

Context

The candidate will be a part of **Rehab Technology** group of Italian Institute of Technology (Genova). Rehab Technologies Lab was born from an agreement between IIT and INAIL and since 2013 has been active in the development of high-tech prosthetic, orthotic and rehabilitative medical devices, ready for immediate use in therapeutic rehabilitation and treatment paths. Our laboratory follows an innovative user centred design approach where technicians, clinicians and patients work together to develop new and innovative devices.

The candidate will work in the context of **upper limb rehabilitation** for orthopaedic and neurological patients.

Position

Impaired trunk control frequently affects stroke survivors. The functionality of the trunk is not only a key predictor but also an essential component for various aspects of recovery, including respiratory function, balance, walking ability, and performance in activities of daily living (ADL). Consequently, it is imperative to prioritize the restoration of these functions from the early stages of the rehabilitation process.

The initial device prototype will be controlled using a real-time target machine, enabling the straightforward acquisition and **immediate processing of sensor signals**.

The candidate will play a crucial role in sensorization design of an innovative 5 Degrees of Freedom (5 DoF) robotic device intended to restore trunk functionality. The candidate will focus on the sensor data acquisition and elaboration. Specifically:

1. Implementing Inertial Measurement Units (**IMUs**): This system will provide real-time assessments of trunk and tibias inclinations, enabling the detection of imbalances and potential falls.
2. Incorporating **Sensorized Seating**: Analysing pressure distribution to reconstruct a pressure map to correctly identify compensatory imbalance mechanisms, along with the clinical interpretation of this data.
3. Developing a **Closed-Loop Control Strategy**: This approach will be based on sensor data, allowing for the identification of compensatory movements and the restoration of the correct trunk position through the device action.

The ideal candidate has a mechatronic background and good skills in using the Matlab/Simulink environment.

To candidate

Please submit your CV along with a concise motivation letter explaining your interest in the proposed topic. Following this submission, we will schedule a meeting to collaboratively discuss your potential role in the project.

Contacts of IIT thesis project supervisor

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