DACHOR PROJECT – INTEGRATED DESIGN AND CONTROL OF HYBRID ACTIVE ORTHOSES

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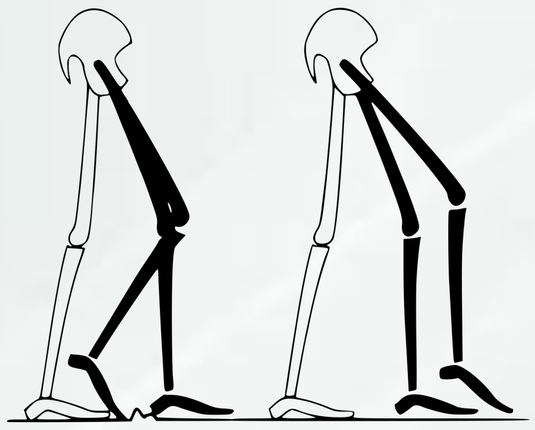
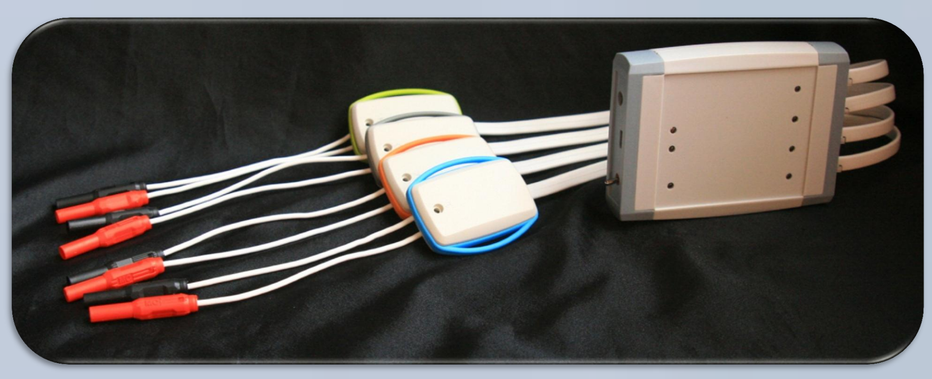


Motivation:

Disabilities involving the Ankle-Foot complex affects thousands of people around the world every year (National Spinal Cord Injury Statistical Center, United States). Some disabilities are generally corrected by Ankle-Foot Orthoses (AFOs), which rely mainly on passive systems. This research aims at endowing standard AFOs with active capabilities.

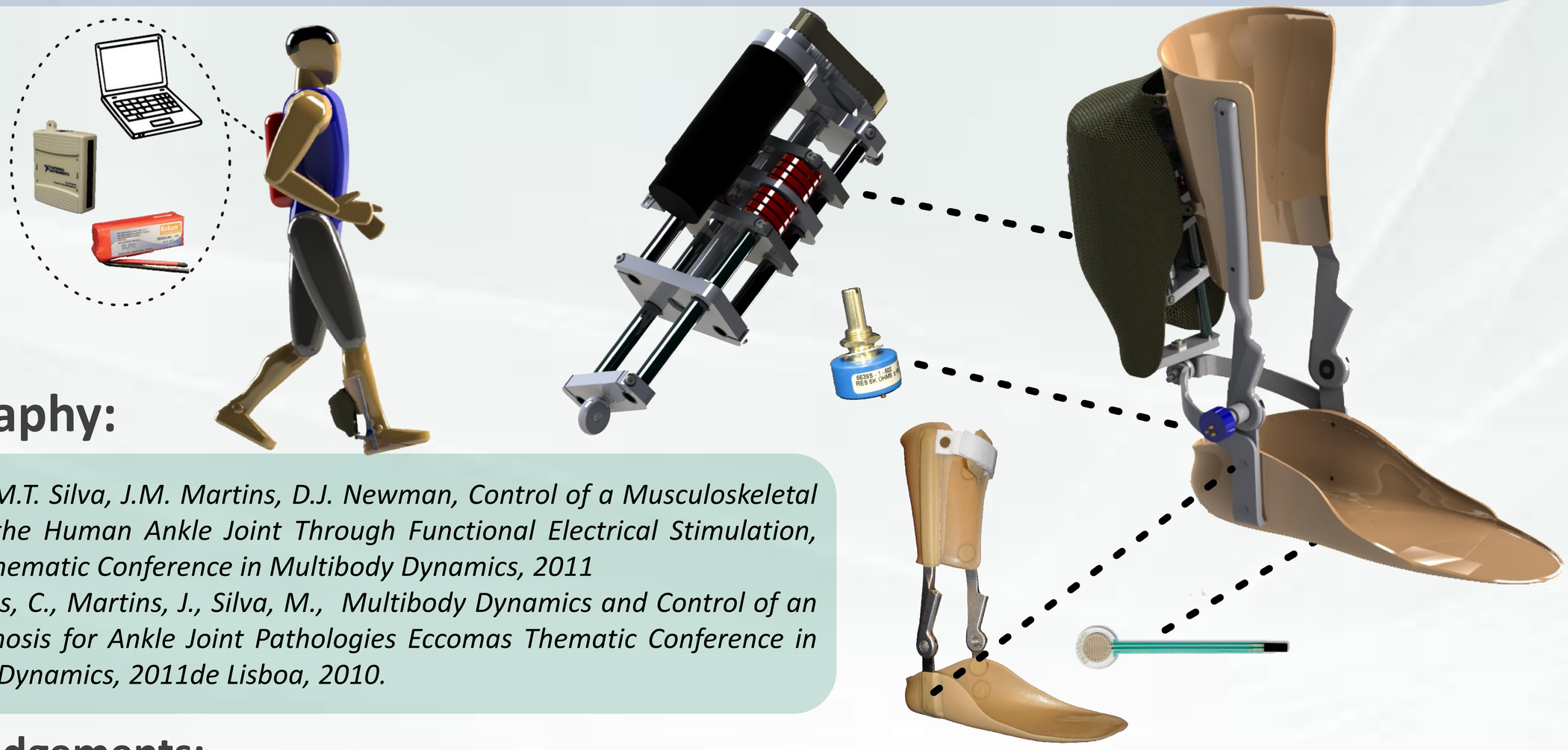
Description:

The DACHOR project proposes the development of an innovative powered Ankle-Foot Orthosis (AFO) to aid individuals with reduced mobility and neuromuscular disabilities of the locomotor apparatus, providing not only the support for general gait disabilities but also some rehabilitation of the musculoskeletal apparatus. The hybrid nature of this powered orthosis is due to an external mechanical actuation that is complemented by functional electrical stimulation (FES).



Custom built Electrical Muscle Stimulator with 4 stimulation channels.

The DACHOR project relies on Multibody Dynamics methodologies to model and optimize altered human gait and on adaptive control architectures to distribute the control forces between both actuators. It is expected that the highlighted innovations will contribute to an improved locomotion and muscular rehabilitation, and also to an increased autonomy and reduced size and weight of the external actuators. The results from the computational modeling provide know-how to the development of active ankle-foot orthoses prototypes with the devised control architecture.



Bibliography:

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2. *Vasconcelos, C., Martins, J., Silva, M., Multibody Dynamics and Control of an Active Orthosis for Ankle Joint Pathologies Eccomas Thematic Conference in Multibody Dynamics, 2011de Lisboa, 2010.*

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