UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Motor-cognitive dual-task in subjects with MS the influence of cognitive exercises on postural control in static and dynamic conditions

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Description

Motivation and application domain

Daily activities like walking while talking on the phone exemplify motor-cognitive dual-tasking (MCDT), combining cognitive and motor tasks simultaneously. In such scenarios, involving both balance exercises and cognitive tasks, healthy subjects show a decline in both balance and cognitive performance. This effect is even amplified with advancing age and in the presence of neurological conditions. While the addition of a cognitive task to static balance tasks has been shown to impair postural control, less focus has been given to understanding its impact in dynamic balance situations under dual-task conditions. More specifically, potential variations in terms of balance when the subject is positioned on an unstable platform or when the platform moves in a way that induces perturbations to the patient, have not been investigated yet. Furthermore, a characterization of postural control under various dynamic dual-task conditions in subjects with Multiple Sclerosis (MS), with the aim of understanding the impact of the disease on postural control in such scenarios, has never been performed.

General objectives and main activities

The general objectives will be to:
- examine the variations observed in postural control by introducing a cognitive task in different static and dynamic balance contexts in subjects with MS.
- assess the variations in motor and cognitive performance when performing a MCDT between healthy subjects and people with MS.

More specifically, we will use hunova, a robotic medical device, which allows for assessing balance in both static and dynamic conditions. The device incorporates two robotic platforms (one positioned under the feet and the other beneath the seat) which can either be static or dynamic, an inertial sensor for evaluating trunk movements and a touchscreen display that enables users to interact with it.

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn to:
- use a certified robotic medical device
- performing experiment with human participants in a clinical environment
- acquire basic knowledge about MS and its symptomatology
- administer cognitive evaluation tests
- perform data analysis on postural control, cognitive and dual-tasking performance and the respective statistical analysis

Place(s) where the thesis work will be carried out: FISM; Movendo technology

Additional information

Maximum number of students: 1