Experiment protocol

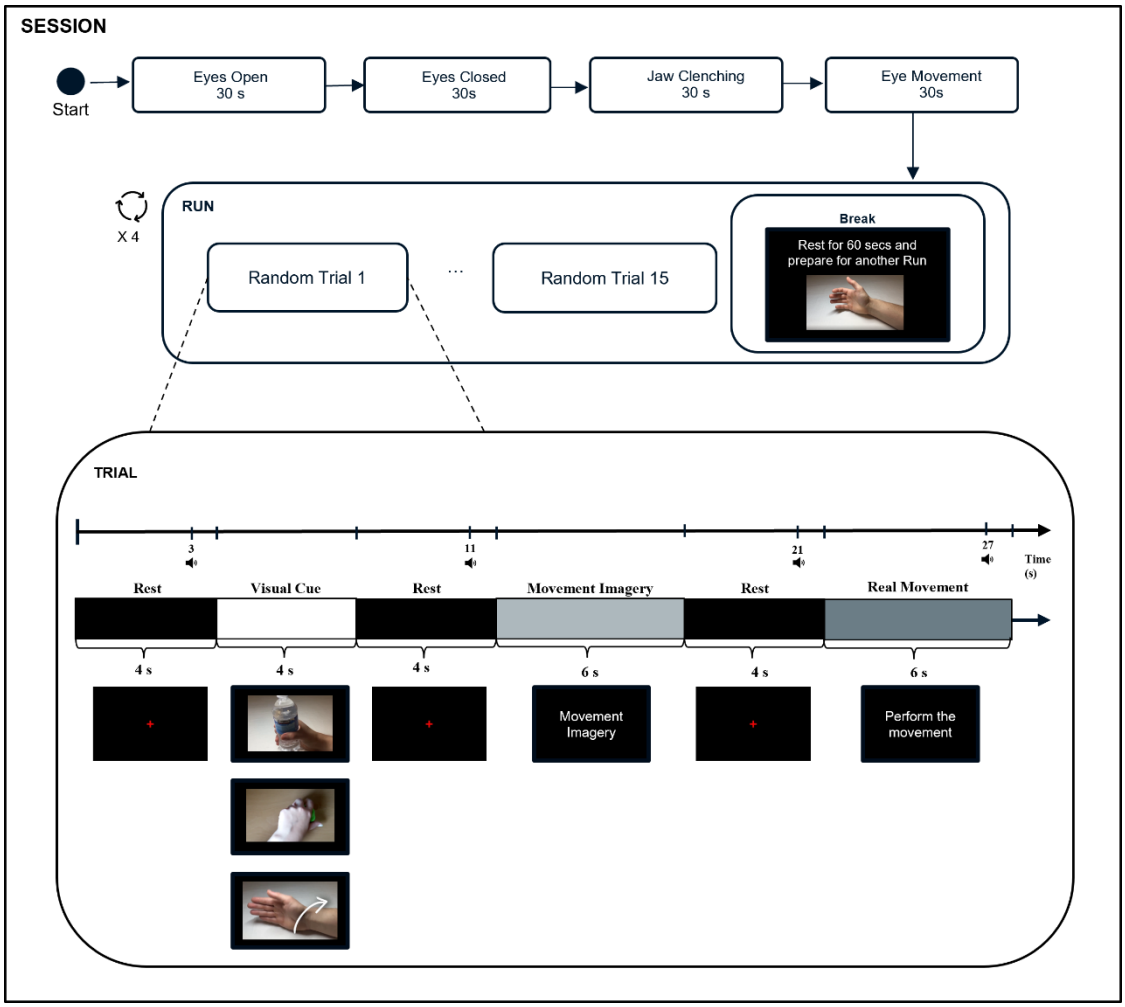
Each trial is associated with a movement execution. The movements that each participant must perform were chosen based on what was mostly found in literature, namely:

- **Hand-grasping**: The participants should grasp a water bottle, an object of daily use.
- **Wrist-twisting (supination):** The participants rotate their wrists to the right, if they are right-handed, otherwise to the left.
- **Pick and place**: The participants grab an object and place it on the opposite side.

Each trial follows the subsequent sequence:

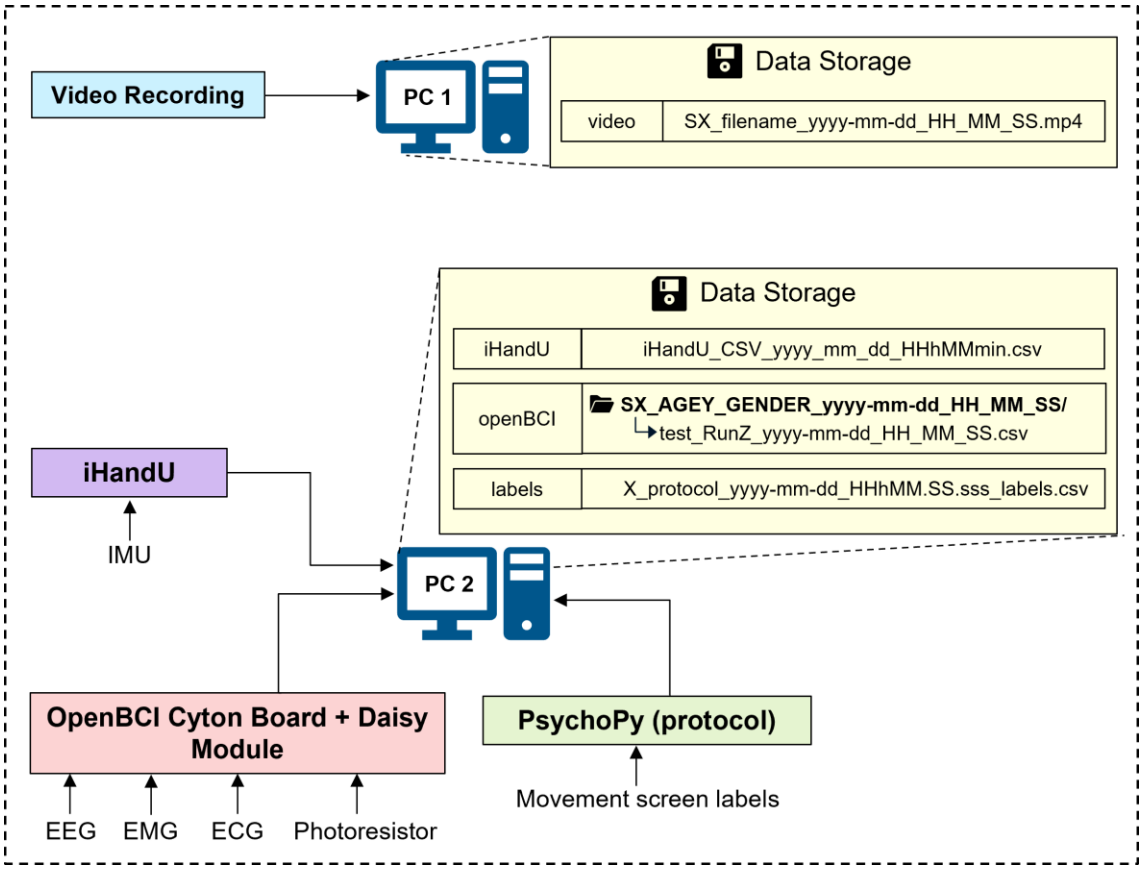
1. **Rest:** A cross-screen shows up for 4 seconds. It includes an audible signal 1 second before the end of the screen.
2. **Visual Cue:** A movement video is played for 4 seconds.
3. **Rest**
4. **Movement Imagery:** The user thinks, for 6 seconds, about the task that should perform.
5. **Rest**
6. **Real Movement:** The participant has 6 seconds to perform the movement. He must perform and hold the position. An audible cue is displayed 1 second before the end, so the participant knows that he should return to the rest position.

Figure bellow illustrates the session pipeline. The rest screens were implemented to accurately separate the screens and the classes. During the rest screens, the participants were asked to avoid executing or imagining any movement.



Data recording

Two computers were used during the experiments to reduce the computational load. Each computer had different tasks assigned, depending on the acquisition phase. The schematic in Figure below corresponds to the organization of phase 1. In the first approach, one computer was responsible for recording the video (PC 1) and the other for performing the experiment and recording the biosignals, the photoresistor signal, and the IMU data (PC 2). It should be noted that all biosignals (ECG, EEG, and EMG) and the photoresistor signal are stored in the same file, and each run has a new file associated. Despite all these efforts to reduce the computational load, some errors and data losses were still observed when analyzing the data obtained.



Thus, a new approach to data recording was considered. In this way, the IMU and OpenBCI data (biosignals + photoresistor) are recorded using different computers but synchronized by the same NTP server, *time.windows.com,* as depicted in the schematic of Figure below.