**Details of BMI-MAHI Experiments**

**Protocol:**

1. For the first 2 sessions we will be collecting only calibration data to train our classifier. The next 3 sessions will be used to test the classifier for closed-loop control of the Exo in real-time. Currently the MAHI-exo is programmed to activate only a single joint i.e. the Elbow joint.
2. For calibration, we will operate the Exo in Triggered and Backdrive modes. During closed-loop the Exo will operate in Triggered mode and the trigger will now be sent by the BMI, when it detects a movement intention.
3. For each trial, 2 targets will appear on the screen (North-South positions). Additionally, a green ball shows the current position of the robot’s end-effector. Initially the ball will be in the centre of the 2 targets (i.e. home position). The flexion/extension movements of the elbow joint of the robot are mapped to up/down movements of the green ball on the GUI.
4. The subject has to randomly pick a target and prepare his movement for reaching the target. After preparing for few seconds, the subject has to initiate movement by flexion/extension of his elbow. When the elbow movement crosses a threshold in either direction, the robot becomes active and completes the movement.
5. If the subject starts to moves early i.e. within 2 sec after targets appear, then the trial is cancelled a new trial is started.
6. During calibration, three triggers are sent from MAHI to the EEG system viz., Targets-Appear, Movement-Onset, Target-Reached. During closed-loop, additional two triggers will be generated depending on situation, which correspond to Trial-Timed-Out and Catch-Trial respectively.

**Script for the Subject:**

1. For ‘Backdrive’ mode:

Your objective is to randomly pick 1 of the 2 targets (N-S) and imagine moving the robot’s handle to hit the target by flexing or extension your elbow (green ball). You should take your time and prepare the trajectory that you will move along (up or down). Once you have prepared your movement and decided which target to hit, and are ready, bend or extend your elbow, as fast as you can, to move the robot’s hand up or down, respectively. (Use your dominant hand)

1. For ‘Triggered’ mode:

Same as above, but now only initiate movement towards desired target.

1. In case you start to move too early without taking time to prepare your movement, that trial will be cancelled and after sometime a new trial will start (the targets will disappear momentarily).
2. Once you reach the target, the target will disappear and you should try to relax and avoid attempting to do any movement. The robot will automatically bring you back to the home position. You must remain stationary during this interval and fixate your eyes on the center cross. After some time a new trial will start and you have to repeat the process.
3. The calibrations phase will be conducted in blocks of 20 trials after which you will be given a short break.