^2);

* **Divide the Band Power with the Total Power (Ratios)**

This help as to visualize and quantify how much of the total spectrum power is concentrated in the band of interest. Show the values in the command window.

ratio\_x = band\_power\_x / total\_power\_x;

* **Plot the Power Spectrum in the frequency of interest (<30 Hz)**

The x axis is represented by f\_one\_sided(idx).

The y axis is represented by P1\_x(idx).

plot(f\_one\_sided(idx), P1\_x(idx));

**Escala de tiempo

Descripción generada automáticamente con confianza bajaEscala de tiempo

Descripción generada automáticamente con confianza baja**



**Imagen que contiene Escala de tiempo

Descripción generada automáticamente**



**Ratio Calculation Mobile Phone:**

Ratio X-axis: 0.47688

Ratio Y-axis: 0.19674

Ratio Z-axis: 0.22438

Ratio of the module: 0.055021

**Ratio Calculation Headphones:**

Ratio X-axis: 0.034749

Ratio Y-axis: 0.034394

Ratio Z-axis: 0.011299

Ratio of the module: 0.0060535

**Ratio Calculation BioPlux:**

Ratio X-axis: 0.092575

Ratio Y-axis: 0.22375

Ratio Z-axis: 0.11846

Ratio of the module: 0.019672

**Interfaz de usuario gráfica, Aplicación

Descripción generada automáticamenteTest 2**

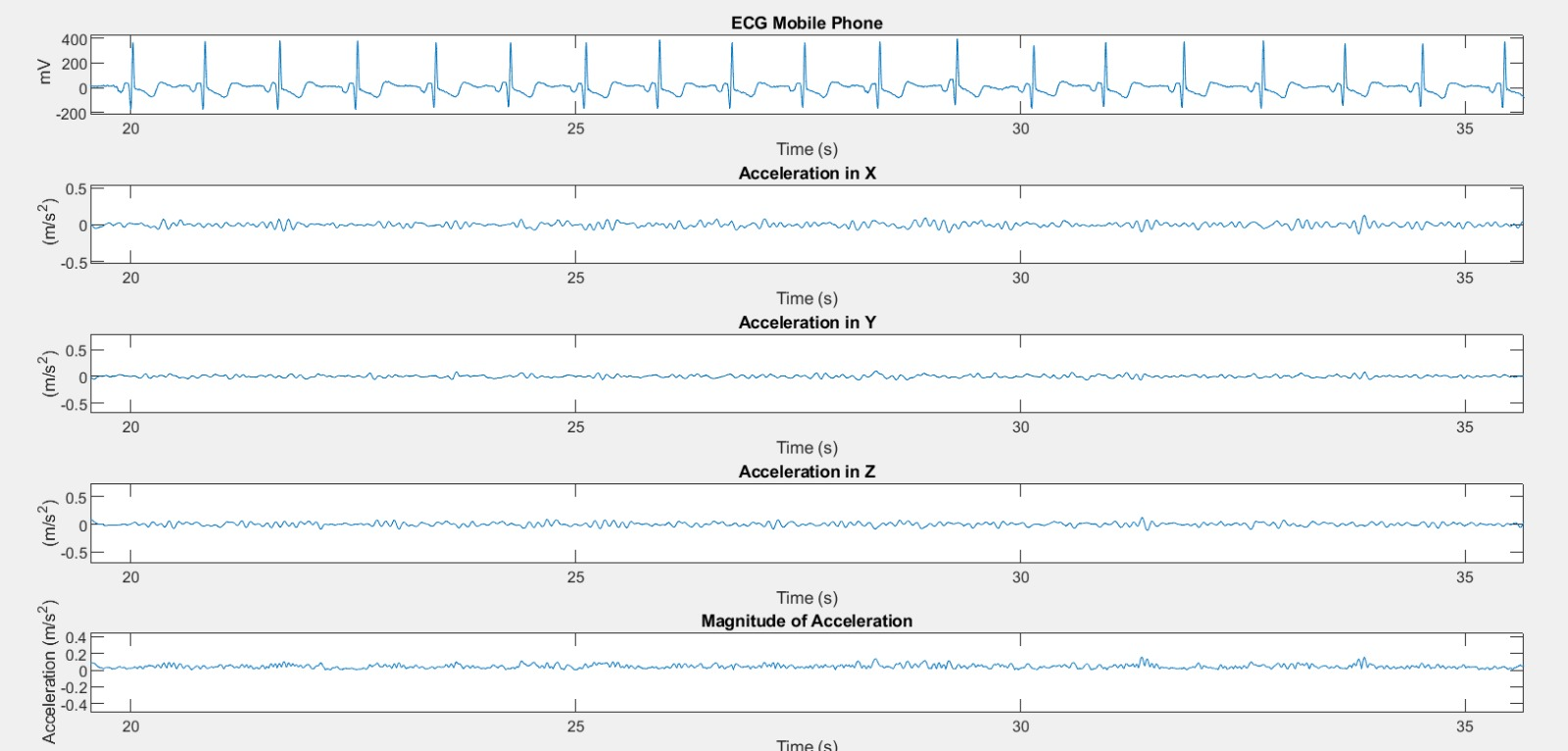
**Imagen que contiene Gráfico

Descripción generada automáticamente**

**Interfaz de usuario gráfica

Descripción generada automáticamente****Interfaz de usuario gráfica, Aplicación

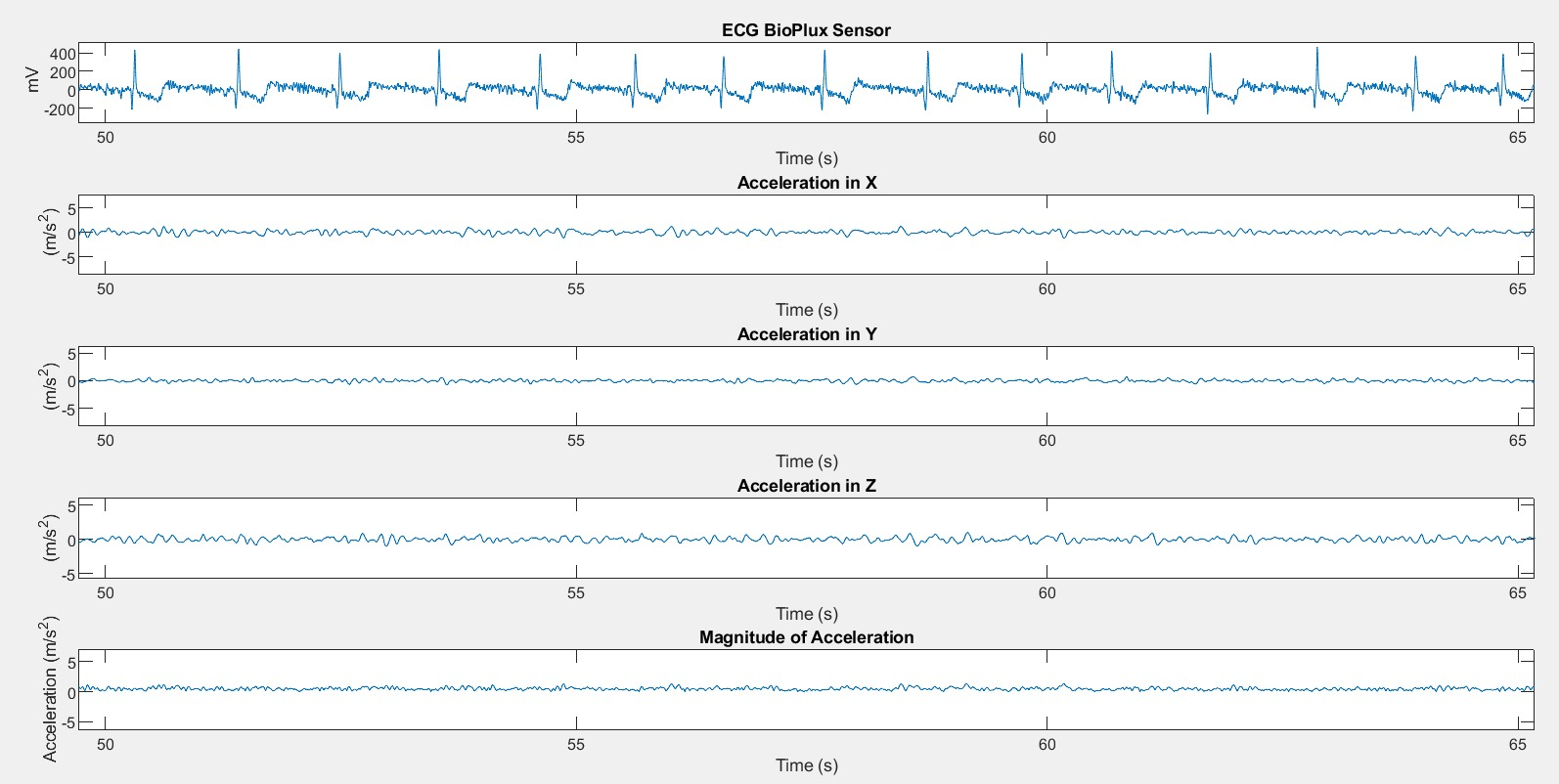
Descripción generada automáticamente**

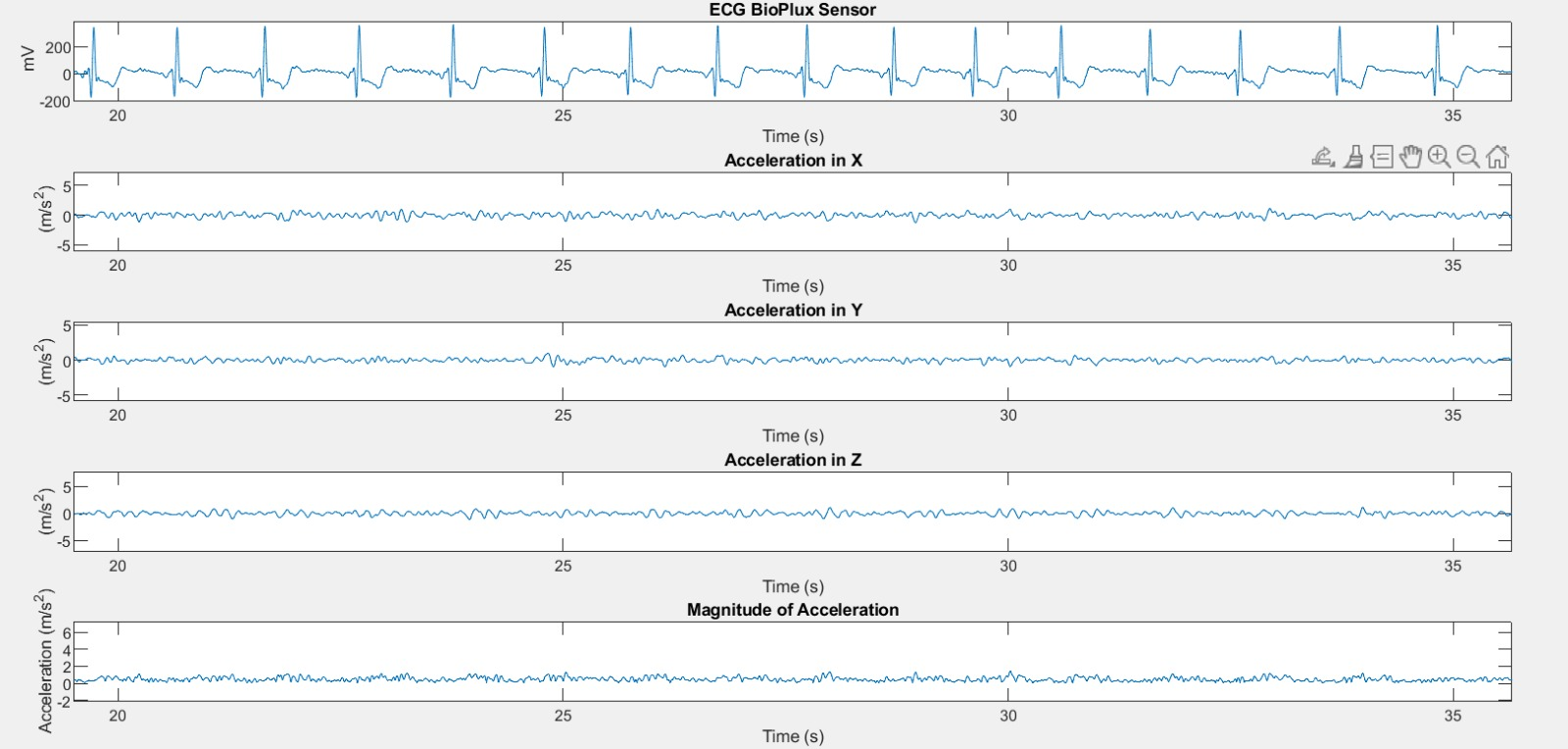
**Test 3**

Interfaz de usuario gráfica

Descripción generada automáticamente con confianza media

**Interfaz de usuario gráfica, Aplicación

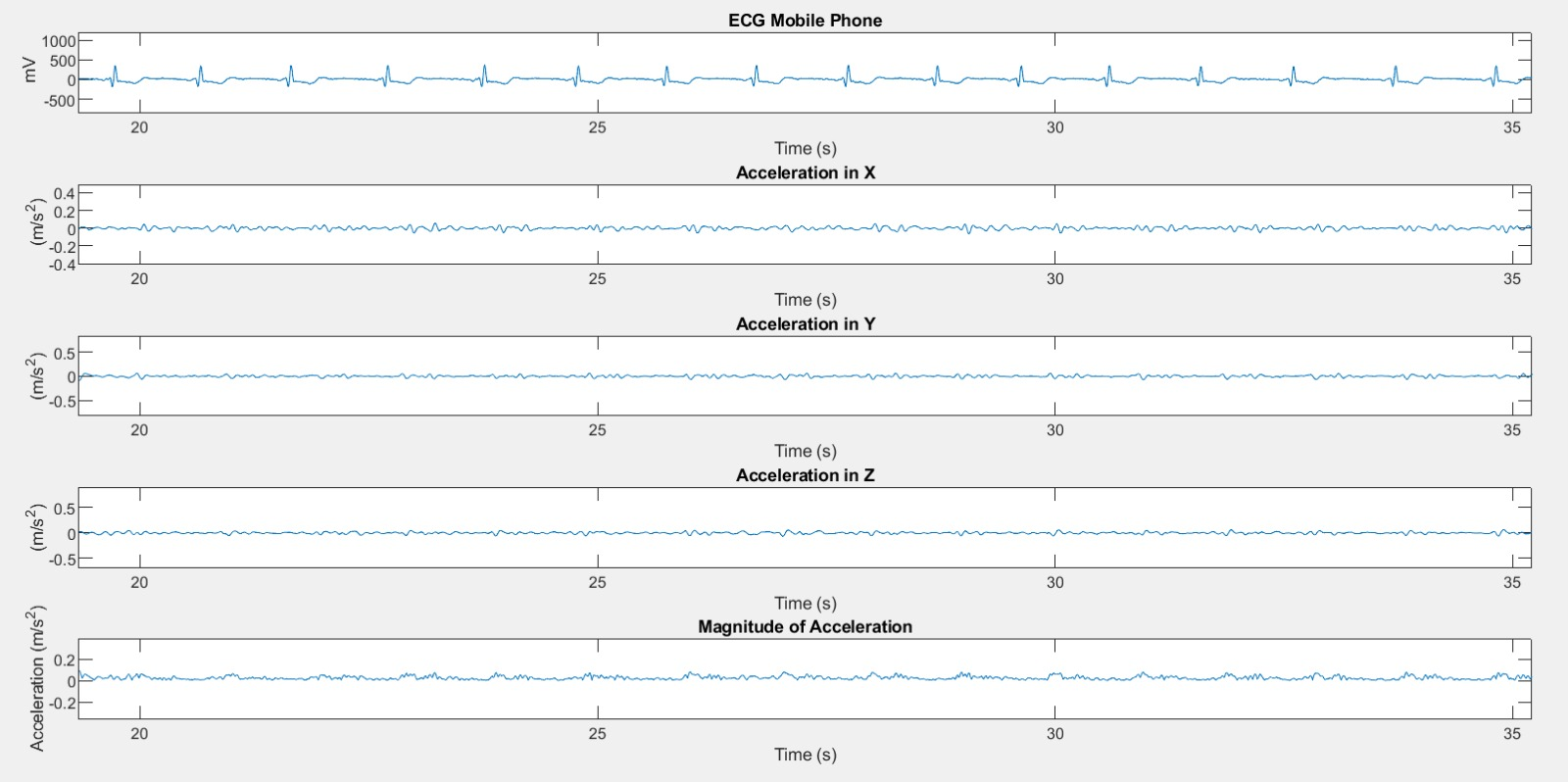
Descripción generada automáticamente****Test 4**

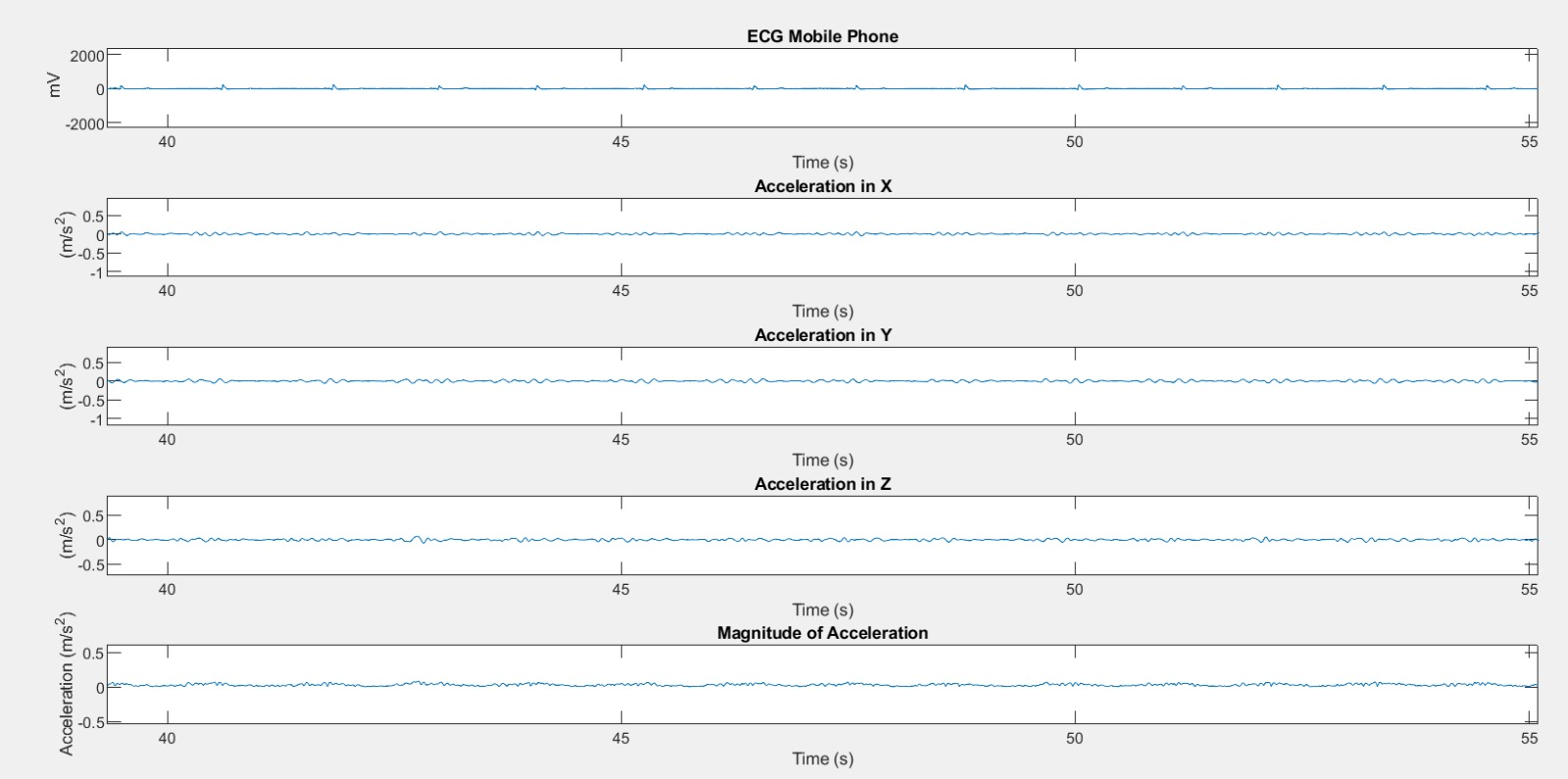
**Test\_5**

**Escala de tiempo

Descripción generada automáticamente**

**Interfaz de usuario gráfica

Descripción generada automáticamente**

**Test\_6******

**Test 7**

**Interfaz de usuario gráfica, Aplicación

Descripción generada automáticamenteImagen que contiene Gráfico

Descripción generada automáticamente**

**Interfaz de usuario gráfica, Aplicación

Descripción generada automáticamente**

**Interfaz de usuario gráfica

Descripción generada automáticamente**

**Calendario

Descripción generada automáticamenteMattress\_1**

**Interfaz de usuario gráfica, Aplicación, Tabla

Descripción generada automáticamente**

**Calendario

Descripción generada automáticamente con confianza bajaMattress\_2**