Classificação de movimentos da mão utilizando redes Perceptron Multicamadas otimizadas via algoritmo de Otimização por Enxame de Partículas

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Resumo

The myoelectric signal allows numerous applications in the medical field, such as, the control of myoelectric prostheses that have an important participation in the rehabilitation process of amputees. However, it is necessary to develop an efficient system, capable of identifying the desired movements. Therefore, this paper carries out the development of Multilayer Perceptron Artificial Neural Networks with optimized architecture through the Particle Swarm Optimization algorithm, for the recognition of classes of hand movements and their respective levels of contraction, based on myoelectric signals collected from the forearm and treated using the Haar family's Wavelet Packet Transform. For movement classification, an accuracy rate of 100% was obtained, while for contraction levels the accuracy rate was 86.93%.

Palavras-chaves: Sinais Mioelétricos, Redes Neurais Artificiais, Perceptron Multicamadas, Otimização por Enxame de Partículas, Transformada Wavelet Packet

Development of a Power Management Circuit applied to Implantable Biomedical Devices.

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Resumo

The application of implantable biomedical devices for continuous monitoring of vital signs became essential in early detection of body’s dysfunctions or diseases. This scenario therefore enables the use of these devices embedded in the system of myoelectric prostheses (for the implementation of a neuromorphic tactile feedback control, for example), but the need to recharge the devices is one of the main challenges for improving performance and miniaturization. An alternative is the use of an Energy Harvesting system by Radio frequency, to convert RF waves into DC energy. Thus, this work addresses the development of a Power Management Circuit for Implantable Biomedical Devices, pursuing the collection of physiological signals and, in the future, to implement it for the control of myoelectric prostheses. In this study, experiments were carried out to evaluate the power received in relation to the distance of the RF transmitter, the energy charging and discharging time, and consumption in different loads.

Palavras-chaves: Power Management, RF Energy Harvester, Biomedical Device, Implantable, Myoelectric Prostheses