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# Optimized design of human Lung sound sensor development applied in clinical diagnosis

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In this paper, we use the stethoscope as the biomedical sensor of human Lung sound detection with the circuit of amplifier. We include Hilbert-Huang Transform (HHT) theorem, which proposed by Norden E. Huang, since it's suitable to process non-stationary and non-linear signal, such as bio-signal. For our research, we take the heart sound signals as interference noise. So we propose the method for filtering the interference of heart sounds from lung sounds. We put the stethoscope on the chest of the object we want to measure. Then, we turn the bio-signal of breathing sounds into electric signal with the circuit. And then, passing by the MP3 player, we can capture the digital signal of breathing sounds by the micro processer. Captured signal can be broken into number of intrinsic mode function (IMF) by empirical mode decomposition (EMD).The IMFs can be transformed into Hilbert space, then it could be observed at its instantaneous frequency in time domain. Due to standard deviation of heart sounds and lung sounds have different range, we classify the signal of heart sounds and lung sounds by the threshold value of standard deviation which we choose. Finally, computing the power spectrum density (PSD) is the result between the input signal and the output signal. Compared with wavelet analysis and Fourier Transform for non-stationary and non-linear signal such as bio-signal, there is better resolution in time domain and frequency domain. So in our research, we improve heart-sound-noise reduction percentage (HNRP) to 85.42 %.

## Biography

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