



## Thesis Project Form

**Title (tentative):** Development and test of a body-machine interface for group rehabilitation

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### Description

#### Motivation and application domain

Traditional rehabilitation methods often face challenges in addressing the diverse needs of individuals with motor disabilities and are resource-intensive due to the requirement for specialized personnel. Recent advancements in rehabilitation technology, particularly Body-Machine Interfaces (BoMIs), offer promising solutions. BoMIs leverage the many degrees of freedom of the body to translate movements into control signals for external devices. These systems are cost-effective and customizable, making them suitable for addressing the heterogeneous nature of motor impairments following spinal cord injury, stroke or multiple sclerosis. Studies have demonstrated the efficacy of BoMIs in improving mobility and muscle strength in individuals with cSCI. However, the current rehabilitation landscape requires interventions that are not just effective but also efficient and motivating. Limited specialized personnel and high costs associated with traditional therapy highlight the need for innovative approaches. To address these challenges, we propose the development of a multi-user BoMI for group rehabilitation. This setup aims to enhance efficiency by engaging multiple users simultaneously, reducing the burden on therapists and healthcare facilities. Moreover, group training can increase motivation and engagement, crucial factors for successful rehabilitation outcomes, especially given the high prevalence of psychological conditions among these populations.

#### General objectives and main activities

The long-term goal is to develop a BoMI for upper limb rehabilitation capable of promoting individual recovery through interactive group therapy. Specifically, we aim to:

Aim 1. Develop and test a set of engaging tasks for group training with the BoMI

Aim 2. Investigate the impact of multi-day single and group training with a BoMI on motor skill acquisition in individuals with SCI, multiple sclerosis or stroke.

#### Training Objectives (technical/analytical tools, experimental methodologies)

1. Software development (Unity, C#)
2. Testing on unimpaired and cSCI individuals
3. Data analysis (Matlab)

**Place(s) where the thesis work will be carried out:**

### Additional information

**Maximum number of students:** 1