PPG and motion validation dataset

I. General information

I.1. Contacts

Persons: Antoine BABU, Camille MASANET, Emma KERBOURCH, Rajeev MYLAPALLI and Tiffany LIN
Contact at: firstname.lastname@cri-paris.org
Affiliations: Learning Planet Institute, University Paris Cite, Institut Pasteur

I.2. Dataset purpose

Accessibility to physical health related wearables is growing day by day. Rings, chest straps, watches and wristbands are some of the popular everyday accessories available for users with capabilities to monitor one's health. Photoplethysmography (PPG) and Electrocardiogram (ECG) are widely used to track cardiac activity.

Even though several popular manufacturers are providing the service to monitor users activity, very few of them enable the access to the raw data acquired. On other hand, the available open datasets aren't meeting all needs and require some updates. Therefore, our main goal for the research community is access to raw data (Approximate length of data stream is 15 hours) from three different devices while the subjects perform various physical activities (walking, running, laying on the bed, ascending and descending the stairs, rocking, jumping, flapping and clapping hands.

I.3. Dataset usage

The main purpose of the dataset Physical activity classification and PPG heart rate estimation. For this task, three different devices are used to accommodate PPG sensor, ECG sensor and 3D-accelerometer that is inbuilt. The devices used for the acquisition are Bangle JS2, Polar H10 and Polar OH1.

I.4. Dataset structure

The dataset will be organized so that each subject has a folder (SX, where X= Subject ID). Each folder contains the activity files acquired from the device.

- BAo.txt: for data from BangleJS (where A=activity code, o = orientation 1 - left & 2 - right)
- HAo.txt: for data from Polar H10
- OAo.txt: for data from Polar OH1
- Info.txt: contains information about the subject (refer to Section I.5 for more information)

Activity codes:

Activity	**ID**	**Description**
Clapping	C	Clapping with hands while seated

Flapping	F	Flapping both hands while seated
Jumping	J	Jumping on toes with no restriction to hand movement
Laying	L	Laying on bed with hand in rest position
Rocking	Ro	Rocking while seated
Running	Ru	Running in a chosen path in participants own pace
Sitting	Si	Hand in rest position and sitting in a chair
Stairs Ascending	Sa	Climbing up the stairs 4 floors in own pace
Stairs descending	Sd	Climbing down the stairs 4 floors in their own pace
Walking	W	Walking in their natural form

I.5. Subjects

Goal is to acquire data from 10 subjects, 5 male and 5 female, age range 20 to 30 years. Subjects are given a unique ID to store their data. The following information is provided about the subject

- Gender
- Skin type (according to the Fitzpatric scale)
- Picture of the user's skin where PPG sensor comes to contact
- Fitness level (how often does the subject do sports; 1 - less than once a month and 6 - more than 4 times a week)
- Data acquires before or after consuming food; 0 - before meal and 1 after meal
- Height (we are still discussing)

II. Data collection protocol

A consent form will be given after explaining the project and protocol to the participants. Subjects wear the Polar H10 around their chest, BangleJS2 to their wrist and Polar OH1 around their arm. The activities are performed twice, changing the position of both Bangle JS2 and Polar OH1 between dominant and less dominant hands.

Subjects follow the defined protocol including 10 different activities with approximate duration (minutes). Please refer to the activity codes table.

Activity	Si	W	Si	F	Si	Sa	Si	Sd	W	L	Ru	L	Ro	J	Si	C	W	Si
Time	2	3	2	3	2	3	2	3	3	5	6	5	3	3	2	2	3	2

III. Data storage and sharing

All the personal data of the subject is anonymised and during the acquisition will be stored locally in the computer. A copy of the raw data is given to the participant within two weeks of the acquisition.

After organizing the data as suggested and analyzing; the raw data, data usage guide and notebooks will be shared using a GitHub repository under MIT License.