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Data Article

UMATUG: A dataset of inertial signals of older and young adults using a gerontologic simulator collected during instrumented Timed Up and Go (iTUG) tests

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ABSTRACT

Timed Up and Go (TUG) test is one of the most popular clinical tools aimed at the assessment of functional mobility and fall risk in older adults. The automation of the analysis of TUG movements is of great medical interest not only to speed up the test but also to maximize the information inferred from the subjects under study. In this context, this article describes a dataset collected from a cohort of 69 experimental subjects (including 30 adults over 60 years), during the execution of several repetitions of the TUG test. In particular, the dataset includes the measurements gathered with four wearables devices embedding four sensors (accelerometer, gyroscope magnetometer and barometer) located on four body locations (waist, wrist, ankle and chest). As a particularity, the dataset also includes the same measurements recorded when the young subjects repeat the test while wearing a commercial geriatric simulator, consisting of a set of weighted vests and other elements intended to replicate the limitations caused by aging. Thus, the generated dataset also enables the investigation into the

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potential of such tools to emulate the actual dynamics of older individuals.

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Specifications Table

Subject	Health and Medical sciences, Geriatrics and Gerontology
Specific subject area	Human activity recognition based on inertial sensors, identification of basic activities and subject characteristics through wearables.
Type of data	Table Raw text files (comma-separated values format)
Data collection	Data acquisition was performed using four Shimmer3 units (one Ebio and three IMU models), which incorporate an accelerometer, a magnetometer, a gyroscope and a barometer. During each execution of the TUG (Timed Up and Go) test, the four devices were attached to different locations on the participant's body (center of the chest, dominant wrist, as well as waist and ankle of the dominant side) and secured with an elastic strap. Before any recording, all the units were time synchronized using a specific programming platform (Consensys Base6) provided by the vendor. For all the tests, the raw data measured by the sensors were stored locally in the internal 8 GB SD memory of each device, and then retrieved in an offline way to a PC using the same platform and the corresponding software (consensysBasic v1.6.0). Each subject was instructed to perform the TUG test five times. Between two consecutive trials, the subject remained seated and motionless in the chair for at least five seconds (before starting the next repetition). Raw files generated by the sensors and containing at least five valid tests of each participant were post-processed so that, in the final dataset, all the measurements corresponding to the same execution of the test and the same sensing unit were included in a single file (different from those corresponding to the other trials and/or the other sensing nodes). Young volunteers (under 40) and some participants aged between 40 and 60 repeated the test other five extra times but now transporting a geriatric simulator. Although all the tests were filmed, video-clips are not are not publicly available due to privacy reasons. The videos were used to track the process and discard those tests with spurious or unexpected movements of the subjects. Just two video clips are released to illustrate the testbed and the tests with and without the geriatric simulator.
Data source location	The tests were accomplished in two main locations: 1) A research lab in the Telecommunication Engineering School of Málaga University, in Malaga (Spain, mean elevation above mean sea level: 19 m/62 feet). 2) A set of domestic environments (participants' homes) located in the city of Portoviejo (Ecuador, mean elevation above mean sea level: 53 m/170 feet).
Data accessibility	All the raw data are available in a public Mendeley repository: Repository name: UMATUG Data identification number: 10.17632/8z96ds3jsp.1 Direct URL to data: https://data.mendeley.com/datasets/8z96ds3jsp/1 **Instructions for accessing these data**: Traces can be anonymously and directly downloaded from the previous link.

1. Value of the Data

- The dataset provides a detailed and extensive collection of inertial measurements captured during the execution of Timed Up and Go (TUG) mobility tests. For its creation, four wearable units were simultaneously employed on four different body locations. Each unit provides measurements of four signals (accelerometry, magnetometry, angular velocity, and barometry) collected at a high frequency (100 Hz).

- The dataset can be utilized to characterize the dynamics of TUG operation as well as to benchmark systems aimed at automating the computation of the duration of the TUG movement or the segmentation and identification of the different phases of the test (stand up, walk forward, turn around, walk back and sit down).
- The dataset contains measurements from 69 experimental subjects (including 30 older adults -over 60-, a number which is higher than those contemplated in other similar datasets).
- The dataset contains not only data from older adults (the main target of TUG test) but also from young adults, which enables population studies based on age.
- As a particular contribution of this dataset, young participants (under 40) also performed the TUG and were monitored while wearing a gerontologic simulator. Thus, the traces samples captured under this procedure allow for assessing the impact of these simulators on users' mobility, through comparisons with the signals captured from older adults.

2. Background

Timed Up and Go (TUG) is a popular mobility test used to quantify basic mobility skills in frail older people. During the execution of the test, the subject under study must successively stand up from a chair, walk a distance of three meters, turn around and return to sit on the same chair at a comfortable and safe pace [1]. Scores obtained during this test (in particular the total duration of the TUG operation) are considered good indicators of the subject's balance or fall risk. Thus, for example, the time needed to complete the test is a predictor of the probability of being a frequent 'faller', with a cut-off time separating non-fallers and fallers typically ranging from 10 to 32 s [2].

The clinical estimation of this timing has traditionally been carried out manually. To automate this measurement and perform other analyses based on segmenting the test into its different component movements, various algorithms [3,4] have been proposed, many of which require characterizing the subject's mobility using the data collected with transportable inertial sensors.

Within this framework, different datasets containing inertial sensor information collected during the execution of Timed Up and Go activities have been documented in the literature. In the repository described by Ponciano et al. in [3], accelerometer and magnetometer signals (sampled at 100 Hz) were recorded with a smartphone placed on a waistband. 37 volunteers aged between 65 and 97 years were involved in the experiments by performing three test trials. Additionally, a BITalino device was used to collect EEG and ECG signals, with sensors placed on the participant's chest.

The dataset presented by Jutharee et al. in [4] includes the inertial signals (accelerometer and gyroscope) gathered from 34 participants during the TUG test using a portable sensing unit, specifically designed for this purpose. During the experiments, data were stored in a local SD card module in the unit with a sampling frequency of 20 Hz. The participants ranged in age from 60 to 69 years.

Matey-Sanz et al. recruited 23 volunteers to generate a similar dataset [5], consisting of the accelerometer and gyroscope signals sampled at 100 Hz from both a smartphone and a smartwatch respectively placed in the left pocket and on the left wrist. Participants' ages varied from 23 to 66 years, although only two subjects were over 60.

Nadeem et al. employed in [6] a Shimmer monitoring unit (attached to the waist) to record the accelerometer, gyroscope and ECG signals (sampled at 51 Hz) during the accomplishment of TUG tests. The experimental cohort included a noteworthy number of subjects (114), aged from 17 to 79 years, but only 8 participants were over 60.

Another dataset comprising inertial signals captured in TUG tests was presented in [7]. The study is based on 65 subjects, aged 19 to 73 years, but with just 15 volunteers over 60. The database includes lower body motion capture, ground reaction force (GRF), surface electromyography (SEMG), and inertial measurement unit (IMU) data (accelerometer and gyroscope) sampled at 148 Hz.

In comparison to most existing datasets, the one presented in this article includes a greater number of subjects, including a noteworthy representation of older individuals (i.e. those above 60, as it is defined by the WHO [8]). It also encompasses measurements from new sensors (magnetometer and barometer) not previously considered in most repositories. Additionally, as a particularly novel contribution, the dataset also incorporates measurements taken when young volunteers (i.e., under 40 years old) repeat the tests while wearing a geriatric simulator.

3. Data Description

The dataset described in this article and the associated files are stored in a repository on Mendeley [9]. As it is sketched in Fig. 1, the dataset is organized in two main subdirectories. The first one (*DATA*) consists of 69 different subfolders containing all movement traces collected from a particular participant. The numerical identifier of the corresponding participant is indicated in the name of the subfolder (*SUBJECT_XX*, with *XX* ranging from 01 to 69). In each subfolder, all the measurements generated by a Shimmer Unit during an execution of the TUG test are included in a unique CSV (Comma Separated Value) file whose name follows the format:
subject_XX_GERT/NOGERT_TUG_trial_YY_WAIST/WRIST/ANKLE/CHEST.csv where:

- *XX* is the participant's identifier.
- The field *GERT/NOGERT* indicates whether the participant was wearing the geriatric simulator during the test (value *GERT*) or not (value *NOGERT*).
- *YY* is a numerical value that identifies the number of repetition or attempt of the test.
- The field *WAIST/WRIST/ANKLE/CHEST* informs about the position where the sensor was located during the measurement process.

In these trace files, each line consists of all the measurements taken at a particular instant by the unit from all the four embedded sensors: the triaxial inertial sensors (accelerometer, gyroscope and magnetometer) and the barometer. The measurements in each line, which are separated by commas, are organized in columns as indicated in Table 1. In any case, each file contains a header informing about the structure and meaning of the data.

The second subfolder of the root or parent directory of the repository, named VIDEOS, simply includes two video clips (in MPEG4 format) in which one of the dataset authors completes two

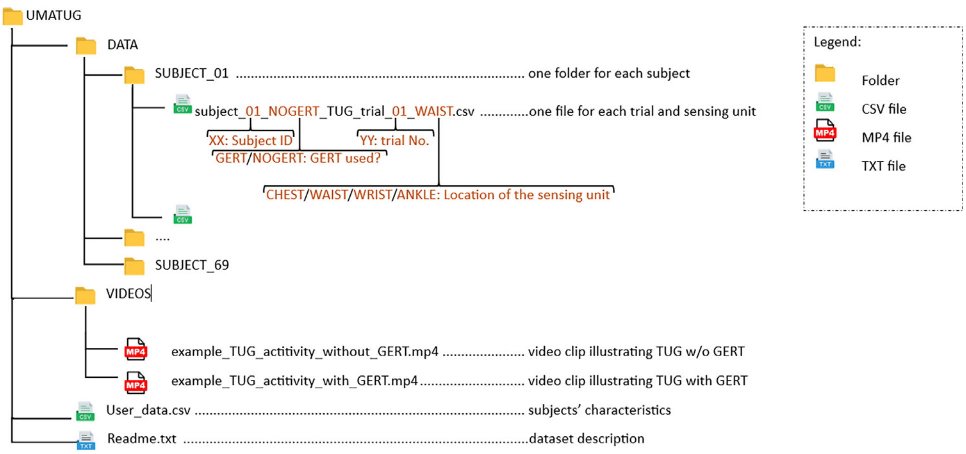

Fig. 1. Structure of the repository.

Table 1
Organization of the data in the measurement files.

Column No.	Column's name	Columns description	Data type unit
1	*Time (ms)*	Timestamp of the data in Unix epoch time (POSIX time) in ms: time elapsed since 00:00:00 Coordinated Universal Time (UTC) on January 1, 1970.	milliseconds (ms)
2	*ACC_X(m/(s^2))*	Value of the *x*-axis of the accelerometer	m/s^2
3	*ACC_Y(m/(s^2))*	Value of the *y*-axis of the accelerometer	m/s^2
4	*ACC_Z(m/(s^2))*	Value of the *z*-axis of the accelerometer	m/s^2
5	*GYRO_X(deg/s)*	Value of the x-axis of the gyroscope	°/s
6	*GYRO_Y(deg/s)*	Value of the *y*-axis of the gyroscope	°/s
7	*GYRO_Z(deg/s)*	Value of the *z*-axis of the gyroscope	°/s
8	*MAG_X*(µT)	Value of the *x*-axis of the magnetometer	microtesla (µT)
9	MAG_Y(µT)	Value of the *y*-axis of the magnetometer	microtesla (µT)
10	MAG_Z(µT)	Value of the *z*-axis of the magnetometer	microtesla (µT)
11	PRESS(kPa)	Value of pressure	kilopascals (kPa)

Table 2
Description of the contents in *User_data.csv* file.

Num	Column	Encoded values
1	Subject identifier	Numerical value from 01 to 69
2	Gender	(0: female, 1: male, 2: undefined)
3	Age	Age in years
4	Height	Height in cm
5	Weight	Weight in kg
6	Handedness	(0: left handed, 1: right handed, 2: undefined)

test runs (with and without the geriatric simulator) to illustrate the testbed and the monitoring procedure.

In addition, the root folder contains two extra files:

- *Readme.txt*: a file in plain text providing the basic information of the structure and contents of the dataset.
- *User_data.csv*: A CSV-formatted file in which each row describes the personal characteristics of each experimental subject. Thus, each row (as also represented in Table 2) informs about the numerical identifier, gender, age, height, weight and handedness of the corresponding participant.

Graphs in Fig. 2 depict an example of the evolution of the data gathered from all the sensors and from all the four body locations for a particular TUG test.

4. Experimental Design, Materials and Methods

4.1. Description of the testbed: sensing units

Shimmer [10] is a general-purpose platform of wireless sensors conceived for the development and evaluation of systems based on wearables. Shimmer provides different programmable sensing units and development kits aimed at tracking inertial signals and different biosignals. To generate this dataset, we used three Shimmer3 IMU units [11] and one Shimmer3 Ebio module [12]. Both models have common characteristics such as Bluetooth communications (not employed for this study), an integrated Li-ion battery and local storage via an 8GB microSD card. The dimensions (51 mm × 34 mm × 14 mm for IMU model and 65 mm × 32 mm × 12 mm for Ebio unit) and weight (23.6 gr for IMU and 31.0 gr for the Ebio) are very similar to those

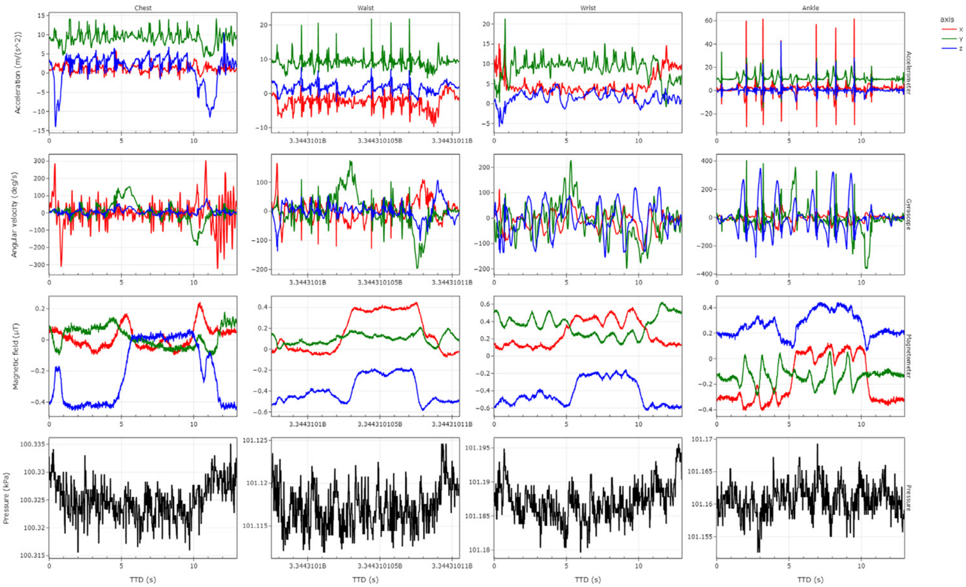

Fig. 2. Measurements collected from the four sensors (rows) and from the four body locations of the sensing units (columns) for a particular execution of the TUG test (first trial of the subject 01 without geriatric simulator).

of a standard smartwatch. Each device embeds two accelerometers (for ultra-low noise or wide range measurements), a gyroscope, a magnetometer and a barometer. In our experiments, only the wide range accelerometer was utilized. To fully capture the most rapid hand movements without limitations, the configurable range was set to its maximum value ±16 g. The ranges of the gyroscope and the magnetometer were fixed to ±2000° per second and ±4900 µT, respectively. All these inertial sensors have a 16-bit resolution.

For all the measurements, a sampling rate of 100 Hz was selected. This frequency is considered to be high enough to properly capture and represent human body mobility [13]. In this regard, in spite of this high rate, no sample losses were detected in the resulting files.

Each device is equipped with a specific press button which was utilized for starting and stopping the recording process. During the TUG tests, the modules stored in their internal SD cards the measurements of the four embedded sensors along with a locally generated timestamp. In order to ensure a common time reference, before any experiment, all devices were synchronized through a specific dock station provided by the manufacturer (Consensys Base6). Once the movement tracking is completed, the trace files were extracted from the sensing units through this dock station, which is connected to a computer and also used to charge the units.

For all the TUG tests, the four sensing units were fitted with elastic straps to four locations on the subject's body: the chest (at the level of the center of the sternum), the wrist (on the dorsal region of the dominant wrist), the waist (inguinal region on the same side as the dominant hand) and over the lateral malleolus of the right or left ankle (also depending on the subject's handedness). Fig. 3 illustrates the position of the four sensing units for a right-handed subject and indicates the direction of the axes for the tri-axial sensors.

4.2. Description of the testbed: gerontologic simulator (GERT)

The GERonTologic simulator (GERT) [14] is an age simulation suit primarily designed to help younger individuals to understand and empathize with the constraints associated with aging.

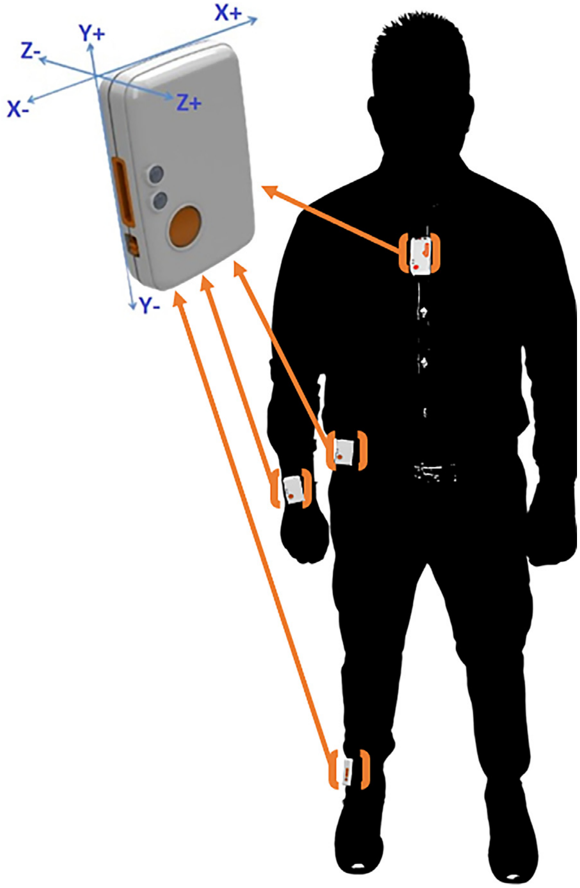

Fig. 3. Locations on the subject's body where the Shimmer sensing devices were placed (for a right-handed subject).

The main objective of this suit is to replicate a range of age-related impairments, including those that heavily impact on body mobility and psychomotor coordination, such as joint stiffness, decreased muscle strength and grip capability, diminishment of the visual field or head motion restrictions.

The GERT employed for our dataset comprises a set of 11 matched components (see Fig. 4), including special goggles, a cervical collar, a 10 kg weight vest, elbow and knee wraps, wrist and ankle weight cuffs (each weighing 1.5 kg and 2.3 kg, respectively), as well as a pair of gloves and overshoes (in different sizes). For our data collection, ear defenders and disposable ear plugs, also included in the set, were not utilized, as they are not particularly relevant to the movements of the TUG test and could hamper communication with the participants to give instructions for initiating or stopping the movements.

The special goggles induce several effects on the wearer, including altered color perception, grainy blurring, increased sensitivity to glare, and a reduction in the width of the visual field. The cervical collar imposes limitations on head mobility, constraining the wearer's ability to turn and tilt their head freely. The weight vest exerts various impacts on the body, such as curving the spine, tilting the pelvis, weakening posture, restricting mobility, diminishing strength, intensifying physical exertion, and impairing balance. Elbow wraps restrict joint mobility, limiting the range of motion in the wearer's elbows. Similarly, weight cuffs contribute to lessen strength

Fig. 4. Participant with the four sensing units attached to the measuring points on his body. Left image: without GERT simulator, right image: wearing the GERT simulator.

and coordination. Special gloves hinder hand mobility, grip strength, and tactile perception. Knee wraps affect joint movement, impeding the wearer's ability to bend their knees freely. Likewise, weight cuffs diminish strength, alter coordination, and result in an unsteady, shuffling gait when worn.

In the study, there were three pairs of special gloves and two pairs of overshoes in two different sizes available. Thus, not all participants used the same gloves and overshoes, as they were selected based on each subject's shoe size. In the case of the goggles, they were not worn by six young participants (with identifiers 11, 22, 60, 64, 67 and 69) since they reported that its use caused them mild dizziness affecting their visual perception.

Fig. 4 (right) shows an image of a volunteer wearing the whole gerontological simulator, with the four sensing units placed on their body. Fig. 4 (on the left) shows the same experimental subject when not carrying the simulator.

4.3. Description of the experimental subjects

For the experiments, 69 participants were recruited through direct person-to-person contact. Participant eligibility was based on both age and health conditions. In the case of volunteers over 60 years old, special efforts were made to guarantee that all age groups (up to 92 years) were represented. As for the selection of young participants, particular attention was paid to guarantee that they did not have any motor impairments or medical issues that would prevent them from performing the tests with the gerontologic simulator normally and without any disabling discomfort. In this regard, all the tests with the GERT equipment were executed by young researchers, Ph.D. and undergraduate students in a laboratory in the Telecommunication

Engineering School of Málaga University. Conversely, all the tests involving older adults (except two) were performed in domestic environments (participants' homes) located in the city of Portoviejo (Ecuador). This ensured that older adults could perform the test in a more natural (less intimidating) environment. All the enrolled volunteers were informed about the purpose of the research and the eligibility criteria and signed the corresponding consent form.

No specific guidelines about attire were provided. Thus, fur completing the movements, all the subjects wore clothes and shoes of their own choice. Nonetheless, they were required to remove any extra object that they carried with them, such as wallets, caps, keys, cell phones, or smart watches (to avoid any conflict with the Shimmer devices or with the elements of the age simulator). All participants were monitored for at least five repetitions of the TUG test. In the case of adults under 40 years old (24 out of 26), the test was repeated another five times but now while wearing the geriatric simulator. Five extra subjects with ages ranging from 40 to 57 accepted iterating the tests with the simulator. After the experiments were conducted, none of the volunteer who underwent the experiments transporting the simulator reported any particular pain or discomfort that hindered them from accomplishing the activity. All tests were filmed to subsequently detect by visual inspection possible anomalies or errors that would require discarding the corresponding sample. The total number of tests (with and without GERT) considered to be valid after this screening for each participant are indicated in Table 3. The table also lists the individual characteristics (gender, age, height, weight, handedness) of each subject, while Table 4 summarizes the basic aggregated statistics (mean and standard deviation) of these characteristics for both population groups (older adults and those under 60 years old).

None of the volunteers mentioned requiring any type of mobility aid (cane, walker, walking frames, etc.) in their daily life. Thus, these elements were not used to perform the tests. Nevertheless, Table 3 also informs about the existing medical issues that might affect motor skills and that were reported by some subjects.

5. Experimental Procedure

Before any experiment, the test supervisor performed one TUG test in front of each participant to show how it should be carried out. Then, before any recording, each subject was instructed to execute (at least) one initial trial. During this trial, the supervisor provided guidance on aspects such as avoiding leaning on the knees when rising, maintaining a steady and natural pace while walking (neither too slow nor too fast), executing smooth turns without abrupt movements, and minimizing spurious or involuntary movements (such as waving hands) before and after the test (while seated).

The protocol for recording the TUG tests continued as it follows:

1. The supervisor attaches the four devices on the subject's body.
2. While the participant is seated, the supervisor initiates the recording on each unit (firstly on that placed on the ankle, and successively those located on waist, chest, and wrist).
3. The volunteer executes the TUG test, following the five typical movements or phases depicted in Fig. 5: stand up, walk three meters in a straight line, turn, walk the same distance in the opposite direction and turn/sit down again.
4. After each iteration of the test, the subject had to wait seated approximately 5 s, before starting the next trail upon receiving a verbal instruction from the supervisor. For older adults, this waiting time was longer to ensure better recovery of the effort exerted during the previous activity.
5. After completing at least five trials considered valid by the supervisor, the recording was stopped in the four sensing units.

During the execution of the tests, video recording was conducted, and the supervisor had a control form to monitor the count of the performed tests. In case of detecting any error, the

Table 3
Individual subjects' characteristics and number of valid trials accomplished by each subject.

Subject ID	Age (years)	Gender	Height (cm)	Weight (kg)	Handedness	Medical condition	Trials without GERT	Trials using GERT
01	66	Male	165	78	Right	–	5	0
02	37	Female	156	75	Right	–	6	0
03	29	Male	176	96	Right	–	5	5
04	63	Female	152	72	Right	–	5	0
05	82	Female	144	41	Right	–	5	0
06	52	Female	144	65	Right	–	5	0
07	49	Male	178	78	Right	–	6	6
08	42	Male	175	86	Right	–	5	5
09	35	Male	168	78	Left	–	6	5
10	33	Male	168	67	Right	–	6	6
11	35	Female	165	62	Right	–	5	9
12	26	Male	171	104	Right	–	5	5
13	32	Male	170	65	Right	–	5	5
14	36	Male	170	67	Right	–	5	5
15	40	Male	174	57	Right	–	5	5
16	36	Male	168	77	Right	–	5	5
17	76	Female	167	77	Right	–	7	0
18	80	Male	157	76	Right	–	5	0
19	25	Female	175	63	Right	–	6	8
20	24	Male	180	78	Right	–	6	6
21	18	Male	175	68	Right	–	6	6
22	19	Male	188	120	Right	–	6	6
23	25	Male	177	85	Right	–	7	6
24	37	Male	171	65	Left	–	5	6
25	51	Male	160	68	Right	–	5	0
26	43	Male	165	69	Right	–	5	0
27	57	Male	162	71	Right	–	5	0
28	20	Female	154	68	Right	–	5	0
29	66	Female	150	58	Right	–	5	0
30	70	Male	156	66	Right	–	5	0
31	55	Female	153	76	Right	–	5	0
32	72	Male	158	71	Right	–	6	0
33	62	Male	162	80	Right	–	5	0
34	50	Female	162	78	Right	–	4	0
35	76	Female	152	66	Right	Prothesis in the right knee	5	0
36	65	Female	146	66	Right	–	5	0
37	43	Female	159	68	Right	–	8	0
38	65	Male	168	77	Right	–	5	0
39	84	Female	147	61	Right	–	6	0
40	65	Female	148	57	Right	–	5	0
41	71	Male	172	77	Right	–	5	0
42	63	Male	169	64	Right	–	6	0
43	73	Male	166	52	Right	–	5	0
44	65	Female	154	42	Right	–	5	0
45	62	Male	180	92	Right	–	5	0
46	60	Male	165	86	Right	–	5	0
47	78	Female	151	39	Right	–	5	0
48	60	Female	160	86	Right	–	5	0
49	75	Female	150	66	Right	–	8	0
50	63	Female	157	72	Right	Osteoarthritis	5	0
51	69	Male	165	75	Right	Right knee hard hit (7 years earlier)	5	0
52	66	Female	159	76	Right	Spinal problems (5 years earlier)	5	0
53	67	Female	153	79	Right		5	0

(*continued on next page*)

Table 3 (*continued*)

Subject ID	Age (years)	Gender	Height (cm)	Weight (kg)	Handedness	Medical condition	Trials without GERT	Trials using GERT
54	65	Male	167	60	Right	Ankle dislocation	5	0
55	69	Male	164	80	Right	Right knee dislocation (40 years earlier)	6	0
56	57	Female	142	52	Right	-	7	0
57	92	Female	141	60	Right	-	11	0
58	37	Male	169	80	Right	-	6	5
59	19	Male	187	85	Right	-	5	6
60	22	Male	178	80	Right	-	6	6
61	19	Male	187	74	Right	-	5	6
62	20	Male	183	94	Right	-	5	6
63	23	Male	172	72	Left	-	6	7
64	32	Male	183	93	Right	-	6	6
65	45	Male	169	61	Right	-	7	7
66	42	Male	178	65	Right	-	6	6
67	25	Male	170	69	Right	-	8	6
68	22	Male	183	83	Right	-	7	6
69	23	Male	172	75	Left	-	6	6

Table 4
Statistical summary of the characteristics of both population groups (above and under 60 year old).

Subject category	Subject count	Gender	Age (years)		Height (cm)		Weight (kg)	
			mean	std	mean	std	mean	std
Adults over 60	30	Female: 16, Male: 14	69.66	7.77	158.16	9.24	68.40	13.28
Adults under 60	39	Female: 9, Male: 30	34.23	11.88	170.17	10.88	75.30	13.22

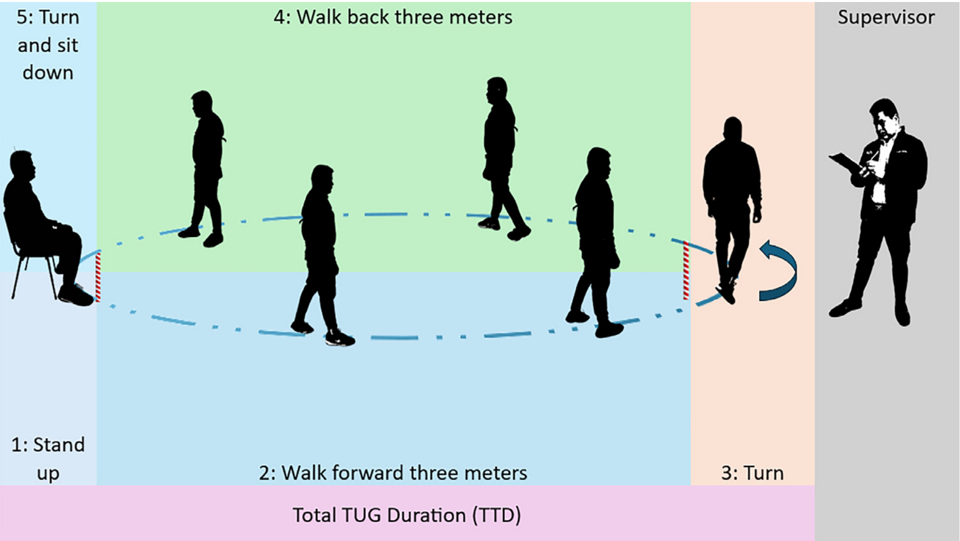

Fig. 5. Timed Up and Go Test testbed.

supervisor marked the form to ease the subsequent removal of these samples from the final dataset.

Limitations

All the experiments of the same participant were monitored without interruptions, generating a single sample file containing all the repetitions of the TUG test. Thus, the primary limitation of the described dataset lies in the segmentation applied to these raw files to generate an individual record of each TUG test. The samples were separated using a custom algorithm specifically developed for this purpose. The algorithm was responsible for detecting the start and end of the TUG movements (rising and sitting on the chair), and for removing those periods of inactivity in which the subject remained seated. Comparison with the recorded videos seems to indicate that the segmentation was performed correctly.

Finally, we have to highlight that there is a certain disparity in the distribution of the gender, height and weight of the participants. In this vein, the imbalance in handedness is particularly noteworthy, as with the majority of participants being right-handed.

Ethics Statement

Experimental procedure and data collection were approved by the ethics committees of the University of Malaga (petitions with registration numbers CEUMA-33-2021-H & 78-2024) and Technical University of Manabí (session held on June 16, 2021).

Following the European Regulation 2016/679 of April 27, 2016 on the protection of personal data, an informed written consent was obtained from all participants. For that purpose, before any experiment, each participant was provided with a document describing in detail the mobility tests to be conducted, the utilization and scope of the sensing devices and the data to be collected, as well as information about the geriatric simulator (not employed by the older adults).

Participants were additionally advised that they had full autonomy to opt out from the study at any stage of the sample collection procedure, without any further explanation. Besides, participants were queried about any motor impairment that might hinder their ability to perform the TUG test. In the cases of those volunteers who used the geriatric simulator, the tests were canceled as soon as they reported any discomfort that prevented them from completing the experiment normally.

CRediT Author Statement

Carlos A. Silva: Conceptualization, Methodology, Software, Data Collection, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization. **Eduardo Casilari**: Conceptualization, Methodology, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Supervision, Funding acquisition. **Rodolfo García-Bermúdez**: Methodology, Formal analysis, Writing – review & editing, Supervision.

Data Availability

UMATUG (Original data) (Mendeley Data).

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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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