Annals of the Academy of Romanian Scientists
Series on Science and Technology of Information
ISSN 2066 - 8562 Volume **4**, Number **2**/**2011**

PCG SIGNAL ANALYZING USING WAVELET TRANSFORM

S. GERGELY,[1] M. V. PUSCA,[2,3] M. N. ROMAN[3]

Abstract. *There are a very few PCG (Phonocardiography) signal characterization algorithms and also only a reduced number of devices capable for a complex pathology analysis. The analysis of the PCG signal is based on using of wavelet transform to achieve the full multi-resolution decomposition of the signal. The paper presents two such algorithms which are included in a portable device controlled by two microcontrollers.*

Keywords: phonocardiography, complex pathology analysis, digital signal processing

1. Introduction

Digital signal processing has a large number of analytical tools including the most important which is the Fourier analysis. Thus Fourier analysis is a technique that can transform a time domain signal into frequency domain. A number of applications in signal analysis require conservation or temporal information of a signal for which Fourier analysis encounters serious difficulties. To correct this deficiency Dennis Gabor introduced the concept of STFT (Short Time Fourier Transform) method which allows analysis of a shorter duration of the signal. This method solves in part the representation of the time-frequency signal, but there is a drawback by maintaining a constant time window throughout the frequency range for which the analysis is done. The appearance of wavelet transform allows the windows to be variable for the analyzed signal over the entire frequency spectrum. Therefore the first analyzing method displays a time-frequency scalogram of the PCG (Phonocardiography) signal. The second method enables the PCG signal analysis by converting two-dimensional convolution of a reference signal with the acquired signal [1]. By comparing the results of convolution it can be determined the correlation of each reference signal with the separately analyzed input signal.

The basic functions used in the Fourier analysis are periodic functions (sine) with infinite duration. Thus it is possible to obtain information only in the frequency domain and of course the provided analyzed signal type must be periodically. Fourier transform for aperiodic signals will generate a continuous spectrum. Figure 1.1. presents a non-stationary signal which can be seen [6] that the inverse

[1]National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj-Napoca, Romania.
[2]Corresponding member of the Academy of Romanian Scientists.
[3]Technical University, Cluj-Napoca, Romania.