



## Data Article

# Data acquisition of timed-up and go test with older adults: accelerometer, magnetometer, electrocardiography and electroencephalography sensors' data



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## ABSTRACT

We present a dataset related to the acquisition of different sensors data during the performance of the Timed-Up and Go test with the mobile device positioned in a waist-band for the acquisition of accelerometer and magnetometer data, and a BITalino device positioned in a chest band for the acquisition of Electrocardiography and Electroencephalography for further processing. The data acquired from the BITalino device is acquired simultaneously by a Bluetooth connection with the same mobile application. The data was acquired in five institutions, including Centro Comunitário das Lameiras, Lar Nossa Senhora de Fátima, Centro Comunitário das Minas da Panasqueira, Lar da Misericórdia da Santa Casa da Misericórdia do Fundão, and Lar da Aldeia de Joanes da Santa Casa da Misericórdia do Fundão from Fundão and Covilhã municipalities (Portugal). This article describes the data acquired from a several subjects from the different institutions for the acquisition of accelerometer and magnetometer data, where each person performed the Timed-Up and

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Go test three times, where each output from the sensors was acquired with a sampling rate of 100 Hz. Related to the data acquired by the sensors connected to the BITalino device, 31 persons performed the different experiments related to the Timed-Up and Go Test. Following the data acquired from Electroencephalography and Electrocardiography sensors, only the data acquired from 14 individuals was considered valid. The data acquired by a BITalino device has a sampling rate of 100 Hz. These data can be reused for testing machine learning methods for the evaluation of the performance of the Timed-Up and Go test with older adults.

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## Specifications Table

Subject	Electrical and Electronic Engineering Biomedical Engineering Health
Specific subject area	Timed-Up and Go test Physical therapy Elderly
Type of data	Table; Chart
How data were acquired	Accelerometer and magnetometer data were acquired with an Android application installed in a Smartphone XIAOMI MI 6 in a wristband. Electrocardiography and Electroencephalography were acquired with a BITalino device in a chest band.
Data format	Raw text files
Parameters for data collection	Older adults were instrumented with one waistband with the mobile device, and one chest band for the BITalino device. The participants were also instrumented with the Electrocardiography and Electroencephalography sensors connected to the BITalino device. The equipment is not intrusive, and the older adults were familiarized with the equipment before recording. The experimental procedure was explained before the data acquisition.
Description of data collection	After the instrumentation, the Timed-Up and Go test was performed three times by the participants involved in the study. The accelerometer and magnetometer data during the performance of the Timed-Up and Go test were concurrently collected by the mobile device and stored in text files for further analysis. The sensors of the mobile device have tree axis. Firstly, the accelerometer model embedded in the mobile device is the Bosch BMI160, and the frequencies of data acquisition are 200 Hz/400 Hz for specific forces, and 100 Hz/400 Hz for angular velocities. Secondly, the magnetometer model embedded in the mobile device is the AK09911, and the frequencies of data acquisition are in the range 50 Hz-200 Hz. At the same time, the mobile device is connected by Bluetooth to the BITalino device for the acquisition of Electrocardiography and Electroencephalography sensors' data. The sample rate of 100 Hz was used for the different sensors connected to BITalino device.
Data source location	Primary data sources: Institution: Centro Comunitário das Lameiras City/Town/Region: Silvares Country: Portugal Latitude and longitude for collected samples/data: 40° 8' 31.003" N 7° 40' 13.543" W Institution: Lar Nossa Senhora de Fátima City/Town/Region: Fundão Country: Portugal Latitude and longitude for collected samples/data: 40° 8' 12.827" N 7° 30' 4.3" W Institution: Centro Comunitário das Minas da Panasqueira City/Town/Region: Minas da Panasqueira Country: Portugal Latitude and longitude for collected samples/data: 40° 9' 5.45" N 7° 44' 33.599" W Institution: Lar da Misericórdia da Santa Casa da Misericórdia do Fundão City/Town/Region: Fundão Country: Portugal Latitude and longitude for collected samples/data: 40° 8' 8.893" N 7° 30' 28.702" W Institution: Lar da Aldeia de Joanes da Santa Casa da Misericórdia do Fundão City/Town/Region: Aldeia de Joanes Country: Portugal Latitude and longitude for collected samples/data: 40° 8' 9.179" N 7° 31' 6.825" W
Data accessibility	Repository name: Timed-Up and Go Data retrieved from Centre of Portugal Data identification number: 10.17632/dv8xt3t3b3.3 Direct URL to data: <a href="https://data.mendeley.com/datasets/dv8xt3t3b3/3">https://data.mendeley.com/datasets/dv8xt3t3b3/3</a>
Related research article	V. Ponciano, I.M. Pires, F.R. Ribeiro, M.V. Villasana, R. Crisóstomo, M.C. Teixeira, E. Zdravevski, Mobile Computing Technologies for Health and Mobility Assessment: Research Design and Results of the Timed Up and Go Test in Older Adults, Sensors 2020, 20 (2020), 3481. <a href="https://doi.org/10.3390/s20123481">https://doi.org/10.3390/s20123481</a> V. Ponciano, I.M. Pires, F.R. Ribeiro, N.M. Garcia, M.V. Villasana, P. Lameski, and E. Zdravevski, Machine Learning Techniques with ECG and EEG Data: An Exploratory Study, Computers 2020, 9, 55. <a href="https://doi.org/10.3390/computers9030055">https://doi.org/10.3390/computers9030055</a>

## Value of the Data

- The data provide a set of data acquired during the performance of the Timed-Up and Go test [1–3] with the sensors available in a mobile [4,5] and a BITalino devices [6], including accelerometer, magnetometer, Electroencephalography and Electrocardiography sensors;
- The data is important for the creation of solutions for automatic validation of Timed-Up and Go test, and, as we acquired Electroencephalography and Electrocardiography data, it will allow to the creation of patterns of different diseases [7–10] for further developments;
- The acquired data may be used for the recognition of different stages and activities during the Timed-Up and Go test, as well as the identification of diseases with machine learning techniques [10–12];
- The data are valid for the creation of disease patterns associated with movement, cardiac and brain frequency, and other problems related to walking activity, applying different techniques to reduce the artefacts [13–15].
- It also allows further research with the sensors available in off-the-shelf mobile devices for further creation of Mobile Health solutions [16,17].

## 1. Data Description

The dataset presented in this paper includes relevant information related to the performance of the Timed-Up and Go test. The data were acquired with a smartphone named XIAOMI MI 6, and a BITalino device with the Electrocardiography and Electroencephalography sensors.

The dataset is composed by a repository with two folders, including one named as “accelerometer\_magnetometer” that contains the data acquired by the sensors embedded in the off-the-shelf mobile device, and another folder named “ecg\_eeg” that contains the data acquired by the Electrocardiography and Electroencephalography connected to the BITalino device. These folders contain one folder for each institution of data collection. Next, each folder related to the different institutions includes one folder for each individual. Finally, each folder related to everyone contains folders for each data capture or repetition of the Timed-Up and Go test. The dataset contains a total of 89 files related to accelerometer and magnetometer sensors, and 72 files related to Electrocardiography and Electroencephalography captures. The data acquired from the mobile device are collected in  $m/s^2$ , and the data acquired from the BITalino device is acquired in millivolts.

The files related to the accelerometer sensor includes the following columns:

- First column: Timestamp of each data acquired in milliseconds (ms);
- Second column: Value of the x-axis of the accelerometer ( $m/s^2$ );
- Third column: Value of the y-axis of the accelerometer ( $m/s^2$ );
- Fourth column: Value of the z-axis of the accelerometer ( $m/s^2$ ).

Next, the files related to the magnetometer sensor includes the following columns:

- First column: Timestamp of each data acquired (ms);
- Second column: Value of the x-axis of the magnetometer ( $m/s^2$ );
- Third column: Value of the y-axis of the magnetometer ( $m/s^2$ );
- Fourth column: Value of the z-axis of the magnetometer ( $m/s^2$ ).

Finally, the files acquired from the BITalino device, including the Electroencephalography and Electrocardiography sensors, include the following columns:

- First column: Sequence number from BITalino device related to the frequency of the capture;
- Second column: Values of Electrocardiography sensor (mV);
- Third column: Values of Electroencephalography sensor (mV).

Magnetometer data, presented in Fig. 1, can be used to measure the instants for the changing of the direction. Thus, we studied two options for the detection of the changing of the direction. These are:

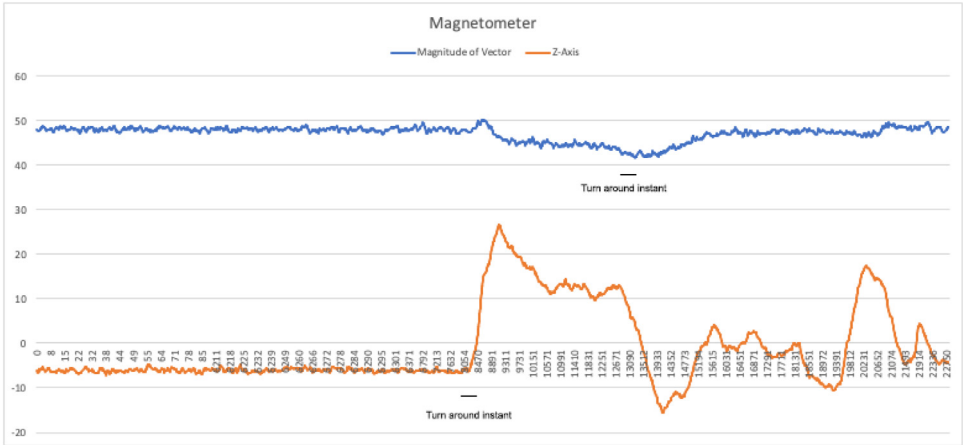


Fig. 1. Example of data acquisition of magnetometer for Timed-Up and Go Test.

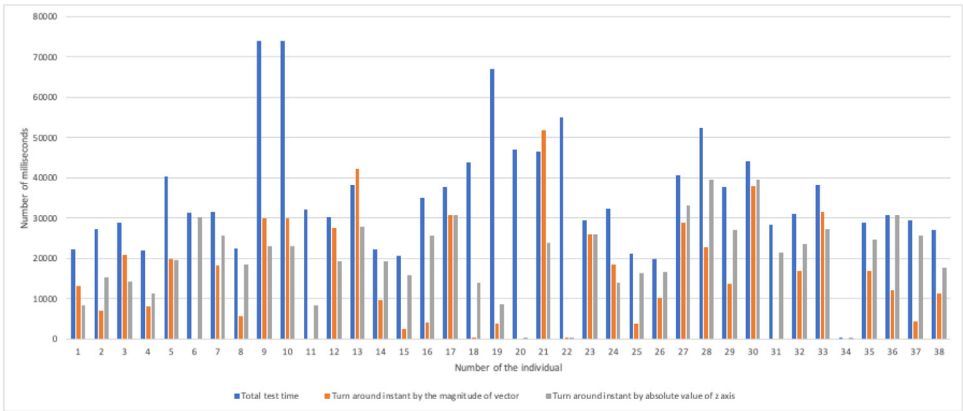


Fig. 2. Average of data acquired by Magnetometer sensor by each person.

- By magnitude of vector: Corresponds to the minimum value of the acceleration of the data captured;
- By value of z axis: Corresponds to the first instant of the change of the signal of value of z axis.

Considering the data acquired from the magnetometer sensor during the performance of the Timed-Up and Go test, Table 1 and Fig. 2 present the dataset that contains data acquired from 31 individuals from the different institutions. The data presented in Table 1 are:

- Total test time (ms) → Total duration of the test in milliseconds;
- Turn around instant by the magnitude of vector (ms) → Number of milliseconds after the start of the data acquisition, where the individual changed the direction of the movement calculated by the magnitude of vector;
- Turn around instant by value of z axis (ms) → Number of milliseconds after the start of the data acquisition, where the individual changed the direction of the movement calculated by absolute value of z axis.

Accelerometer data, presented in Fig. 3, can be used to measure the reaction time, going time, turn around instant, and going time. These are:

**Table 1**

Data collected from the Magnetometer sensor.

#	Institution	Person ID	Total test time (ms)	Turn around instant by the magnitude of vector (ms)	Turn around instant by absolute of z axis (ms)
1	Centro Comunitário Das Lameiras	10	22190	13271	8433
2	Centro Comunitário Das Lameiras	12	27332	6964	15424
3	Centro Comunitário Das Lameiras	3	28937	20776	14157
4	Centro Comunitário Das Lameiras	5	21851	7988	11338
5	Centro Comunitário Das Lameiras	6	40410	19750	19590
6	Centro Comunitário Das Lameiras	8	31495	18123	25683
7	Centro Comunitário Das Lameiras	9	22457	5698	18577
8	Lar da Aldeia de Joanes da Santa Casa da Misericórdia do Fundão	1	74053	30070	23034
9	Centro Comunitário das Minas da Panasqueira	1	74053	30070	23034
10	Centro Comunitário das Minas da Panasqueira	4	30107	27487	19308
11	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	10	38305	42285	27844
12	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	12	22105	9727	19205
13	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	13	20755	2591	15875
14	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	14	34990	3996	25648
15	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	15	37584	30805	30731
16	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	18	66947	3836	8704
17	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	20	46608	51742	23762
18	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	3	29397	26044	25931
19	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	5	32318	18447	13908
20	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	6	21157	3967	16266
21	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	8	19819	10344	16509
22	Lar Nossa Senhora de Fátima	1	40706	28895	33206
23	Lar Nossa Senhora de Fátima	10	52377	22804	39465
24	Lar Nossa Senhora de Fátima	11	37737	13757	27056
25	Lar Nossa Senhora de Fátima	13	44071	38031	39649
26	Lar Nossa Senhora de Fátima	16	30923	16989	23555
27	Lar Nossa Senhora de Fátima	17	38345	31644	27205
28	Lar Nossa Senhora de Fátima	7	28835	16996	24543
29	Lar Nossa Senhora de Fátima	8	30663	12223	30643
30	Lar Nossa Senhora de Fátima	9	29504	4336	25740
31	Lar Nossa Senhora de Fátima	2	26930	11310	17570

- Reaction time: Corresponds to the time where the data is  $9.81 \pm 1 \text{ m/s}^2$ ;
- Turn around instant: Corresponds to the instant where the data is  $9.81 \pm 1 \text{ m/s}^2$ , after the reaction time;
- Going time: Corresponds to the time between the reaction time, and the Turn around instant;
- Return time: Corresponds to the time between the Turn around instant, and the end of the capture.

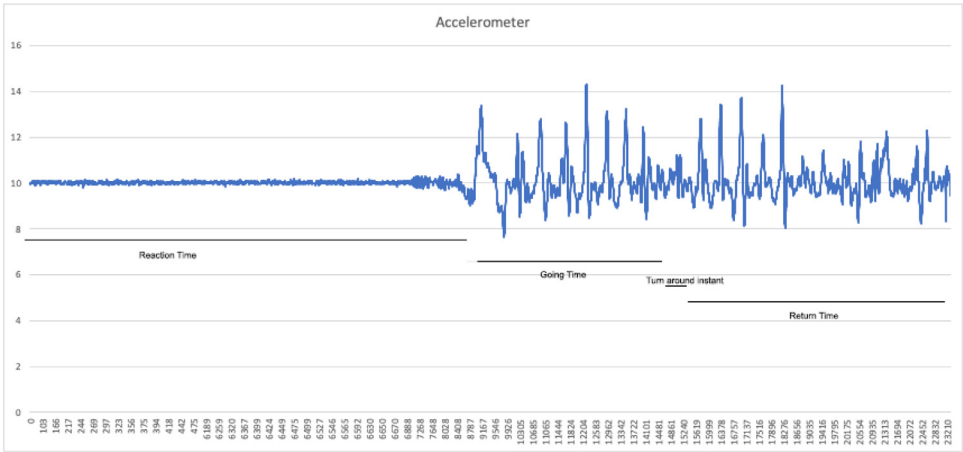


Fig. 3. Example of data acquisition of accelerometer for Timed-Up and Go Test.

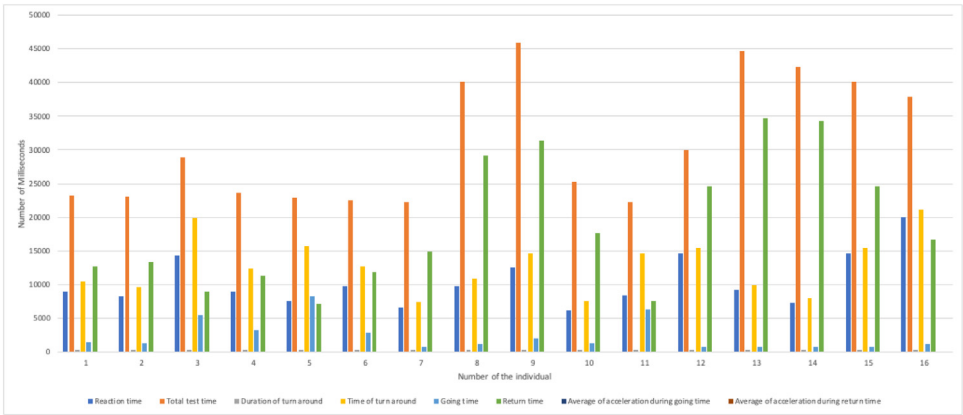


Fig. 4. Average of data acquired by Accelerometer sensor by each person.

Considering the data acquired from the accelerometer sensor during the performance of the Timed-Up and Go test, Table 2, and Fig. 4 present the dataset that contains data acquired from 16 individuals from the different institutions. The values related to acceleration or magnitude of vector were calculated by the Euclidean norm of each vector acquired. The data presented in Table 2 are:

- Total test time (ms) → Total duration of the test in milliseconds;
- Duration of turn around (ms) → Duration of the movement related with the changing of the direction;
- Turn around instant (ms) → Number of milliseconds after the start of the data acquisition, where the individual changed the direction of the movement calculated by the magnitude of vector;
- Going time (ms) → Number of milliseconds elapsed before the changing of the direction;
- Return time (ms) → Number of milliseconds elapsed after the changing of the direction;
- Average of acceleration during going time ( $m/s^2$ ) → Average of the values calculated with the Euclidean norm until the changing of the direction;

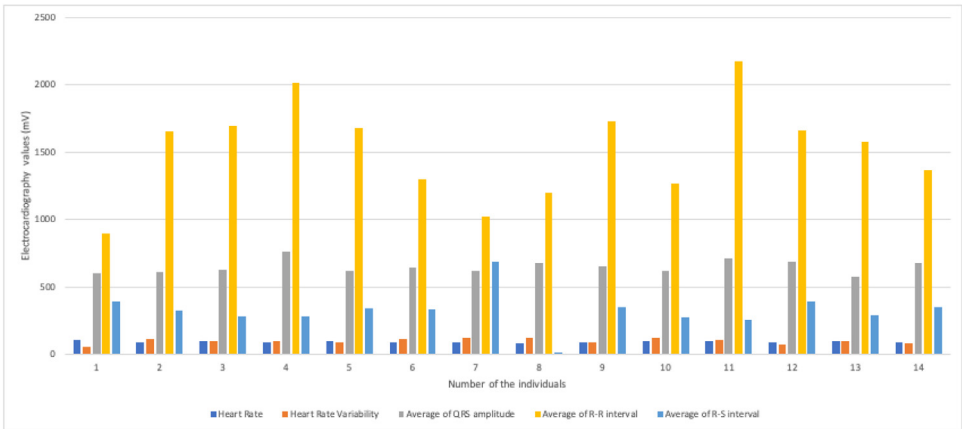
**Table 2**

Data collected from the Accelerometer sensor related to the acceleration.

#	Institution	Person ID	Reaction time (ms)	Total test time (ms)	Duration of turn around (ms)	Turn around Instant (ms)	Going time (ms)	Return time (ms)	Average of acceleration during going time (m/s <sup>2</sup> )	Average of acceleration during return time (m/s <sup>2</sup> )
1	Centro Comunitário Das Lameiras	10	8970	23169	402	10417	1447	12752	10.05	10.09
2	Centro Comunitário Das Lameiras	12	8265	23036	408	9628	1363	13408	9.86	9.89
3	Centro Comunitário Das Lameiras	3	14369	28854	408	19858	5489	8996	9.80	9.85
4	Centro Comunitário Das Lameiras	5	9018	23689	406	12356	3338	11333	9.85	9.92
5	Centro Comunitário Das Lameiras	9	7552	22909	401	15798	8237	7120	10.05	10.05
6	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	12	9728	22590	405	12664	2936	11926	10.05	10.06
7	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	13	6618	22295	401	7407	789	14888	10.05	10.04
8	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	14	9773	40083	408	10949	1176	29134	9.82	9.83
9	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	15	12595	45978	401	14602	2007	31376	10.04	10.01
10	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	6	6203	25254	409	7575	1372	17679	10.04	10.05
11	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	8	8383	22286	401	14668	6285	7618	9.85	9.88
12	Lar Nossa Senhora de Fátima	1	14639	30044	409	15458	819	24586	9.82	9.85
13	Lar Nossa Senhora de Fátima	13	9195	44724	407	9985	790	34739	9.99	10.03
14	Lar Nossa Senhora de Fátima	16	7272	42296	408	8000	728	34296	9.93	10.02
15	Lar Nossa Senhora de Fátima	17	14639	40044	409	15458	819	24586	9.82	9.85
16	Lar Nossa Senhora de Fátima	7	19986	37853	407	21133	1147	16720	10.03	10.05

**Table 3**  
Data collected from the Electrocardiography sensor.

#	Institution	Person ID	Heart Rate (bps)	Heart Rate Variability (%)	Average of QRS interval (ms)	Average of R-R interval (ms)	Average of R-S interval (ms)
1	Centro Comunitário das Lameiras	3	107	58.0	598.5	899	396
2	Centro Comunitário das Minas da Panasqueira	2	86	116.0	614.1	1651	321
3	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	12	99	97.5	627.0	1693	279
4	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	13	86	95.5	762.8	2013	279
5	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	14	100	89.3	617.3	1678	343
6	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	17	86	115.6	642.6	1302	334
7	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	18	94	120.0	619.0	1018	683
8	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	20	84	120.7	675.2	1198	15.77
9	Lar da nossa senhora de Fátima	10	94	87.3	656.4	1725	348
10	Lar da Nossa Senhora de Fátima	15	97	122.0	620.0	1265	277
11	Lar da Nossa Senhora de Fátima	17	97	110.0	713.5	2169	255
12	Lar da nossa senhora de Fátima	5	89	73.0	686.1	1663	390
13	Lar da nossa senhora de Fátima	7	99	97.3	579.6	1574	295
14	Lar da Nossa Senhora de Fátima	9	87	84.0	674.1	1363	351



**Fig. 5.** Average of data acquired by Electrocardiography sensor by each person.

- Average of acceleration during return time ( $m/s^2$ ) → Average of the values calculated with the Euclidean norm after the changing of the direction.

Considering the data acquired from the Electrocardiography sensor during the performance of the Timed-Up and Go test, **Table 3** and **Fig. 5** present the dataset that contains data acquired from 14 individuals from the different institutions.

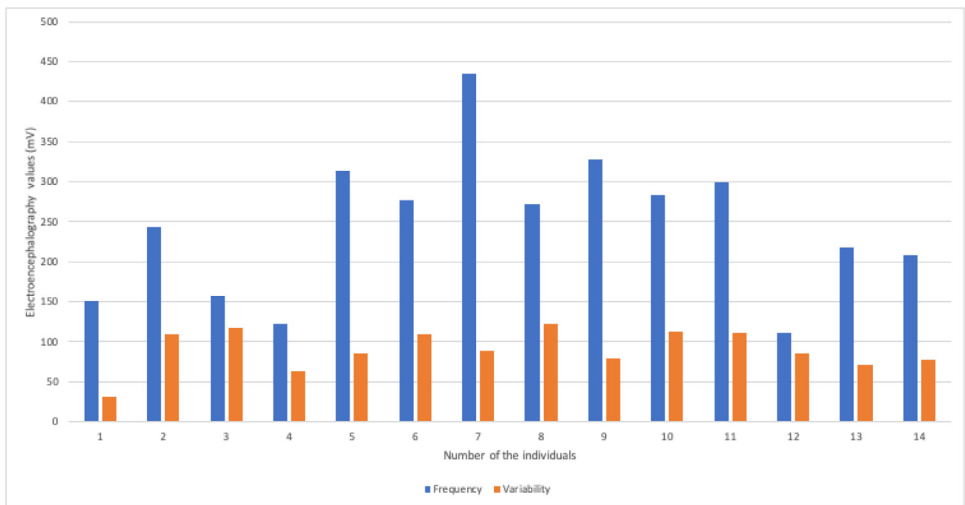
Considering the data acquired from the Electroencephalography sensor during the performance of the Timed-Up and Go test, **Table 4** and **Fig. 6** present the dataset that contains data acquired from 14 individuals from the different institutions.



**Table 4**

Data collected from the Electroencephalography sensor.

#	Institution	Person ID	Frequency	Variability (%)
1	Centro Comunitário das Lameiras	3	151	31
2	Centro Comunitário das Minas da Panasqueira	2	243	110
3	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	12	157	118
4	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	13	122	64
5	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	14	313	85
6	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	17	277	109
7	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	18	434	89
8	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	20	272	122
9	Lar da nossa senhora de Fátima	10	328	79
10	Lar da Nossa Senhora de Fátima	15	284	112
11	Lar da Nossa Senhora de Fátima	17	299	111
12	Lar da nossa senhora de Fátima	5	111	85
13	Lar da nossa senhora de Fátima	7	218	71
14	Lar da Nossa Senhora de Fátima	9	208	77

**Fig. 6.** Average of data acquired by Electroencephalography sensor by each person.

## 2. Experimental Design, Materials and Methods

The Timed-Up and Go test was implemented according an experimental protocol that includes the following steps:

- Several older adults from the different institutions were instrumented with the mobile device, and Electrocardiography and Electroencephalography sensors connected to a BITalino device;
- Each subject performed the Timed-Up and Go test three consecutive times. The test included the following activities:
  - Sit down on the chair;
  - Stand up from the chair;
  - Walk three meters;
  - Turn around;
  - Walk another three meters;
  - Sit down on the chair again.

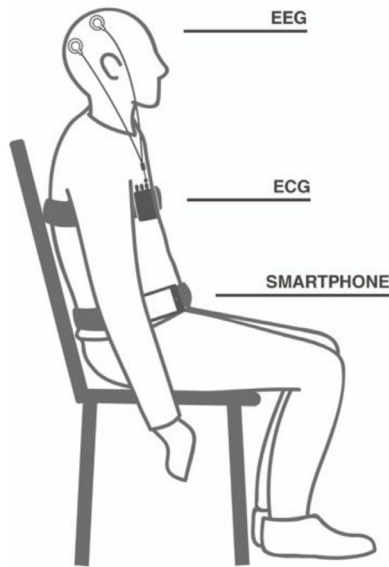


Fig. 7. Sensors placement.

### 3. Participants

A total of 37 individuals with different types of diseases aged between 73 and 92 years old were selected for participation as reported in Table 5. Between them, some experiments were invalidated, and some individuals were not considered as presented in Tables 1 to 4. The different diseases identified in Table 5 were indicated by the responsible persons of the institutionalized older adults. In Lar da Aldeia de Joanes da Santa Casa da Misericórdia do Fundão, Centro Comunitário das Minas da Panasqueira, and Lar da Misericórdia da Santa Casa da Misericórdia do Fundão, the participants used a chair with armrests that helped in the movement for standing up from the chair. The test conditions are also reported in Table 5 because they influence the results of the data acquisition.

- Age =  $84.5625 \pm 6.9093$  years old

### 4. Procedure

The different sensors data were recorded during the voluntary performance of the Timed-Up and Go test by institutionalized individuals with the smartphone on a waistband, and a BITalino device with the Electrocardiography and Electroencephalography sensors attached to the individuals positioned in a chest band.

Initially, the individuals were instrumented as presented in Fig. 7. Then, they performed the test procedure three times.

There is high importance to the results related to the positioning of the sensors. Thus, there are different rules to instrument the different individuals during the experiments. These are:

- Put the smartphone in a waistband in the horizontal orientation;
- Attach the waistband to the individual;
- Put the Electrocardiography and the Electroencephalography sensors on the individuals as presented in Fig. 5;

**Table 5**  
Population of the study.

#	Institution	Person ID	Diseases	Age (years old)	Availability of Armrests	Physical conditions	Mobile network coverage	Presence of physical therapist
1	Centro Comunitário das Lameiras	10	Arthrosis	85	No	Spacious place. Floor with the right conditions.	Available	Yes
2	Centro Comunitário das Lameiras	12	Gastroenteritis	92	No	Spacious place. Floor with the right conditions.	Available	Yes
3	Centro Comunitário das Lameiras	3	Arterial hypertension; Arthrosis	85	No	Spacious place. Floor with the right conditions.	Available	Yes
4	Centro Comunitário das Lameiras	5	Arterial hypertension; Cardiac arrhythmia	92	No	Spacious place. Floor with the right conditions.	Available	Yes
5	Centro Comunitário das Lameiras	6	Arterial hypertension; Cardiac arrhythmia; Diabetes mellitus Type II; Scoliosis	92	No	Spacious place. Floor with the right conditions.	Available	Yes
6	Centro Comunitário das Lameiras	7	Scoliosis	85	No	Spacious place. Floor with the right conditions.	Available	Yes
7	Centro Comunitário das Lameiras	8	Osteoporosis	83	No	Spacious place. Floor with the right conditions.	Available	Yes
8	Centro Comunitário das Lameiras	9	Arthrosis	87	No	Spacious place. Floor with the right conditions.	Available	Yes
9	Lar da Aldeia de Joanes da Santa Casa da Misericórdia do Fundão	1	N/D	N/D	Yes	Floor with the right conditions.	Weak	No
10	Centro Comunitário das Minas da Panasqueira	1	Arterial hypertension	88	Yes	Floor with the right conditions.	No	No
11	Centro Comunitário das Minas da Panasqueira	2	Arterial hypertension; Cardiac arrhythmia; Arteriosclerotic coronary disease; Heart failure	84	Yes	Floor with the right conditions.	No	No
12	Centro Comunitário das Minas da Panasqueira	4	N/D	65	Yes	Floor with the right conditions.	No	No
13	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	3	N/D	91	Yes	Flat ground with a slight slope.	Weak	No
14	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	5	N/D	84	Yes	Flat ground with a slight slope.	Weak	No

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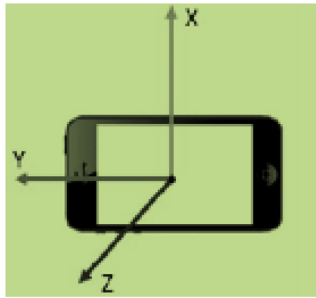
**Table 5** (continued)

#	Institution	Person ID	Diseases	Age (years old)	Availability of Armrests	Physical conditions	Mobile network coverage	Presence of physical therapist
15	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	6	Hernioplasty in 2010; Sarcoidosis	87	Yes	Flat ground with a slight slope.	Weak	No
16	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	8	Chronic obstructive pulmonary disease; Chronic bronchitis; Osteoarthritis	73	Yes	Flat ground with a slight slope.	Weak	No
17	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	10	Cirrhosis; Anemia; Chronic kidney disease; Umbilical hernia; Inguinal hernia	79	Yes	Flat ground with a slight slope.	Weak	No
18	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	12	Right leg amputation; Umbilical hernia; Arterial hypertension	88	Yes	Flat ground with a slight slope.	Weak	No
19	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	13	Prostate Cancer; Parkinson's disease; Post-traumatic stress	76	Yes	Flat ground with a slight slope.	Weak	No
20	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	14	Arterial hypertension; Diabetes mellitus Type II	86	Yes	Flat ground with a slight slope.	Weak	No
21	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	15	Prostate Cancer; Osteoporosis; Chronic Venous Insufficiency of the lower limbs; Chronic bronchitis	92	Yes	Flat ground with a slight slope.	Weak	No
22	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	17	Diabetes mellitus Type II; Arterial hypertension; Depression; Sequelae of surgery to brain injury	83	Yes	Flat ground with a slight slope.	Weak	No
23	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	18	Diabetes mellitus Type II; Vertigo syndrome; Chronic headaches; Osteoarthritis; Prosthesis in the right humeral; Osteoporosis; Arterial hypertension	81	Yes	Flat ground with a slight slope.	Weak	No
24	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	19	Arterial hypertension; Anemia	91	Yes	Flat ground with a slight slope.	Weak	No
25	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	20	Osteoarthritis; Depression; Heart failure; Arterial hypertension; Osteoporosis	89	Yes	Flat ground with a slight slope.	Weak	No
26	Lar da Misericórdia da Santa Casa da Misericórdia do Fundão	1	N/D	N/D	Yes	Flat ground with a slight slope.	Weak	No
27	Lar da Nossa Senhora de Fátima	10	Diabetes mellitus Type II;	86	No	Narrow location. The floor and width of the test site were very tight.	Good	No

(continued on next page)

**Table 5** (continued)

#	Institution	Person ID	Diseases	Age (years old)	Availability of Armrests	Physical conditions	Mobile network coverage	Presence of physical therapist
28	Lar da nossa senhora de Fátima	11	Dementia of vascular etiology; Prostate Cancer; Arterial hypertension; Vertigo syndrome	N/D	No	Narrow location. The floor and width of the test site were very tight.	Good	No
29	Lar da nossa senhora de Fátima	13	Depression; Osteoporosis	83	No	Narrow location. The floor and width of the test site were very tight.	Good	No
30	Lar da Nossa Senhora de Fátima	15	Diabetes mellitus Type II; Osteoarthritis	87	No	Narrow location. The floor and width of the test site were very tight.	Good	No
31	Lar da Nossa Senhora de Fátima	16	Diabetes mellitus Type II; Arterial hypertension; Heart failure; Hyperuricemia; Depression; Bilateral gonarthrosis	N/D	No	Narrow location. The floor and width of the test site were very tight.	Good	No
32	Lar da nossa senhora de Fátima	17	Prostate cancer	88	No	Narrow location. The floor and width of the test site were very tight.	Good	No
33	Lar da Nossa Senhora de Fátima	5	Heart failure; Chronic obstructive pulmonary disease; Bilateral gonarthrosis	97	No	Narrow location. The floor and width of the test site were very tight.	Good	No
34	Lar da nossa senhora de Fátima	7	Diabetes mellitus Type II; Arterial hypertension	71	No	Narrow location. The floor and width of the test site were very tight.	Good	No
35	Lar da nossa senhora de Fátima	8	Arterial hypertension	74	No	Narrow location. The floor and width of the test site were very tight.	Good	No
36	Lar da Nossa Senhora de Fátima	9	Osteoarthritis; Lumbar hernias; Depression; Gastric ulcer	82	No	Narrow location. The floor and width of the test site were very tight.	Good	No
37	Lar da Nossa Senhora de Fátima	2	Heart failure; Arterial hypertension; Pulmonary fibrosis; Hyperuricemia; Anemia; Chronic kidney disease; Cardiac arrhythmia; Acute myocardial infarction; Hypocoagulated	N/D	No	Narrow location. The floor and width of the test site were very tight.	Good	No



**Fig. 8.** Representation of the different axes of the sensors by the position of the smartphone.

- iv) Connect the Electrocardiography and the Electroencephalography sensors to the BITalino device;
- v) Put the BITalino device in a chest band;
- vi) Attach the chest band to the individual;
- vii) Open the mobile application used for data acquisition;
- viii) Connect the BITalino device to the mobile application;
- ix) Start the data acquisition, and the individual performs the test;
- x) After the performance of the test, stop the data acquisition.

The signals are collected and stored in text readable files for further analysis. As the smartphone is in the horizontal orientation, the different axes of the sensors are represented in [Fig. 8](#).

## Ethics Statement

The participants signed an ethical agreement to allow us to share the results of the tests in an anonymous form. The agreement also provided the participants' informed consent considering the risks and the objective of the study. Ethics Committee from Escola Superior de Saúde Dr. Lopes Dias at Polytechnic Institute of Castelo Branco approved the study with the number 114/CE-ESALD/2019.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ideas by sharing them with their peers. It boosts their research, career, and innovation. More information in [www.cost.eu](http://www.cost.eu).

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.dib.2020.106306](https://doi.org/10.1016/j.dib.2020.106306).

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