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**Developing of the informational system for
management of the electromyographic device**

Teză de master

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ANNOTATION (ENGLISH)

At the master's thesis "Developing of the informational system for management of the electromyographic device"

The thesis includes the list of figures, introduction, three chapters, conclusions, the bibliography of 90 titles, 80 basic pages including 31 figures.

Key words: Muscle, signal, rehabilitation, EMG, patients, soft, graph, EMG signal processing, storage.

Research domain is the theoretical and practical aspects of electromyographic signal collection as well as interactive rehabilitation methods.

Thesis scope consists in developing an information management system for an electromyographic device for rehabilitation, which will help rehabilitate patients due to muscle trauma, displaying and scoring procedural data, allowing the tracking of rehabilitative progress.

Methodology of scientific research is based on research of methods to obtain and process the electromyographic signal.

Scientific novelty and originality of results consists in developing an information management system for an electromyographic device that combines two important functions - monitoring the muscle activity during the rehabilitation process and the interactivity and motivation of the patient to practice rehabilitation after some trauma. The actual information system consists of several parts. EMG signal acquisition module, displaying the signal, with the next storage of the signal. Interfacing the profile of the doctor and the patient.

The theoretical signification is the elaboration of methods of research and processing of the EMG signal. The first chapter includes the theoretical research of muscle structure and activity, and the methods of studying it. The second chapter includes the methodology of developing the information system. The third chapter includes the results obtained and the results of software simulation / testing.

Practical value of the thesis consists of building an informational system of the electromyographic device for rehabilitation that participates directly in the rehabilitation of the patient's muscular activity and monitoring the progress of the rehabilitation exercises.

ANNOTATION (ROMANIAN)

La teza de master cu tema “Elaborarea sistemului informțional de gestionare a dispozitivului electromiografic”

Teza cuprinde lista figurilor, introducerea, trei capitole, concluzii, bibliografia din 90 de titluri, 80 de pagini de baza inclusiv 31 de figuri.

Cuvinte cheie: Mușchi, semnal, reabilitare, EMG, pacienți, soft, grafic, liste prelucrarea semnalului EMG, stocare.

Domeniul de cercetare il constituie aspectele teoretice si practice al culegerii semnalului electromiografic precum si metode interactive de reabilitare

Scopul lucrării consta in elaborarea unui sistem informational de gestionare pentru dispozitiv electromiografic pentru reabilitare, care va ajuta la reabilitarea pacienților in urma traumelor musculare, afisarea si scocarea datelor procedurilor, permițând urmărirea progresului reabilitational.

Metodologia cercetării științifice se bazează pe cercetarea metodologiei de obținere si prelucrare a semnalului electromiografic

Noutatea și originalitatea științifică a rezultatelor consta in elaborarea sistemului informational de gestionare al unui dispozitiv electromiografic care combina doua funcții importante – monitorizarea activității musculare in timpul procesului de reabilitare si interactivitatea si motivarea pacientului sa practice exerciții de reabilitare după un oarecare traumatism. Sistemul informational propriu zis consta din mai multe parti. Modulul de achiziționare a semnalului EMG, afisarea semnalului obtinur, cu urmatoarea stocare a acestuia. Interfatarea profilului medicului si a pacientului.

Semnificația teoretică o constituie elaborarea metodelor de cercetare si prelucrare a semnalului EMG . Primul capitol cuprinde cercetarea teoretica al structurii si activității musculare, si al metodelor de studiere a acesteia. Al doilea capitol cuprinde metodologia elaborării sistemului informational. Al treilea capitol cuprinde rezultatele obținute si rezultatele simulării / testarii soft-ului.

Valoarea aplicativă a lucrării consta in construirea unui sistem informational al dispozitivului electromiografic pentru reabilitare care participa nemijlocit la reabilitarea activității musculare al pacientului si monitorizare progresului in urma exercițiilor de reabilitare.

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INTRODUCTION

Electromyography (EMG) is an electrodiagnostic medicine technique for evaluating and recording the electrical activity produced by skeletal muscles.[1] EMG is performed using an instrument called an electromyograph to produce a record called an electromyogram. An electromyograph detects the electric potential generated by muscle cells[2] when these cells are electrically or neurologically activated. The signals can be analyzed to detect medical abnormalities, activation level, or recruitment order, or to analyze the biomechanics of human or animal movement. Signals are becoming increasingly important in many applications, including clinical/biomedical, prosthesis or rehabilitation devices, human machine interactions, and more. However, noisy EMG signals are the major hurdles to be overcome in order to achieve improved performance in the above applications. Detection, processing and classification analysis in electromyography (EMG) is very desirable because it allows a more standardized and precise evaluation of the neurophysiological, rehabilitational and assistive technological findings. This paper reviews two prominent areas; first: the pre-processing method for eliminating possible artifacts via appropriate preparation at the time of recording EMG signals, and second: a brief explanation of the different methods for processing and classifying EMG signals.

Generally EMG signals are variable to the amplitude of the muscle activity. There is a sequential order to perform a specific muscles activity in different muscle groups. Self-repeating periodic activity defines a period of time in which certain muscle participates in the activity. The EMG include onset and offset times to identify the time period of EMG bursts. In this paper, we set the default threshold value and it gives the threshold peak level on the electromyograms which is helpful in prediction of muscle stimulation for upper limb as well as lower limb amputee. It is perform by using LabVIEW.

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