ExoExpert

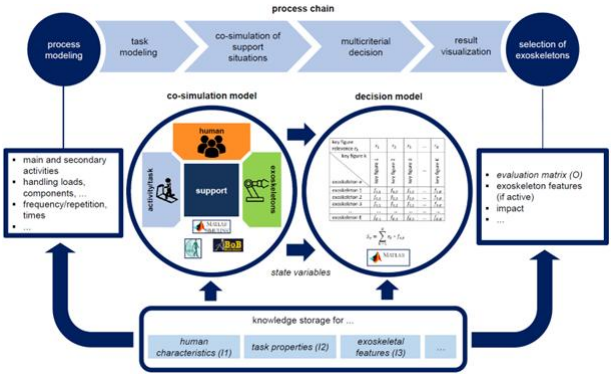
Knowledge-based selection of occupational exoskeletons

BACKGROUND

The interaction between humans and technology has intensified in recent years. As an approach to human-machine interaction, the exoskeleton has increasingly emerged as a suitable support technology in industry. Depending on the production scenario, exoskeletons are suitable for supporting workers by either facilitating or supplementing movements or stabilizing postures. However, supporting methods or tools for the simulation-based selection and adaptation of exoskeletons only exist for individual aspects up to date.

FOCUS OF WORK

Due to a lack of knowledge and models for the detailed and holistic simulation of exoskeletons in manual production scenarios, regarding dynamic and kinematic aspects, there is still uncertainty about their targeted use and supporting effect on the human body. On order to address this issue, ExoExpert aims to develop a novel planning method including a simulation model to provide decision support for the identification of exoskeletons for manual production processes and the adaptation of system behavior for the individual use case.



The project aims to support ergonomists and engineers in appropriately evaluating, selecting and adapting exoskeletons for industrial application scenarios prior to system implementation. Thus, the optimal exoskeleton setup and implementation for the individual occupational situation is enabled. The aim is to:

- develop a system for describing heterogeneous exoskeletons,
- set up a co-simulation model for the multi-criteria evaluation and
- derive a decision model for the context-appropriate selection of an exoskeleton.

KEY MESSAGES

The knowledge- and simulation-based method consists of four main building blocks. Based on the analysis of properties and state-of-the-art methods, a (1) evaluation system for heterogeneous exoskeletons is designed. This system serves as the basis for the development of a (2) co-simulation model, which is composed of the modeling and simulation of (a) process-related and (b) technical and biomechanical parameters. A (3) decision model operationalizes the co-simulation results with regard to the context-adapted selection of exoskeletons. The last step is the (4) practical validation and optimization of the developed method.

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