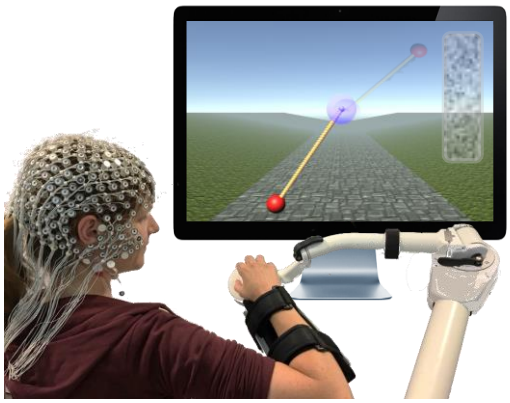
**The role of haptic and visual information on brain activity and motor task performance**

**Background:**



The interest in using robotic systems to investigate the human motor learning processes, especially to improve neurorehabilitation outcomes, has significantly increased in the last years. In parallel, Brain Computer Interfaces have been investigated to improve the interaction between humans and robotic systems.

Although there is recent evidence that robotic training can improve motor function more effectively than conventional therapist-assisted practice, the benefits seem to be limited to patients with severe impairment. A possible explanation for this limited benefit is the inability of the robotic rehabilitation system to adapt to the subjects' special needs. By adjusting the training setup (i.e. sensory-motor environment) with respect to subject related factors (e.g. motor and cognitive capabilities), the rehabilitation output could be optimized.

The goal of this study is to understand how different elements in a game help understanding and learning a motor task. In daily life activities, we constantly make use of information of different modalities coming from the environment to accomplish motor tasks. However, some elements of the environment provide more information than others about the underlying rules to achieve a goal**. In this study, our interest is to qualitatively and quantitatively measure the influence of haptic and/or visual environmental elements on motor task performance and brain activity using EEG.**

**Aims:**

1. Review relevant literature: Influence of perceptual stimuli on cognitive neural correlates.
2. Study design: Design a study protocol to investigate the effects of multimodal feedback on motor learning and execution. Program protocol in Unity 3D.
3. Data collection and analysis: Conduct experiments in healthy participants and statistical analysis of collected data.
4. Scientific reporting: Report methods and results of the study.

**Materials and Methods:**

A commercial robot, EEG system and display device will be provided.

**Requirements:**

Basic robotic motion control and dynamics knowledge (or strong determination to acquire such knowledge). Willing to learn basics in Neuroscience. *Recommended:* Basic human motor control knowledge. High creativity and critical thinking skills.

**Supervisor:**

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