Development of a Novel Walking Training Machine

-Motion control, Directional intention identification and Clinical trial-

Project Leader:

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Objective:

Walking is not only the primary form of human locomotion, it is also a good form of exercise for maintaining human health. A novel walking training machine, called omni-directional walker, has been developed for walking rehabilitation and walking support. This walker is equipped with four omni-directional wheels, which can allow users a full range of normal walking freedom. Furthermore, its unique design is more effective than earlier models in preventing users from falling and avoiding obstacles. In this research, control algorithms to increase the precision of the walker's movement and to improve the interaction between the walker and the user are being investigated in order to make the walker more effective and more human friendly.

Omni-directional walker

Project Outline:

(1) Improvement of path tracking precision

It is necessary for the walker to precisely follow the paths defined in the training programs to guarantee the effectiveness of rehabilitation. We will improve the path tracking using robust control or adaptive control considering the center of gravity shift and load change of the walker.

(2) Directional intention identification

The walker can also be used for walking support. In this case, the walker needs to automatically recognize the user's directional intention. A method is proposed to identify a user's directional intention according to the pressures from the user's forearms based on f The distance type fuzzy reasoning method. In the next step, we will introduce high-speed learning method to improve precision still more.

(3) Clinical trial

The results of (1) and (2) will be tested by clinical trial with doctors and physical therapist in the hospital or care home.   Finally, this omni-directional walker will be used for real walking rehabilitation.

References:

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③ Yinlai Jiang, Shuoyu Wang, Kenji Ishida, Takeshi Ando and Masakatsu G. Fujie, Control of an Omnidirectional Walking Support Walker by Forearm Pressures, IEEE EMBC2011, pp.7466-7469, Aug. Boston, USA.

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