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Data Article

Extraction of notable points from ECG data: A description of a dataset related to 30-s seated and 30-s stand up

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Dataset link: ECG data related to 30-s seated and 30-s standing for 5P-Medicine project (Original data)

ABSTRACT

It is increasingly possible to acquire Electrocardiographic data with featured low-cost devices. The proposed dataset will help map different signals for various diseases related to Electrocardiography data. The dataset presented in this paper is related to the acquisition of electrocardiography data during the standing up and seated positions. The data was collected from 219 individuals (112 men, 106 women, and one other) in different environments, but they are in the Covilhã municipality. The dataset includes the 219 recordings and corresponds to the sensors' recordings of a 30 s sitting and a 30 s standing test, which checks to approximately 1 min

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for each one. This dataset includes 3.7 h (approximately) of recordings for further analysis with data processing techniques and machine learning methods. It will be helpful for the complementary creation of a robust method for identifying the characteristics of individuals related to Electrocardiography signals.

Specifications Table

Subject	Signal Processing, and Health and medical sciences
Specific subject area	Evaluation of the 30-s seated and 30-s stand up based on ECG data
Type of data	Table
How the data were acquired	The data was acquired with a BITalino (r)evolution Plugged kit, and a computer with OpenSignals software for the data acquisition. The data was acquired by Bluetooth, and the data is automatically saved in text files.
Data format	Raw JSON
Description of data collection	After placed the electrodes in the individual, the BITalino (r)evolution Plugged kit is also placed in a wristband, and the equipment is powered on. The data was acquired with OpenSignals software, and the data is acquired by Bluetooth with a sample rate of 1 kHZ.
Data source location	City/Town/Region: Covilhã Country: Portugal Latitude and longitude (and GPS coordinates, if possible) for collected samples/data: 40° 16′ 50.037′′ N 7° 30′ 15.555′′ W
Data accessibility	Repository name: ECG data related to 30-s seated and 30-s standing for 5P-Medicine project Data identification number: 10.17632/z4bbj9rcwd.2 Direct URL to data: https://data.mendeley.com/datasets/z4bbj9rcwd.2

Value of the Data

This dataset is important to different kinds of people for various reasons. These are:

- The presented dataset allows the implementation of techniques to automatically identify the potential heart condition problems a person might currently have and in the future [1,2].
- The use of mobile devices for the data acquisition and integration of the acquisition of electric signals allows the identification of a heartbeat in a practical way [3, p. 19], [4,5].
- ECG data allow the individuals' monitoring during free time, allowing the identification of possible problems, which may occur anytime [6,7].
- Big data and machine learning techniques are essential to monitoring the heart [8–10]. These data represent the electric signals of the heart, which can be used by machine learning techniques to find patterns of heart problems and find them earlier than before.

1. Objective

Some datasets have been published related to ECG data, namely the UofTDB ECG database [11] from the University of Toronto. This private database consists of samples of 1020 patients whose single lead ECG was recorded from 2 to 5 min, with different body postures (standing, sitting, tripod, and supine) and physical exercise. To achieve automatic human identification, Biel et al. [12] presented a private database consisting of 20 persons aged between 20 and 55

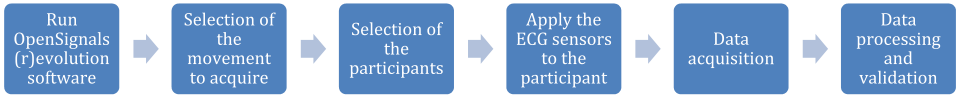

Fig. 1. Workflow of the dataset creation.

years old. Another approach was introduced by Kim et al. [13], where ECG measurements were performed on ten male subjects between 22 and 26 years old who had not been diagnosed with heart diseases. Applied to the acquisition of Electrocardiogram signals from chairs is another database [14], where the ECG signals were read from a 1.75 m and 76 kg man.

The presented work is focused on data provided for related projects with Electrocardiography data for pattern identification [15–17] (with signal processing or algorithms) that allows the identification of abnormal patterns or other relevant information within the signal for 30 s sitting and 30 s standing test. Thus, with the simple movement of an individual, it will be possible to verify how medicine can be directed to the individual with patient-based methods. The BITalino (r)evolution Plugged kit [18] was used to implement the setup. This device was previously validated as a research device capable of acquiring ECG data, and the position used was described in [19]. The workflow of the research setup is presented in Fig. 1.

2. Data Description

The dataset presented in this paper is available in a Mendeley Data repository [20], and it contains two files for each individual, making a total of 219 folders. Each folder has a JSON file that contains the description of the data acquisition conditions, the characteristics of the individual, and the sensors used, and a text file that includes the acquired data from the ECG sensor. The following columns are presented in the text files:

- First column: includes the sequence number related to the data acquisition time in milliseconds.
- Second, Third, and Fourth columns are empty because they are not used.
- Fifth column: reports the data related to the ECG sensors in millivolts (mV).
- Sixth column: it is not relevant to our study, but it includes the value of the z-axis of the accelerometer embedded in the device. It can be helpful in the detection of sitting-down movements.

The chart related to an excerpt of 30-s of the ECG data available at the following link is available in Fig. 2:

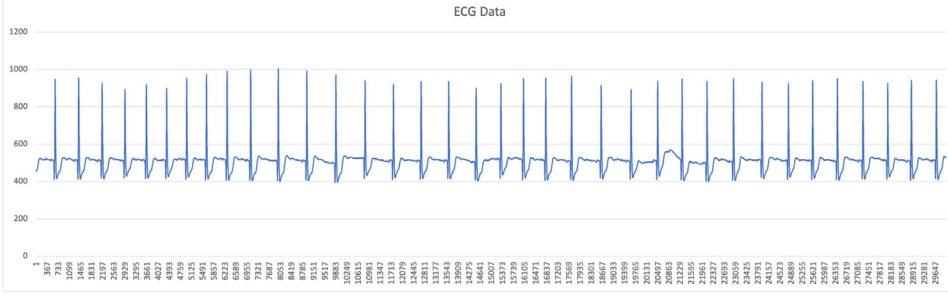

Fig. 2. Excerpt of 30-s of ECG data.

Table 1
Distribution of recordings by gender.

Gender	IDs
Male	1, 2, 5, 6, 9, 11, 15, 18, 22, 23, 26, 28, 29, 30, 32, 34, 36, 37, 40, 41, 43, 45, 46, 50, 51, 53, 57, 58, 59, 60, 62, 64, 68, 76, 77, 79, 80, 81, 98, 99, 103, 106, 107, 108, 113, 114, 116, 117, 118, 119, 122, 123, 124, 125, 127, 130, 132, 133, 135, 137, 139, 140, 141, 142, 144, 146, 147, 152, 154, 155, 157, 159, 161, 163, 164, 165, 169, 170, 172, 173, 174, 175, 176, 178, 180, 184, 187, 188, 190, 191, 194, 196, 200, 201, 203, 205, 207, 208, 210, 214, 215, 216, 218, 219
Female	3, 4, 7, 8, 10, 12, 13, 14, 16, 17, 19, 21, 24, 42, 44, 47, 48, 49, 52, 55, 56, 61, 63, 65, 66, 67, 69, 70, 71, 72, 73, 74, 75, 78, 82, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 100, 101, 102, 104, 105, 109, 110, 111, 112, 115, 120, 121, 126, 128, 129, 131, 134, 136, 138, 143, 145, 148, 149, 150, 151, 156, 158, 160, 162, 166, 167, 168, 171, 177, 179, 181, 182, 183, 185, 186, 189, 192, 193, 197, 198, 199, 204, 206, 209, 211, 212, 213, 217
Other	83

Table 2
Distribution of recordings by relevant diseases.

Diseases	IDs
allergies	11, 24, 51, 113, 125, 167
arrhythmia	23, 187, 189
Asthma	40, 113, 157, 199
Brain problems	147, 179, 194
Cholesterol	17, 49, 73, 107, 147, 148, 188, 194, 197
Diabetes	21, 22, 26, 53, 60, 67, 68, 69, 152, 169, 181, 186, 188
heart problems	76, 112, 150, 187, 189, 194
Hypertension	12, 16, 21, 22, 46, 61, 71, 82, 84, 107, 109, 147, 148, 152, 157, 186, 194, 196, 199

- https://data.mendeley.com/datasets/z4bbj9rcwd/1/files/448fccb3-d386–4b21–8581-bddeb41c2085

The JSON file related to the description of the data acquisition conditions related to the excerpt of Fig. 2 is available in the link below:

- https://data.mendeley.com/datasets/z4bbj9rcwd/1/files/f25ceaa8–1292–4fba-b3cf-8502c5d5108b

To complement the data description, Table 1 presents the distribution of the gender by the different individuals, reporting 104 males, 102 females, and one other. Also, Table 2 shows the distribution of the diseases by the different individuals to perform the Technical Validation of the data, where only 55 individuals reported some disorders. Still, the ones with relevant diseases are only 47 subjects. Finally, the average measurements for each volunteer for the 30-s seated and 30-s stand-up tests are presented in Table 3.

As presented in Tables 4–6, the significance of differences between male and female groups was analyzed using Student's *t*-test for independent samples. Those differences where the p-value was less than 0.05 ($p < 0.05$) were considered statistically significant.

Table 3
Average measurements for each volunteer for the 30 s sitting and 30 s standing test.

ID	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
1	863.387	866.113	31.921	194.683	162.762	160.619	115.579	181.302	341.921	536.603	529.016	113.651	109.873
2	701.920	701.880	31.355	98.421	67.066	100.158	128.513	164.961	265.118	363.539	185.724	34.432	32.387
3	906.629	908.161	41.032	200.143	159.111	115.905	206.952	252.032	367.937	568.079	209.635	46.710	35.065
4	860.443	862.071	22.141	141.775	119.634	52.380	200.958	245.183	297.563	439.338	50.408	16.433	57.386
5	762.718	760.179	23.013	195.203	172.190	83.620	170.646	279.671	363.291	558.494	198.861	108.120	142.570
6	739.525	739.650	39.704	122.284	82.580	91.395	153.543	223.383	314.778	437.062	108.284	38.000	32.125
7	714.518	716.181	38.060	123.464	87.915	95.512	176.361	225.774	321.286	444.750	92.810	20.683	59.714
8	816.014	813.556	32.973	184.164	156.000	106.616	224.575	285.877	392.493	576.658	96.164	27.000	37.808
9	1002.000	1001.968	53.063	128.750	75.688	99.938	28.000	55.094	155.031	283.781	279.344	42.517	57.219
10	634.605	634.145	34.688	102.753	69.184	106.792	82.000	121.636	228.429	331.182	161.208	20.920	65.494
11	783.622	782.149	62.413	157.840	105.057	132.253	160.099	216.827	349.080	506.920	391.160	130.890	85.689
12	916.206	918.222	31.906	182.828	150.922	83.531	234.109	272.563	356.094	538.922	146.547	55.516	32.453
13	1047.820	1050.360	39.275	147.569	110.780	94.255	169.872	213.882	308.137	455.706	141.447	129.619	111.362
14	658.629	659.135	40.089	116.100	77.045	92.744	133.556	215.522	308.267	424.367	186.600	44.744	61.091
15	852.333	852.621	63.866	174.567	110.701	151.179	124.375	205.433	356.612	531.179	371.940	111.439	59.149
16	863.261	863.261	40.000	159.957	119.957	113.786	152.486	242.114	355.900	515.857	322.786	85.304	57.314
17	867.059	867.279	39.319	151.290	111.971	118.826	195.507	240.768	359.594	510.884	156.000	47.783	38.232
18	997.400	998.783	73.033	211.459	181.551	186.066	154.607	295.426	481.492	692.951	310.967	142.960	38.180
19	797.680	800.480	24.276	143.026	118.750	98.316	143.724	211.053	309.368	452.395	274.013	60.882	36.224
21	619.536	619.629	37.480	100.776	63.296	115.316	124.551	191.245	306.561	407.337	231.898	55.908	28.643
22	976.333	977.030	50.735	197.500	146.765	141.000	150.176	210.794	351.794	549.294	345.882	65.394	95.970
23	1041.370	1032.481	18.714	192.071	173.357	66.179	300.071	322.679	388.857	580.929	261.357	98.321	51.071
24	779.692	779.446	27.303	125.288	97.985	96.697	154.492	191.348	288.045	413.333	581.515	151.034	89.354
26	662.180	662.700	27.804	108.706	80.902	86.804	139.314	184.196	271.000	379.706	206.765	102.745	97.765
28	558.028	558.370	47.606	121.119	87.787	130.505	61.179	86.394	216.899	338.018	661.550	67.294	123.541
29	690.671	690.250	27.130	128.597	101.468	109.805	144.468	178.455	288.260	416.857	580.831	122.197	84.532
30	769.818	769.667	36.970	195.358	158.388	72.672	187.388	261.343	334.015	529.373	116.791	103.388	114.896
32	1224.194	1223.028	77.595	144.892	74.441	134.378	86.645	146.919	281.297	426.189	629.703	259.121	154.767
34	786.360	786.267	63.868	133.368	69.500	199.816	42.267	114.789	314.605	447.974	548.276	115.632	147.500
36	771.987	772.000	48.987	108.557	60.551	67.595	128.241	244.924	312.519	421.076	448.354	89.582	129.696
37	775.231	775.936	42.696	193.456	150.759	86.101	196.848	292.709	378.810	572.266	99.127	47.121	78.090
40	699.482	699.647	51.872	162.372	133.288	136.233	113.058	258.953	395.186	557.558	374.140	127.628	93.465
41	749.171	751.614	21.535	150.662	129.127	101.113	177.451	235.944	337.056	487.718	293.408	62.229	84.141
42	870.221	870.221	32.145	164.000	131.855	107.971	189.899	241.116	349.087	513.087	357.884	80.478	85.493
43	851.557	851.771	50.817	148.831	98.014	87.099	226.408	326.296	413.394	562.225	367.577	90.225	84.592
44	804.230	804.351	53.040	120.400	67.360	120.773	197.653	248.800	369.573	489.973	341.760	97.267	52.000

(*continued on next page*)

Table 3 (*continued*)

ID	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
45	812.924	813.182	45.657	156.821	111.164	105.836	195.388	249.761	355.597	512.418	217.433	65.179	53.358
46	788.160	788.213	56.724	156.632	99.908	135.921	119.803	233.276	369.197	525.829	327.645	112.855	77.066
47	821.139	821.847	32.027	165.630	133.603	108.740	243.466	293.767	402.507	568.137	111.973	32.918	42.699
48	875.298	875.064	39.979	124.146	84.167	172.104	70.698	196.167	368.271	492.417	334.729	95.688	50.792
49	714.452	714.452	46.235	191.624	149.313	130.118	103.583	216.341	346.459	538.082	614.200	151.082	270.659
50	750.519	751.469	35.049	149.561	116.099	96.817	148.451	205.012	301.829	451.390	80.232	31.258	35.886
51	938.639	938.852	20.016	220.661	200.645	128.097	213.210	242.855	370.952	591.613	713.419	254.726	97.097
52	839.887	840.014	45.431	132.500	88.521	74.333	226.500	270.222	344.556	477.056	299.250	55.903	52.806
53	760.091	760.286	45.269	111.423	66.154	110.910	167.564	219.115	330.026	441.449	337.218	81.821	83.885
55	856.161	856.484	47.889	161.714	113.825	86.222	96.094	143.238	229.460	391.175	215.790	57.635	50.737
56	823.681	823.710	35.671	157.243	123.594	90.500	214.400	247.500	338.000	495.243	97.143	34.243	46.743
57	711.047	710.906	43.523	135.600	92.077	167.615	74.447	141.877	309.492	445.092	547.200	87.477	134.415
58	817.013	819.288	33.778	190.049	158.413	95.012	206.074	250.259	345.272	535.321	233.593	58.815	79.667
59	1053.518	1053.411	71.018	178.474	115.056	171.719	159.807	325.421	497.140	675.614	283.404	72.632	69.298
60	1056.364	1051.000	79.446	207.161	127.714	249.911	63.515	135.446	385.357	592.518	392.161	117.161	55.696
61	1008.966	1008.881	31.217	241.050	209.833	69.500	255.033	308.050	377.550	618.600	127.283	44.717	43.117
62	1029.556	1025.533	42.087	179.848	137.761	159.761	139.971	169.043	328.804	508.652	650.652	131.413	149.696
63	807.803	805.690	31.958	148.597	116.639	102.306	152.903	215.736	318.042	466.639	168.153	43.569	40.792
64	781.789	782.366	26.681	182.653	155.972	54.417	177.833	233.694	288.111	470.764	116.250	37.576	122.958
65	645.167	644.089	38.000	123.220	86.333	93.857	170.418	209.407	303.264	426.484	154.407	31.409	50.670
66	996.500	993.923	19.132	134.377	115.245	69.528	186.038	209.736	279.264	413.642	185.321	55.642	67.654
67	964.295	964.361	23.871	174.710	150.839	78.306	245.532	271.403	349.710	524.419	203.355	60.129	25.435
68	1069.129	1071.097	21.000	163.781	142.781	51.281	202.688	228.875	280.156	443.938	210.281	87.414	78.968
69	708.875	708.963	29.160	130.938	101.778	75.975	212.284	241.074	317.049	447.988	186.864	46.605	22.914
70	915.750	915.955	50.778	120.222	69.444	77.578	142.822	225.400	302.978	423.200	98.133	48.818	42.200
71	879.806	876.910	24.868	185.471	160.603	112.868	197.853	248.412	361.279	546.750	329.632	90.147	66.515
72	836.732	836.829	20.542	122.602	102.060	107.096	154.928	200.675	307.771	430.373	306.651	79.349	70.012
73	867.603	867.635	40.219	150.859	114.742	126.781	166.667	207.281	334.063	484.922	253.734	55.079	50.906
74	921.621	921.466	38.610	173.712	137.672	110.441	183.625	234.864	345.305	519.017	628.915	218.474	147.927
75	522.504	522.658	34.186	113.881	79.695	117.542	74.079	143.271	260.814	374.695	227.110	43.381	30.619
76	711.631	711.583	45.588	130.329	84.741	203.859	90.940	159.518	363.376	493.706	541.047	175.494	28.059
77	752.635	752.703	68.853	137.787	108.980	104.320	148.167	232.480	336.800	474.587	351.333	81.760	103.108
78	891.758	892.439	37.358	146.522	111.045	94.418	174.045	238.567	332.985	479.507	189.179	56.522	42.284
79	700.127	698.329	63.038	154.913	103.917	128.725	93.354	168.563	297.288	452.200	180.375	69.411	68.363
80	748.899	750.911	42.013	151.900	109.888	155.300	91.700	260.188	415.488	567.388	712.788	301.025	219.675
81	845.100	847.943	40.746	229.141	188.394	168.648	110.479	280.930	449.577	678.718	688.225	254.197	150.789
82	746.475	746.713	55.321	163.099	107.778	115.309	160.667	240.420	355.728	518.827	236.432	57.577	84.938
83	765.164	765.027	43.446	140.689	98.781	71.500	175.446	259.257	330.757	471.446	183.959	45.169	43.703
84	884.642	882.119	47.706	167.118	119.412	101.985	180.868	252.206	354.191	521.309	166.926	47.162	41.691
85	814.377	814.541	21.065	132.129	111.065	69.774	193.855	226.081	295.855	427.984	320.548	86.931	83.902

(*continued on next page*)

Table 3 (*continued*)

ID	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
86	723.247	724.778	43.463	146.585	105.025	95.732	152.383	209.707	305.439	452.024	175.198	67.744	59.293
87	1020.160	1021.220	81.941	198.314	124.469	150.333	169.756	203.216	353.549	551.863	512.275	173.980	141.528
88	998.109	998.219	52.769	202.785	150.015	64.138	306.369	397.477	461.615	664.400	112.292	33.414	38.015
89	926.778	925.143	55.719	213.688	157.969	173.078	150.047	264.422	437.500	651.188	661.563	213.094	69.359
90	605.442	605.453	37.260	114.646	77.385	110.510	116.656	176.854	287.365	402.010	280.927	54.063	27.652
91	837.718	838.958	41.097	117.194	77.352	138.139	97.323	186.222	324.361	441.556	329.639	76.347	72.042
92	1128.543	1128.657	50.333	135.139	84.806	106.806	124.200	160.583	267.389	402.528	142.278	32.222	35.639
93	754.987	755.177	50.388	112.063	61.675	158.200	61.047	161.188	319.388	431.450	610.788	113.863	166.513
94	700.082	699.918	36.198	120.698	84.500	114.826	122.558	187.105	301.930	422.628	226.663	37.518	38.635
95	713.610	713.866	40.169	116.627	77.549	126.723	101.539	155.036	281.759	398.386	372.265	58.205	73.434
96	1075.632	1077.895	53.436	143.282	89.846	171.410	83.735	155.154	326.564	469.846	504.231	104.769	24.865
97	717.536	719.417	44.059	113.659	69.600	149.612	73.532	155.988	305.600	419.259	307.812	62.894	57.929
98	651.012	651.221	42.080	132.759	90.678	69.425	121.274	168.575	238.000	370.759	35.103	34.434	40.815
99	775.191	773.191	49.507	165.768	118.162	50.870	214.377	306.174	357.043	522.812	277.217	129.420	54.567
100	924.475	920.475	49.226	195.306	148.705	130.661	117.017	196.371	327.032	522.339	363.226	90.721	51.597
101	791.852	791.770	34.871	88.565	53.694	140.403	77.769	149.516	289.919	378.484	600.645	96.823	51.968
102	732.333	734.840	40.976	124.683	87.456	158.695	59.232	149.390	308.085	432.768	403.195	70.122	79.963
103	926.049	926.115	48.435	123.548	75.113	91.968		133.210	225.177	348.726	642.597	747.323	12.226
104	710.326	712.488	33.954	134.839	100.885	76.966	173.851	219.000	295.966	430.805	183.621	65.279	87.195
105	776.092	776.026	28.883	155.156	126.273	82.857	168.169	219.831	302.688	457.844	185.844	36.610	32.701
106	726.825	724.850	45.395	135.642	90.247	148.543	86.039	174.000	322.543	458.185	275.160	82.734	74.646
107	715.829	715.878	61.108	114.518	53.410	120.482	136.361	198.205	318.687	433.205	152.458	32.627	53.470
108	758.197	756.539	40.922	164.104	123.182	81.026	250.649	307.000	388.026	552.130	177.831	54.443	86.857
109	699.495	700.242	33.560	117.180	83.620	85.830	164.293	200.180	286.010	403.190	121.880	32.670	14.560
110	840.986	842.214	39.000	162.493	123.493	120.239	149.897	224.394	344.634	507.127	187.423	51.352	25.718
111	682.495	682.560	45.467	88.304	47.035	146.500	94.442	174.620	321.120	409.424	330.772	65.924	76.978
112	818.486	817.083	35.479	132.274	96.795	114.288	146.877	198.521	312.808	445.082	123.904	33.548	25.055
113	685.674	683.709	37.678	167.000	129.322	81.598	103.678	190.552	272.149	439.149	180.517	38.667	125.552
114	811.014	810.667	38.479	122.233	83.753	153.411	121.178	218.945	372.356	494.589	340.521	151.438	44.219
115	930.464	926.679	26.807	173.018	146.211	124.579	197.246	240.158	364.737	537.754	465.561	104.754	32.561
116	779.151	777.575	22.743	145.446	122.703	104.135	204.351	234.486	338.622	484.068	327.797	92.243	88.581
117	730.527	730.473	47.933	104.733	57.824	113.427	185.293	233.493	346.920	451.653	238.240	50.960	89.880
118	798.260	799.384	37.284	167.676	130.392	63.986	209.716	254.635	318.622	486.297	108.432	33.661	23.297
119	1055.160	1057.980	46.627	157.020	113.140	137.373	206.510	243.667	381.039	538.059	398.392	119.922	27.843
120	649.663	649.798	45.767	108.367	62.600	107.589	142.756	203.189	310.778	419.144	131.378	27.489	55.633

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Table 3 (*continued*)

ID	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
121	667.694	669.347	37.123	114.137	79.648	112.753	84.191	132.877	245.630	359.767	323.877	47.732	95.877
122	830.815	830.538	30.394	157.439	127.045	154.985	158.359	210.788	365.773	523.212	379.364	86.288	41.955
123	1910.438	1910.625	48.471	144.118	95.647	68.059	163.412	267.059	335.118	479.235	647.588	150.588	142.824
124	686.193	686.795	37.798	151.382	113.584	66.191	56.727	102.438	168.629	320.011	427.517	443.640	56.976
125	810.343	810.586	41.127	187.028	148.214	154.338	106.625	183.930	338.268	525.296	572.000	117.803	119.028
126	819.985	819.333	37.090	191.642	154.552	146.433	109.968	180.970	327.403	519.045	543.373	120.803	126.866
127	2517.375	2517.500	59.111	184.667	125.556	51.111	140.889	230.444	281.556	466.222	368.778	111.200	91.111
128	2486.625	2504.625	33.889	137.444	103.556	54.111	201.667	250.778	304.889	442.333	474.667	108.429	97.333
129	777.284	776.704	43.110	163.915	122.494	139.939	133.370	198.037	337.976	501.890	477.329	109.110	116.183
130	775.415	774.122	43.867	170.807	128.695	128.169	157.341	206.964	335.133	505.940	432.482	107.916	113.096
131	721.661	720.274	39.508	167.159	129.968	150.921	119.333	180.587	331.508	498.667	515.905	111.032	116.603
132	944.935	941.984	47.063	195.238	150.919	140.651	136.175	206.286	346.937	542.175	352.667	90.937	52.540
133	945.694	946.177	28.603	163.667	135.063	131.127	157.017	215.492	346.619	510.286	343.016	75.222	43.444
134	904.303	903.697	28.836	173.910	145.075	109.672	180.152	239.269	348.940	522.851	319.910	73.985	43.939
135	896.813	898.859	31.554	178.108	146.554	115.800	172.222	225.615	341.415	519.523	336.031	79.062	54.738
136	873.209	875.970	31.853	154.015	122.162	118.897	166.892	221.132	340.029	494.044	334.382	89.926	49.348
137	767.697	767.776	30.805	223.481	192.675	119.468	161.078	226.675	346.143	569.623	292.299	80.494	65.857
138	737.062	735.901	34.841	146.549	113.284	101.195	162.232	219.610	320.805	467.354	244.598	71.829	64.585
139	742.304	743.671	35.225	139.188	105.468	123.925	116.263	200.775	324.700	463.888	286.438	79.750	66.713
140	739.675	738.263	30.444	170.074	139.630	113.210	146.778	209.272	322.481	492.556	254.790	76.815	64.025
141	760.634	760.854	32.458	180.964	150.500	107.627	149.735	226.325	333.952	514.916	276.735	87.361	68.976
142	785.459	783.574	20.645	157.984	137.339	76.952	180.885	209.387	286.339	444.323	562.492	147.167	141.968
143	938.984	939.032	40.109	181.000	140.891	162.125	75.472	186.797	348.922	529.922	666.422	181.188	40.794
144	652.685	650.957	35.172	120.516	86.424	196.591	34.130	90.968	287.559	408.075	621.839	137.237	69.183
145	736.100	736.250	51.914	102.679	50.765	186.346	40.400	117.926	304.272	406.951	445.840	66.395	86.963
146	901.864	904.167	21.657	139.612	117.955	86.090	158.955	242.075	328.164	467.776	618.761	181.403	75.433
147	777.111	775.681	22.096	185.849	163.753	57.356	252.068	282.233	339.589	525.438	273.370	79.973	42.342
148	654.965	655.035	67.860	143.174	75.314	113.233	99.181	189.105	302.337	445.512	333.279	106.500	107.320
149	709.842	711.895	25.410	135.051	109.641	71.333	111.194	157.487	228.821	363.872	31.229	135.108	115.514
150	972.018	972.070	41.500	148.172	106.672	71.655	240.793	280.500	352.155	500.328	110.707	52.969	27.089
151	890.161	890.726	49.095	167.444	118.349	127.159	133.033	205.175	332.333	499.778	260.476	76.143	60.790
152	852.017	850.783	47.049	160.803	113.754	127.164	147.885	208.541	335.705	496.508	322.328	99.016	38.787
154	819.179	818.036	29.877	125.281	99.764	81.544	99.982	138.386	219.930	345.211	169.018	49.577	117.860
155	995.140	994.560	55.353	142.627	93.729	128.412	94.087	166.373	294.784	437.412	592.098	225.813	366.479
156	1509.686	1513.229	30.722	184.306	163.559	92.556	248.686	273.278	365.833	550.139	109.333	32.229	43.278
157	620.453	620.400	45.958	107.188	61.229	73.229	173.490	214.031	287.260	394.448	104.771	28.292	47.200

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Table 3 (*continued*)

ID	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
158	748.950	749.225	38.593	172.704	137.797	169.037	62.094	131.889	300.926	473.630	652.642	181.272	61.321
159	833.149	835.567	39.588	171.971	132.382	150.044	104.439	191.794	341.838	513.809	597.382	154.765	88.765
160	938.508	940.016	66.032	193.677	132.433	108.242	191.050	258.355	366.597	560.274	165.194	77.274	51.903
161	798.740	796.562	37.041	174.649	137.608	124.514	188.877	254.622	379.135	553.784	316.568	102.338	44.770
162	785.919	784.149	40.667	157.493	118.581	115.293	127.878	201.173	316.467	473.960	410.693	121.840	47.703
163	1208.533	1208.800	75.891	199.913	127.178	198.065	138.303	264.826	462.891	662.804	641.304	163.000	60.326
164	799.861	801.847	39.466	202.849	163.384	134.205	118.814	183.863	318.068	520.918	353.356	80.342	103.438
165	968.052	965.190	48.305	131.983	83.678	185.559	87.966	179.441	365.000	496.983	655.881	191.000	66.966
166	824.057	823.914	45.324	180.479	135.155	97.028	192.928	231.930	328.958	509.437	150.423	56.471	101.143
167	756.387	755.880	46.276	157.592	114.689	153.513	109.525	166.711	320.224	477.816	500.776	115.882	59.573
168	1322.862	1322.483	49.800	219.567	169.767	131.967	168.483	240.100	372.067	591.633	444.967	157.724	104.591
169	705.880	705.602	38.667	182.405	143.738	117.940	162.119	258.321	376.262	558.667	221.881	107.155	82.012
170	738.541	738.568	56.027	142.267	92.183	162.720	126.200	260.213	422.933	565.200	609.440	188.947	174.827
171	1043.018	1040.518	67.491	217.018	174.220	124.351	173.000	272.667	397.018	614.035	141.070	65.632	51.807
172	874.364	872.667	24.731	229.761	208.394	80.925	193.985	250.478	331.403	561.164	221.030	59.284	170.939
173	815.746	818.775	34.792	208.931	174.139	150.681	102.750	220.125	370.806	579.736	367.500	121.181	101.653
174	888.406	888.203	49.338	134.908	85.569	159.246	178.806	228.954	388.200	523.108	392.585	105.923	82.354
175	960.500	962.550	45.197	168.721	128.203	156.180	116.393	215.475	371.656	540.377	417.197	112.311	59.550
176	747.081	744.622	54.533	185.080	134.630	53.840	175.227	245.720	299.560	484.640	150.453	151.391	119.708
177	1382.848	1383.121	68.559	193.912	125.353	210.971	106.032	206.912	417.882	611.794	362.382	102.118	40.706
178	810.528	810.472	36.863	184.630	150.125	113.000	226.712	267.918	380.918	565.548	154.681	50.986	66.973
179	682.058	682.244	35.103	129.586	94.483	102.471	150.759	208.034	310.506	440.092	179.977	41.172	37.724
180	835.029	832.071	37.930	263.169	225.239	60.563	214.239	320.775	381.338	644.507	181.211	89.113	87.577
181	982.941	982.980	66.481	168.923	107.480	172.115	151.980	282.673	454.788	623.712	620.058	204.462	53.333
182	903.106	903.121	53.642	135.448	81.806	139.970	132.049	204.791	344.761	480.209	282.194	64.078	49.582
183	695.565	697.318	45.558	155.442	109.884	59.140	152.035	200.372	259.512	414.953	63.267	20.600	17.258
184	894.682	894.750	50.733	142.311	91.578	130.956	111.364	153.867	284.822	427.133	326.733	79.182	74.867

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Table 3 (*continued*)

ID	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
185	799.123	797.164	46.838	132.635	87.151	136.446	158.507	205.892	342.338	474.973	211.500	51.162	33.397
186	636.634	636.548	50.011	96.553	47.967	65.723	217.426	285.181	350.904	447.457	168.745	45.483	38.902
187	817.847	818.111	46.082	146.370	100.288	69.712	181.301	260.493	330.205	476.575	218.384	74.667	39.809
188	810.644	810.658	39.108	127.459	89.863	106.095	224.243	265.108	371.203	498.662	254.703	67.865	121.824
189	970.333	968.200	34.344	200.803	169.667	104.787	281.000	319.475	424.262	625.066	95.820	32.051	28.614
190	894.773	895.348	53.299	197.672	144.373	70.313	200.727	269.224	339.537	537.209	153.985	65.642	30.023
191	850.014	850.319	30.786	195.786	165.000	66.400	246.671	279.914	346.314	542.100	147.829	59.926	38.484
192	790.384	789.918	72.851	187.365	120.620	106.811	154.075	212.338	319.149	506.514	206.270	116.397	72.800
193	635.484	635.753	40.915	103.149	62.234	96.872	146.064	208.979	305.851	409.000	112.755	33.053	43.085
194	726.036	726.250	68.753	190.600	121.847	127.376	139.659	278.129	405.506	596.106	300.153	201.871	25.691
196	760.500	760.221	41.724	123.736	82.011	80.011	177.437	240.644	320.655	444.391	215.874	77.448	55.333
197	807.260	809.315	53.419	199.351	145.932	81.405	152.465	212.743	294.149	493.500	138.041	71.589	55.838
198	2262.462	2262.231	33.929	124.286	90.357	126.786	95.615	137.214	264.000	388.286	302.571	62.846	60.429
199	795.108	797.649	36.333	144.427	108.093	62.173	195.880	234.493	296.667	441.093	110.333	48.191	20.411
200	1132.787	1130.021	89.104	185.583	104.044	192.917	126.000	320.625	513.542	699.125	811.563	357.000	141.375
201	913.391	913.344	19.446	178.646	159.200	75.800	191.538	229.277	305.077	483.723	256.585	68.569	49.738
203	792.760	792.733	18.276	254.961	236.684	96.987	216.987	243.684	340.671	595.632	642.145	164.250	146.961
204	771.013	770.671	18.675	241.325	222.649	95.026	219.545	247.403	342.429	583.753	620.701	156.338	143.013
205	739.689	739.905	19.520	174.693	155.173	96.307	219.640	246.653	342.960	517.653	588.373	146.867	138.053
206	757.474	755.789	20.779	207.519	186.740	105.818	216.065	243.883	349.701	557.221	619.740	153.506	140.792
207	755.041	755.432	19.493	224.560	205.067	105.720	207.333	235.320	341.040	565.600	615.853	148.200	135.280
208	800.883	800.982	18.339	249.393	231.054	105.027	215.973	243.598	348.625	598.018	632.330	152.554	135.009
209	811.456	810.868	18.797	222.203	203.406	101.971	215.899	244.000	345.971	568.174	630.087	150.797	134.464
210	854.000	853.841	18.169	261.798	243.629	99.865	223.944	251.854	351.719	613.517	640.146	158.730	138.629
211	833.984	834.406	19.092	239.200	220.108	101.308	216.508	245.277	346.585	585.785	629.985	155.969	140.723
212	797.471	794.914	18.479	239.958	221.479	102.296	217.901	242.915	345.211	585.169	628.930	153.296	136.127
213	808.371	808.386	18.423	237.690	219.268	106.070	214.986	242.239	348.310	586.000	621.972	151.127	136.761
214	805.159	805.244	18.687	242.181	223.494	106.217	209.795	237.771	343.988	586.169	633.494	154.952	136.651
215	807.408	807.233	19.769	228.702	208.933	102.788	215.490	242.125	344.913	573.615	624.192	151.981	137.260
216	816.278	816.458	19.315	222.781	203.466	104.260	210.877	238.521	342.781	565.562	636.233	156.178	139.507
217	831.903	832.661	19.143	189.762	170.619	104.937	206.968	235.921	340.857	530.619	584.270	136.778	125.238
218	761.554	763.703	18.787	207.573	188.787	101.733	204.573	232.453	334.187	541.760	637.707	158.107	145.400
219	879.852	877.459	18.806	226.177	207.371	107.839	204.806	231.484	339.323	565.500	641.710	149.484	132.016

Table 4
Average, maximum, minimum, standard deviation, and median of measurements for Male gender.

Male	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
Average	863.07	863.31	39.65	155.87	117.45	111.70	158.60	217.49	329.19	485.06	303.79	80.85	66.59
Maximum	2486.63	2504.63	81.94	241.33	222.65	210.97	306.37	397.48	461.62	664.40	666.42	218.47	270.66
Minimum	522.50	522.66	18.42	88.30	47.04	52.38	40.40	117.93	228.43	331.18	31.23	16.43	14.56
Standard Deviation	263.47	264.58	12.74	37.10	39.99	30.68	53.47	45.66	42.69	70.59	180.61	47.22	40.66
Median	817.25	815.81	38.81	151.07	114.26	107.78	156.72	215.63	327.22	478.66	257.11	65.46	53.07

Table 5
Average, maximum, minimum, standard deviation, and median of measurements for Female gender.

Female	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
Average	851.24	851.04	41.01	168.79	129.92	115.62	155.91	223.01	338.63	507.42	380.19	119.88	90.19
Maximum	2517.38	2517.50	89.10	263.17	243.63	249.91	300.07	326.30	513.54	699.13	811.56	747.32	366.48
Minimum	558.03	558.37	18.17	98.42	53.41	50.87	28.00	55.09	155.03	283.78	35.10	28.29	12.23
Standard Deviation	229.78	229.70	15.86	37.66	44.05	40.16	52.19	52.83	56.49	78.98	189.89	91.53	49.60
Median	800.37	801.41	40.23	166.38	127.11	108.82	157.34	230.96	340.13	514.36	341.77	102.54	83.12

Table 6
Student's *t*-test values for Male/Female for each attribute.

Male/ Female	RR interval (ms)	PP interval (ms)	P Duration (ms)	PR interval (ms)	PR segment (ms)	QRS duration (ms)	ST segment (ms)	ST-T segment (ms)	QT duration (ms)	TP interval (ms)	R amplitude (mV)	T amplitude (mV)	P amplitude (mV)
Student's *t*-test (p values)	0.732	0.722	0.499	0.014	0.035	0.433	0.716	0.424	0.178	0.033	0.003	0.000	0.193

3. Experimental Design, Materials, and Methods

3.1. Participants

The data was collected from 219 volunteering individuals (112 men, 106 women, and one other) aged between 12 and 92 years old. If over 18 years of age, the participants signed the informed consent, and informed consent was required from parents or legal guardians in the case of children under 18. Parents or legal guardians were present during the experiments. Although it only allows us to share the results of the tests anonymously, the participants considered the risks and the study's objective. Only the data related to the individuals that signed the consent to participate in the study were recorded. Ethics Committee from Universidade da Beira Interior approved the study with the number CE-UBI-Pj-2021–041.

3.2. Data Acquisition

The data was acquired using a BITalino (r)evolution device [18], linked to a personal computer, running the OpenSignals (r)evolution software. Through these devices, each volunteer's data were stored in two files: one JSON file regarding the characteristic data of the volunteer and his lifestyle and a text file with the data related to the test data over time. These files were stored in an individual folder per volunteer.

3.3. Procedure

In the procedure for data collection, we extracted data using BITalino (r)evolution device, and the steps were the following:

(1) The electrodes were connected to the ECG sensors available in BITalino (r)evolution device.
(2) Three electrodes were attached to the subject.
(3) The BITalino (r)evolution device was synchronized with the OpenSignals (r)evolution software.
(4) The data acquisition was started in the OpenSignals (r)evolution software.
(5) Data was collected from the individual in a standing position for 30 s.
(6) The individual sits down in a chair.
(7) Data was collected from the individual in the seated position for 30 s.
(8) The data acquisition was stopped.

4. Data Validation and Quality Control

The quality and quantity of data acquired from the different sensors are important for further data usage. The data acquired show interesting preliminary conclusions that can be explored with other data available in public datasets. Initially, validation was performed during the extraction of the different analyzed variables related to the ECG data, including RR interval, PP interval, P Duration, PR interval, PR segment, QRS duration, ST segment, ST-T segment, QT duration, TP interval, R amplitude, T amplitude, P amplitude. During this analysis, it was found that some of the data acquired were invalid, i.e., the data related to the individuals with IDs 20, 25, 31, 33, 35, 38, 39, 54, 153, 195, 202, resulting in the exclusion of the analysis of 11 individuals.

The exclusion of the data related to the 11 individuals is mainly related to the incorrect positioning of the electrodes for acquiring the ECG data or involuntary movements that misplace the electrodes during the standing-up exercise. However, this data is included in the dataset because some parts of the acquired data are valid and can be compared with the correctly acquired data.

However, as validated by the medical doctor that analyzed this protocol, it is not related to the diseases of these individuals because eight do not report health problems, and the other three reported diseases unrelated to cardiovascular problems, such as diabetes and anemia. The data acquired from these individuals are included in the dataset for further analysis.

However, to analyze and validate the acquired data, different machine learning methods were tested, including Nearest Neighbors with k = 3, Linear SVM with C = 0.025, RBF SVM with gamma = 2 and C = 1, Decision Tree with a max depth of 5, Random Forest with a max depth of 5, 10 estimators and max features of 1, Neural Networks, AdaBoost, and Naive Bayes with default configuration as implemented in the python library. The methods were tested for classification by gender and by disease. Additional details about the techniques used can be found in the Jupyter notebook (https://github.com/impires/JupyterNotebooksECGData). The reported results demonstrated that it could be better used after the combination with a larger dataset, but it is a starting point for future studies.

The Python files used to measure the parameters and points related to the ECG signal are available at https://github.com/impires/featureExtractionECGData. The preliminary data exploration and analysis code are available as a Jupyter notebook at https://github.com/impires/JupyterNotebooksECGData. The Jupyter notebook shows how the data can be loaded and how the initial data exploration can be performed, showing some charts and descriptive statistics. This will be more than sufficient to bootstrap future uses of the dataset. The measured ECG data indicates certain conditions [21] when specific parameters reach certain thresholds. The application of machine learning methods could be used by doctors and ease and speed up the diagnosis process.

5. Re-Use Potential

The potential use of this dataset is related to the analysis of ECG data related to seated and standing-up activities. Unlike the other datasets available for this purpose, this dataset describes the different data related to the data acquisition environment and individuals. Additionally, providing the various related data allows the comparison with other datasets in the same conditions related to daily activities. This dataset can be the starting point for their research studies associated with the COVID-19 pandemic. The individual's data is already anonymized, and the participants signed informed consent to allow the data acquisition.

Ethics Statements

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 study's risks and objectives. Ethics Committee from Universidade da Beira Interior approved the study with the number CE-UBI-Pj-2021–041.

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.

Data Availability

ECG data related to 30-s seated and 30-s standing for 5P-Medicine project (Original data) (Mendeley Data).

CRediT Author Statement

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Supplementary Materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2022.108874.

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