

DENOISING OF ABDOMINAL MATERNAL ECG SIGNALS

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Abstract

The abdominal electrocardiogram (AECG) which is the recording of the cardiac activity of both the mother and the fetus, can be used as the signal from which the fetal ECG is obtained. The main challenge is to extract the fetal ECG, which is strongly distorted by maternal component of dominating energy and other artifacts. Baseline wander is caused by the patient's breathing or movements. Baseline wandering can mask some important features of the Electrocardiogram (ECG) signal hence it is desirable to remove this noise for proper analysis and display of the ECG signal. This paper presents the implementation and evaluation of some methods to remove this noise. The Signal to noise ratio (SNR) are calculated of the denoised signals to compare the performance of some of these filtering methods. Kaiser FIR filter has been proved to be an efficient method for the removal of baseline wander from the AECG signal.

Power-line interference which consists of a sine wave with a center frequency around 50 Hz and harmonics at multiples of this frequency may significantly corrupt electro-physiologic recordings. A Notch filter with a bandwidth of 2Hz was designed in Matlab using Fdatool to remove the 50 Hz power line interference. The abdominal ECG signals are taken from the Physionet Non-invasive ECG database.

Keywords: AECG Filtering, Baseline wander, Signal to Noise, Ratio, QRS, Power-line interference (PLI), Physionet.

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