

Aufgabenbeschreibung

Masterarbeit / Studienarbeit/ Bachelorarbeit

Mechanically Actuated Ankle Rehabilitation Mechanism

The Institut für Medizingerätetechnik is investigating a project for a mechanically actuated ankle rehabilitation mechanism. Rehabilitative physiotherapy exercises, of all kinds, help patients recover sooner so that they can resume their daily tasks. Unfortunately, the number of limited available physiotherapists negatively affects patients' recovery. Additionally, rehabilitative physiotherapy exercises are both time-consuming and sumptuous. As a consequence, rehabilitation robotics have gained considerable attention amongst researchers and scientists as they are time-efficient and available. However, robotic devices are costly and require frequent maintenance. This project is focused on presenting a cheap, and effective yet easy-to-use alternative: a mechanically actuated ankle rehabilitation mechanism that is based on a four-bar linkage and the patients' upper limb motion transmits the required movement. It rehabilitates the human ankle plantarflexion and dorsiflexion.

Below there are some four-bar linkage mechanisms for ankle movement:

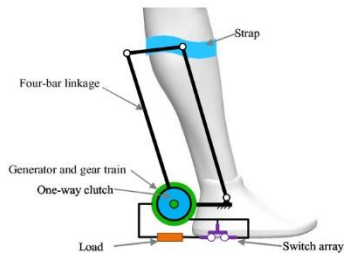


Fig.1. One of the four-bar linkage joints is fixed on a human shank through a wearable strap, serving as an interface between the mechanical device and the human body.

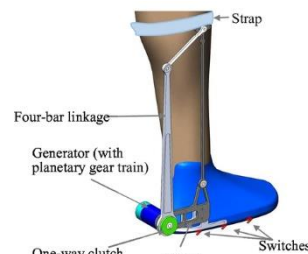
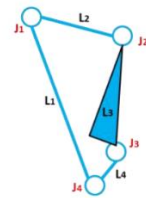


Fig.2. Three-dimension model of the smart energy harvester



Fig.3. Cyclist's bicycle treated as a four-bar linkage



Below you will find the aim of your thesis:

- to model and characterize a four-bar linkage mechanism for the ankle.
- to design and conceptualize the mechanics and electronics integration.
- to evaluate and test the mechanically actuated ankle rehabilitation mechanism.

The following requirements would be ideal for the prospective student:

- basic knowledge in programming microcontrollers
- basic knowledge of CAD (Creo Parametric preferably)
- basic knowledge of manufacturing processes
- basic knowledge of mechatronics

Supervision will be provided in English. Hence, the thesis should be written in English.

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