

PSYCHOMOTOR REHABILITATION OF SMALL CHILDREN BY MEANS OF INTERACTIVE MECHATRONIC SYSTEM

Iwona Chuchnowska¹, Agnieszka Hankus², Agnieszka Sękala³

¹ Silesian University of Technology, Biomechatronics Department, Faculty of Biomedical Engineering, Zabrze, Poland; ² Center of CNS Disorders Treatment and Supporting Children's Development, Kangaroo, Sosnowiec, Poland; ³ Silesian University of Technology, Institute of Engineering Processes Automation and Integrated Manufacturing Systems, Faculty of Mechanical Engineering, Gliwice, Poland

Introduction

Rehabilitation of children with motor organ impairment is a complex process, in which an important role is played by psychological rehabilitation. The main purpose of this work is to present the assumptions of an innovative method of rehabilitation of small children with lower limbs dysfunction based on interactive mechatronic equipment devised by the author. The method consists in movement therapy combined with simultaneous psychological stimulation of the child. As a controlling function of the rehabilitation process one applied EEG sensor which measures brain activity. The patient undergoing rehabilitation will not be easily bored during the therapy and thus will repeat recommended movement exercises, which is a critical factor in the case of small children.

Assumptions of the System

The mechatronic system presented in this work supports the children's rehabilitation process by "play and learn" activities, which is essential to their development. At the same time a psycho-motor stimulation of the body takes place. The main components of the system are as follows: a children's tricycle, drive and control system, EEG sensor, stationary PC and multimedia display. The child under rehabilitation is subject to the following external stimulation: by means of their eyesight and hearing they receive multimedia transmission, while the rotary movement of the tricycle pedals activates their muscular and skeletal system. The measurement system of the brain activity was applied here in order to intelligently control the degree of the child's interest in the process of rehabilitation. On the basis of the obtained electroencephalogram (EEG) one assesses the degree of the child's concentration. The achieved level of concentration is further used as feedback in the control loop of the change of multimedia content. The movement of the limb registered by means of the engine control

system will generate a certain reaction on the synoptic screen connected to the master control unit.

Summary

The innovative element presented in this paper consists in combining standard cyclotherapy with multimedia technology. Application of multimedia content, such as games and educational software, aims at distracting the child's attention from doing boring and tiring workout. In order to identify the degree of the child's concentration while exercising and to provide a quick reaction to growing tiredness of the rehabilitation process one applied the measurement of the brain activity by means of EEG technique. The combination of movement therapy with psychological stimulation enables the children to use their abilities more efficiently and speeds up the rehabilitation process.

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References

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