عنوان مقاله:

Developing a Stimulator and an Interface for FES-Cycling Rehabilitation System

محل انتشار:

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خلاصه مقاله:

FES cycling system is introduced as a beneficial rehabilitation method for restoring muscle function in SCIpatients. The system is made up of three main parts: a cycling device, a controller and an electrical stimulator. In this paper, a commercial motorized bicycle was augmented with an electrical muscle stimulator and a pedal observation interface. Firstly, a six-channel electrical stimulator was designed and manufactured whose output consists of current pulses (faradic/bursting stimulation pulses) with a wide range of rectangular waveforms (monophasic/biphasic) ranging from 0- 150mA with steps of 0.6mA and time resolution of 5μs. The device is capable of receiving position feedback data from the cranks and exchanging data with the computer via serial connection, that is, it is capable of sending the cycling speed to the computer and receiving two groups of commands from thecomputer: the commands, needed for adjusting the frequency and pulse width of the output signals as well as the commands needed for activating the desired stimulation channel at different time intervals. The main advantages of the device are the high level of output current amplitude, the capability of fine time and amplitude tuning, the vast range of output waveforms, and the use of low cost electronics components in its structure which makes it economically efficient for being used in various FES research studies, specially FES-cycling. Secondly, a commercial motorized bicycle (Viva1) is equipped with a pedal observation interface. The device receives the signal produced by the shaft encoder attached to the motor of the bicycle and uses this data in order to calculate the cycling speed and provide an angular position index which is consequently fed to an electromyography device and helpswith the process of determining muscle recruitment pattern .in FES-cycling

کلمات کلیدی: