



## Thesis Project Form

**Title (tentative):** Kinematic and Dynamic assessment of seating performance in healthy subjects and spinal cord injury patients during static and dynamic seating

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### Description

#### Motivation and application domain

To maintain balance healthy subjects integrate visual, somatosensory and vestibular information. In neurological disorders or injuries, such as stroke, multiple sclerosis and spinal cord injury, problems in different sensory inputs affect trunk control abilities, forcing patients to adopt different and balance abnormal strategies with extensive functional impairments. As patients have damaged sensory information, central sensory integration ability is essential for balance. The sensory integration of patients can be enhanced through special training. Training can be implemented by distorting the somatosensory input sensor or restricting visual input.

#### General objectives and main activities

The thesis project aims to study the role of different feedbacks on balance control using a robotic device, able to guarantee different interaction with the subjects. Specifically the thesis wants to study the destabilizing effect that alterations of sensory integration process (sensory perturbations) have on trunk control and the muscular strategies subjects adopt to compensate the instability due to perturbations.

The long-term goal wants to characterize trunk control in different pathologies and identify the principal components in order to develop an effective rehabilitative protocol tailored to the specific need of the subjects. In order to accomplish this goal, the proposed thesis has different aims:

- Study both kinematic and electromyography responses to different perturbations in sitting tasks
- Study the muscular correlates that are fundamental to control trunk motion in the target population and correlate them with kinematic data.

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

The student will learn to:

1. Analyze kinematic, and electrophysiological data;
2. Correlates data in order to have a comprehensive understanding on the phenomenon;
3. Improve the knowledge of Matlab and statistical analysis.

**Place(s) where the thesis work will be carried out:** Centro di UnitÀ Spinale, Ospedale Santa Corona, PietraLigure (SV) - DIBRIS

### Additional information

**Maximum number of students:** 1