Rf based wireless electronic sthethoscope

A condenser micro phone is connecting into its head of diaphragm which s used to capture the heart sound and change acoustic energy into electrical energy. The heart sound signal is then processed by preamplifier and amplified to achieve the high gain and filter Is used to give the desired audible heart sound which Is sent wirelessly using RFC module at receiver side. Indeed more than one doctor can play the heart sound and can do auscultation easily.

The PC connectivity Is also made available so that the captured data can be sent to PC for storage purpose and software analysis using think lab. Video can be made through cam and send Vela internet for telekinetic consultation. Keynoters. Electronic stethoscope, RFC. Heart sound 1. Introduction The technique of listening to internal sounds, such as the circulatory and respiratory systems, has been used for many centuries. A stethoscope is a very commonly use device.

The chest piece consists of a shallow, bell-shaped piece and a clear, stiff diaphragm, which is then connected to the metal earpieces by a flexible tube. The bell is used to pick up lower frequency sounds, and the diaphragm is used for higher frequency sounds. When the chest piece Is placed on the skin, vibrations within In the body are amplified by either the bell or diaphragm. These acoustic pressure waves then travel up through the tubing to the earpieces and Into the listener's ears It still requires substantial clinical experience, a fine stethoscope and good listening skills.

Cardiologist notice that an unnatural heart beats during physical exercise and after return to a original shape there is a probability of sudden death

because the rating of cardiovascular diseases grow up year by year, Cardiovascular diseases belong to heart and blood vessels that's why this disease is classified as one of the most common disease in all over the world, as a result of the growing of he wireless technology the diagnosis based on wireless technology to analyze the heart sound for the diagnose of cardiovascular disease will be a new technique[l].

The main purpose of this paper is to design a low cost affordable wireless electronic stethoscope. We processed heart beat signal and sent It wirelessly using Radio frequency module. This method Is very cheap and affordable as compared with other personal are networks (PAN) and wireless devices such as Bluetooth and Globe. Almost wireless electronic stethoscope use Bluetooth and Gibe technology the impaired with RFC module, we can overcome this disadvantage by using the process of preamplifier, filter and power amplifier stage with variable gain after doing this we can get nearly same result as of gibe and Bluetooth.

One major difficulty with acoustic stethoscope is that heart sound is highly low level and short coming during heart sound analysis. However, there are problems associated with current models. For example, with the standard acoustic stethoscope, the listener is not able to amplify the sound. This is sometimes a problem if he or she is only getting very quiet sounds through the stethoscope [2]. In a stethoscope condenser micro phone is connected into its head of diaphragm which captures the heart sound and change acoustic energy into electrical energy. The heart sound signal is processed and amplified for desired audible sound.

The currently used stethoscope for auscultation uses traditional mechanical stethoscope whose sound quality and accuracy is low [4]. One problem with acoustic stethoscope is that auscultation is easily affected by the subjectivity of the doctor and measuring environment. Low frequencies which represent the heart sound cannot be appropriately distinguished by the doctors. Rest of the paper organized as related work done for this idea, different heart sounds and design of whole system including circuit of signal processing system with its simulation and finally features of system with conclusion is discussed in this paper. . Related Work The first stethoscope Invented by French physician Rene© Lance in 1816, the first stethoscopes were simple wooden tubes with flared trumpet-like ends. Although many incremental improvements have been made to Leanness's original invention, including flexible tubes and binaural constructions, the essential function and usage f the non-electronic stethoscope remained relatively unchanged for almost 150 years [5].

Ottomans who recorded and analyzed bowel sounds of infants with pyloric Stetsons, before and after applying a corrective phlebotomy references include at [7]. Heart beat observing system with wireless technology using GIBE is represented in [2]. The system contain bandage type heart rate detection unit this system contain a conveying information through wireless, data record and a networked computer. [8] and [9] gives idea about an electronic stethoscope based n embedded processor and Bluetooth transmission which fulfill the shortages from auscultation.

It contain a small device when pre-processing and amplification is done it play the heart sound PC connectivity is also provided so that in addition data

can be sent to PC through Bluetooth for storage, design of electronic stethoscope is explained in [10]. The main objective of this is to develop wireless electronic stethoscope which overcomes the acoustic stethoscope drawbacks Gives idea about the wireless stethoscope, it consists heart sound transmission technology using GIBE gives idea about the wireless stethoscope [1].

The proposed design devices consist of hardware stages like front end pickup circuitry, with low pass filter and pre-amp and amplifier designed to deliver an audible and efficient sound compare with current available wireless stethoscope like Gibe and Bluetooth and deliver a low cost wireless electronic stethoscope. Nowadays there are many electronic stethoscopes available in the market, in which Litany electronic stethoscope 3000 is commercially available which is manufactured by mm [6]. M has a functionality of up electronic stethoscope which is commonly used electronic stethoscope model CE-321 ND it has also 18 times greater amplification than the acoustic stethoscope with the functionality of 8 level volume control manufactured by ICE technologies. 3. Body Sound Heart sound is created by beating of heart sound, there are two types of heart sound SSL and so, where SSL is the first heart sound and so is the second heart sound which is generated by closing of valves as shown in figure I(a) Fig.. Normal Heart Sound Murmurs occur when a valve does not work properly.

When a valve does not open all the way, less blood flows through the smaller opening. When a valve does not close tightly, blood may leak backward. This can occur in either systole or diastole as shown in fig I(b). Heart beat and murmurs are of low level sound and band limited frequency which is 100 to

1000. It means that communication of a signal is very much noticeable for human hearing that's why the auscultation is very much difficult with a traditional acoustic stethoscope. Fig.. Murmurs sound In a standard mechanical stethoscope, there are two settings, or sides, that can be used to listen to internal sounds.

The bell has a detection range of 20 - 500 Hz's and is designed to be able to hear the sound of the heart and blood vessels pumping. The other side of the mechanical stethoscope is the diaphragm. The diaphragm has a range of 200 - 1000 Hz's and is used to listen to the higher frequency respiratory sounds [1] and [11]. By utilizing an electrets condenser microphone capable of picking up sounds with a frequency as low as 20 Hz's and a low pass filter designed to eliminate sounds about 1000 Hz's, the desired frequency range was achieved for the wireless Electronic Stethoscope. 4.

System Architectural Block Diagram The whole system design consists of two parts one is transmitter and other is receiver. Fig: 2 shows Architectural block diagram. The transmitter consist front end circuitry, sensor, preamplifier, filter and power amplifier with variable gain and FM transmitter module. Fig.. Transmitter 4. 1 Front end Circuitry This circuit is designed with the help of protests 7. 6 software. The main objective of this circuit is to amplify the signal from the condenser microphone with a reasonable signal-to-noise ratio, maintain low power consumption, and be cost effective.

Frequency response, gain, noise, and harmonic distortion also must be taken into account when designing the analog circuit. The circuit was separated into four main stages: preamplifier, Filter, Amplifier, and FM transmitter

module (Figure 3). Preamplifier The preamplifier was created to increase the low-signal from the condenser microphone to line-level for further amplification. This was accomplished by providing a voltage gain from the microphone to the circuit. The LEMMA is an operational amplifier (pop-amp) that is used in the preamplifier circuit to achieve a voltage gain of 3.

The gain can be varied by increasing or decreasing the resistor between pin 1 and pin 2 or the resistor between the microphone and pin 2. The LEMMA was chosen because it is a low-power device that draws a small amount of current can be powered by a 3 volt DC supply. There are other various pop-amps that can be used in this circuit; however, the LEMMA is very inexpensive. Filter A low-pass ARC filter was used to limit the audible frequency. The filter has a characteristic of 500 Hz's cut-off frequency; this was achieved by using a 3. 2 k resistor and a 0. If capacitor, two filters implemented to simulate the bell and diaphragm. A typical bell has the detection range of 20 - 500 Hz's for sounds of the heart and blood vessels; this can be implemented using a low-pass filter. A typical diaphragm has a detection range of 200 - 1000 Hz's for respiratory sounds; this can be implemented using a band-pass filter RL. These filters would be used by the physicians to focus on either heart or respiratory problems. A switch in between these two filters can be applied to determine which mode would be used.

The signal then travels to the FM transfer stage followed by the filter stage. Amplifier The amplifier is used to supply the necessary power to drive the headphones. The LEMMA is a low voltage audio power amplifier that is used to achieve a gain of 40. The main can be varied by setting the values of the

capacitor and resistor between pins 1 and 8. The gain was set to 40 because further amplification lead to increase in noise and distortion. In addition to the gain increase in this stage, the volume control was implemented.

The volume was controlled by varying the KICK variable resistor. From the amplifier stage, the signal travels to the filter. RFC Transmitter Module This circuit is based on nanny transistor. It uses FM modulation techniques. It is taken because of its cost; its component used in it and its supply voltages, no more external component is required except of its antenna. L forms an oscillator that operates in the 88 to 108 Mash range. A small button type variable capacitor with a value of 22 If can be used to adjust the resonant frequency of the tank circuit.

The variable capacitor and the inductor coil form the Tank circuit (LLC circuit) that resonates in the 88-108 Mash the oscillator is voltage controlled, so it is modulated by the audio signal that is applied to the base of nanny transistor. 4. 2 Receiver Fig.. Receiver Fig: 4 shows the receiver architectural block diagram. The design of receiver system insists of three parts: FM receiver module, power amplifier and a headphone to listen the heart sound. The receiver module catches the signal from the air and transmits to power amplifier.

The power amplifier amplifies the signal with gain control same as at transmitter side. In the end the amplified signal is given to the implemented with facility of heart signal storage on PC for further analysis. This signal can be sent over internet for consulting with other physician. 5. PC Connectivity The PC connectivity is also provided so that the captured data can be sent to

PC wrought serial ports for storage purpose and software analysis using think lab, use of software analysis for heart sound is a new technique to diagnose cardiovascular diseases. . Results and Simulation Of Signal Systems Status of a signal and observing for the electronic stethoscope is manufactured. Think lab software is used for this purpose, for analyzing of heart sound, in order to do this the recorded heart sound is given as input and checking the output completely in every respect circuit is simulated and checked with the help of oscilloscope. Some results of Lungs and heart sounds are filtered as shown with both hype of cut off frequency 100 HZ'S to 1000 Hz's.) Heart sound oscilloscope image shown in fig 5 as an input. Output at pre-amplifier and amplifier is observed and after amplified filter output at different frequency is monitored which is shown in fig: 6 to fig: 7. 2) Lung sound as an input in fig: 8 and output is monitored at oscilloscope shown in fig: 9 to fig: 10 Fig.. Heart sound as input Fig. 6. Output at preamplifier stage . Output after power amp and at filter stage Fig Normal lung sound at input stage Fig . Preamplifier stage Fig. 0. At power amp and filter stage 7. Prototype Model The figure shows stethoscope which is configured with commercially available stethoscope. The diaphragm contain a front end pick up circuitry, condenser MIMIC which is connected into a diaphragm head, first it captures heart sound energy and converts it into electrical energy then it sends for processing to preamplifier filter and power amplifier stage after this process it sends the signal via FM transmitter module to receiver side.

The black box or receiver contains a power amplifier and FM receiver module, the FM receiver module receives the signal and power amplify it after this recess it sends the sound to ear piece where the head phones are

connected to listen the heart sound, the volume control facility is also available for listening the Fig: 1 1 Prototype model 8. Features Heart and lung sounds are amplified and gives clear audible sound in noisy environment.

Noise minimization is done by using of filter that's why proper auscultation is possible and accuracy is also increased. Volume control facility is done by using of amplifier and filters designed for proper frequency selection. Heart's amplified and filtered sound can be sent to PC for auscultation without to be n the hospital and could be sent via internet to consult with other physicians. Using RFC module, wireless auscultation is done and patient auscultation can be monitored by multiple physicians at a time most effectively. 9.

Conclusion Electronic wireless stethoscope is designed and gets audible heart sound and it can be send to PC for further analysis and data can be stored. It will help to understanding the heart diseases and also improve the accuracy of proper auscultation. The pre-amplifier is used for increase the condenser captured sound. Gain of amplifier is 40 which can be controlled using potentiometer. Filter is used for reduction of noise with frequency selection; the frequency selection can be possible by changing the value of capacitor.

The design and simulation is done by using of protests software and analysis of signaling system is done by using of Think lab software. The simulation of circuit design gives better result of heart and lung sounds.