Optimization and Biomechanics for Human Centred Robotics
KIT BioRobotics Lab

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Institute for Anthropomatics and Robotics (IAR)

Master's Thesis: Technical evaluation of passive back exoskeletons in occupational rehabilitation

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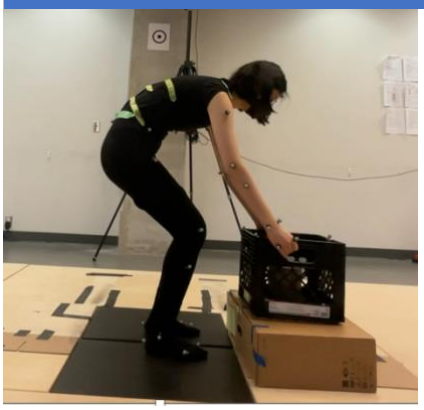
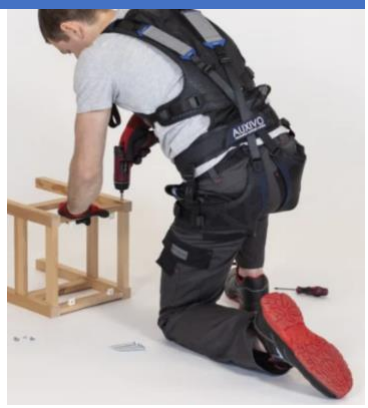
Background

Soft passive back exoskeleton Auxivo LIftsuit





Back pain is one of the major widespread diseases and one of the most common reasons for absence from work worldwide. Back pain is particularly prevalent in work situations where heavy loads have to be lifted or unhealthy working positions adopted. Preventing back pain at the workplace is of great interest to those affected as well as to employers and the healthcare system, and ack pain patients form a big group in. occupational rehabilitation. In addition to ergonomic training for the best possible execution of movements and observing the limits of the loads lifted, back exoskeletons, also called spinal exoskeletons can make an important contribution to the prevention of back pain in the workplace. Exoskeletons could also support and enable the reintegration of workers after a back pain-related absence from work, or even before that, support the rehabilitation process. During the past decade, a number of different spinal exoskeletons have been developed by research labs and companies, ranging from soft lightweight passive exoskeletons to more bulky rigid devices with strong actuators, but the evaluation of their effects is still limited.

Scope of the thesis

The goal of this thesis is to technically evaluate the use of passive back exoskeletons, specifically the commercial exoskeleton Auxivo Liftsuit, in the context of occupational rehabilitation. Together with our collaboration partner, an orthopedical rehabilitation clinic. This includes (in collaboration with medical experts):

- Planning experimeents & procedures for exoskeleton based rehabilitation
- Selecting moodalities to be measured, Developing questionnaires and measurement protocols
- Performing rehablitation studies with experimental and control group
- Evaluating quantitative and qualitative experimental results
- Taking conclusions and extracting technical requirements for future use of exoskeletons in occupational rehabilitation.

Required knowledge

This thesis requires an interest in the transfer of robotic technology to medical applications, understanding of mechanical and robotics concepts (Robotics 1 or similar), programming knowledge. Knowledge in social robotics is a plus.