

Aufgabenbeschreibung

Studienarbeit/ Bachelorarbeit

Development of a game-based ankle rehabilitation device

The Institut für Medizingerätetechnik is investigating a project for the development of gamification for ankle rehabilitation. 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 the potential to carry out the required rehabilitation tasks. This project is focused on merging an existing mechanically actuated four-bar mechanism with the idea of gamification for ankle rehabilitation. It presents rehabilitation regarding dorsi- and plantarflexion movements. Below there are some Ankle Rehabilitation Robotic Systems and the developed four-bar mechanism from the literature.

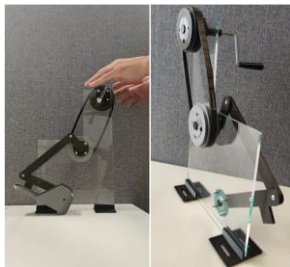


Figure 1 Model of the mechanically actuated four-bar mechanism at the IMT, university of Stuttgart.

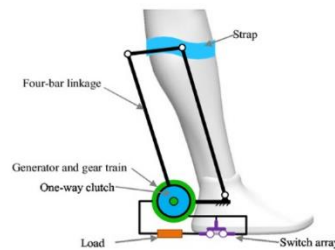


Figure 2 C. Mingjing; et al. (2018): A smart harvester for capturing energy from human ankle dorsiflexion.

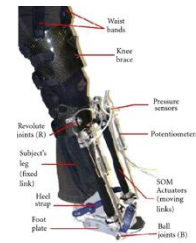


Figure 3 W. Jeffery; et al. (2007): Robotic Gait Trainer Reliability.

Aim of your thesis:

- to model and characterize a game-based rehabilitation unit for the four-bar mechanism for the ankle.
- to design and conceptualize the mechanics and electronics integration.
- to evaluate and test the game-based ankle rehabilitation four-bar mechanism.

The following requirements would be ideal for the prospective student:

- basic knowledge of MATLAB / Ansys
- basic knowledge of CAD (Creo Parametric)
- basic knowledge of mechatronics

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

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