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REDUCTION OF POWER LINE INTERFERENCES FROM ELECTROCARDIOGRAPHIC SIGNALS BY APPLYING ADAPTIVE FILTERING ON FIELD PROGRAMMABLE GATE ARRAY CIRCUITS

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Abstract

The paper presents an extended implementation of an adaptive filter structure for electrocardiographic (ECG) signals denoising which is implemented on Field Programmable Gate Array (FPGA) circuit. The proposed FPGA adaptive filter structure can be used to clean in real-time the ECG signals from power line interferences. In order to update the adaptive filter weights, the Least Mean Square (LMS) algorithm is used. The discrete forms of the filter structure and adaptive algorithm are presented and argued. The adaptive filter structure and the LMS algorithm were developed on the DE2 platform (Development and Education Board, version 2) which includes an Altera Cyclone II FPGA circuit. The obtained experimental results concludes that the FPGA implementation, designed to process the ECG signals in real-time, presents good performances in suppressing the power line interfering signals.

Key words: digital adaptive filtering, ECG, electromagnetic interferences, FPGA, power line interference

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