**Activity: AI based dynamics classification tool, exploiting processing of stabilogram images.**

Experimental surveys aimed to acquire the dataset have been performed by using the dedicated structure, shown in Fig. 1. This set-up allows for reproducing different dynamics, thus resembling the following movements: Stable behaviors (ST), Antero-Posterior (AP) and Medio-Lateral (ML) dynamics, as well as overall Unstable behaviors (UNST). The sensor node is located on the structure in a position corresponding to the user chest, where *H1* is the distance between the sensor node and the bottom joint (on the floor), while *H2* is the distance between the node and the belt joint. ML displacements are obtained by manually tilting the system around the belt joint, while APs are generated by exploiting tilting around the bottom joint.



Starting from three acceleration components, time evolutions of the Antero-Posterior and Medio-Lateral displacement (DAP and DML) have been estimated by the following relationships [42]:

|  |  |
| --- | --- |
| *DAP= H1* | (1) |
| *DML= H2* | (2) |

where *H1* and *H2* are defined in Fig. 1, while *Ax,y,z* are the acceleration components.

The combination of DAP and DML dynamics allows for elaborating the so called stabilograms.

**DATASET**

The dataset is organized as follows:

- in each folder Case\_x you can find the time evolution of [DAP DML] for several examples of Standing, AP, ML, Unstable dynamics, obtained by the above-described set-up.

- each case represents a different positioning of the sensor node (different heights H1 and H2).

Sampling frequency: 100 Hz.

Plotting DAP against DML you can find the stabilogram for each dynamic, and then you can save as images to be used for training and testing AI classification tool.

If you prefer stabilograms centered around zero DAP-DML values, you have just to remove the mean value from time-series.