An Improved Design of Home Cycling System via Functional Electrical Stimulation for Paraplegics

陳適卿

Kuoshiang Chen;Shih-Ching Chen;Kun-Horng Tsai;Jia-Jin Jason Chen;Nan-Ying Yu;Mao-Hsiung Huang

摘要

Abstract

This study developed a functional cycling system for home use by paraplegics. It is a hybrid system with functional electrical stimulation (FES). In an earlier study, three tasks were completed: (1) determine user needs and potential problems in interface design, (2) interviews with therapists, and (3) questionnaires to the patients. These findings were converted to functional elements (for design of the FES cycling ergometer) and design criteria (for evaluation of the FES-cycling device).

The FES device has both hardware and software features. Hardware includes: arm-crank, leg-cycling, guarded thigh holders, protective paddleboard, easy-access battery box and easy wheelchair height adjustment. The wheelchair can roll into a U-shaped track so the patient can exercise while in the wheelchair. A pocket PC-based controller was used for stimulation control of the patient and data acquisition. A better controller was used to adjust the stimulation based on a pre-defined stimulation pattern. The data recorded was wired to a clinic for evaluation of cycling smoothness as well as to redesign the training protocol.