

Abstract

One of the methods of signal analyzing the lungs is by using a stethoscope. This technique is called the auscultation method. The disadvantages of this method are that it's affected by the sensitivity of the ears, noises coming from the outside, and so on.

The designing process of the signal extractor of lungs as a first step for interpretation and classification of the lung signals by using FPGA has some advantages, for example FPGA is an embedded designed system, a low cost hardware, and the high point of precision that the method has, and also because FPGA can work on high frequencies. The extractor system is designed using a wavelet transformation method with mother wavelet Daubechies 2. The recording of the lungs sound is processed with Matlab and the digital value of it then gets converted into 16 bit binary with the help of Microsoft Excell 2007. This binary data will be stored into ROM as a data generator. The input of this generator will be continued to IC FPGA for the extraction process. This extraction process will be passing the signal to several wavelet cells which stacked into 5 levels. A wavelet cell consisted as a Low Pass Filter (LPF), High Pass Filter (HPF), and a downsampler. Some points which represent every level will be squared in value to get a positive value out of it and then gets summed so afterwards, we will get characteristic coefficient. This value will be drawn later as a characteristic pattern with the help of Microsoft Excell and gets compared with the result of the simulation of the extraction of the signal characteristic of lungs sound in Matlab^[7].

By using those methods we will get a coefficient value for bronchovesicular (97, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0), wheezing (118, 3, 0, 3, 0, 0, 0, 0, 0, 3, 0, 0, 1, 0, 0), bronchial (50, 150, 33, 103, 1, 16, 15, 18, 0, 0, 0, 1, 0, 0, 0), coarse crackles (50, 134, 33, 123, 2, 25, 2, 28, 0, 5, 3, 0, 3, 0, 0), and pleural friction (97, 62, 0, 50, 0, 0, 2, 0, 0, 4, 1, 0, 0, 0, 0) with the memory usage of Virtex 4 can be described as 13% of total registers, 88% LUT, 99% occupied slices, 80% DSP48, and 50% BUFGs (*clock buffer*).

Keyword : lungs sound signal, wavelet transform, FPGA