TECHNISCHE HOCHSCHULE DEGGENDORF

BionEx

USING BIOMIMETICS TO DESIGN LIGHTWEIGHT AND EASY-TO-WEAR STRUCTURES FOR A LOWERLIMB EXOSKELETON TO SUPPORT PEOPLE WITH MOBILITY ISSUES

Weitere Infos:

Abstract

Projekttitel/ Project title:

BionEx
- How Nature can help with optimising Exoskeleton design

Kurztitel/ Short title:

BionEx
- Biomimetic Optimisation of an Exoskeleton

Einleitung/ Introduction:

Exoskeletons are used in physiotherapy or as support for elderly people. Active lower-limb exoskeletons enable the elderly to maintain their mobility until an advanced age, so they can live in their own homes and maintain a good quality of life independent of healthcare resources. However, the state-of-the-art products and prototypes are bulky and uncomfortable with big motors and many straps, which reduces acceptance with patients. The Technology Campus Hutthurm (TCH) at Deggendorf Institute of Technology has therefore developed prototypes of an exoskeleton as part of the ForCEs project (ForschungsCluster Exoskelett - Research Cluster Exoskeleton), which is designed to support the patient, but should be significantly lighter than other lower-limb exoskeletons. To further improve these prototypes, innovative solutions are required. Biomimetics is a field with great potential for new innovations. The term biomimetics describes an interdisciplinary science at the interface of biology and technology with the aim of solving practical problems with the analysis of biological systems. With around 9 million eukaryotic species, there is great potential, which is also to be tapped in the present project. This paper aims to indicate which biomimetic principles can be included in the design process of optimising an exoskeleton.

Ziel/ Aim:

The overall aim of this research is to find more lightweight and easier-to-wear structures that support especially elderly people who suffered from mobility issues, e.g. after an injury or stroke.

Methode/ Method:

To generate innovative optimisation approaches, the problem-driven biomimetic process is followed and adapted accordingly. The process starts with a technical problem, which is identified by using innovation management strategies. To overcome this problem, the required functions are searched in biological systems. When potential biological models are identified, they can be abstracted and potentially implemented and thus improve the technical product.

Ergebnis/ Result:

The results show how biological functions for a given technical requirement can be systematically researched and evaluated and that innovation workshops can be highly efficient for idea generation. Furthermore, the research will demonstrate how a lower limb exoskeleton can be improved with a bio-inspired solution approach. One part of the solution will be adaptable, 4D-printed exoskeleton parts that react to external stimuli.

Projektbeteiligte/ Project participants:

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Logos/ Logos:

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