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An ECG Acquisition Using Wireless System

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ABSTRACT
ECG, electrocardiogram plays a major role in detection of heart diseases. The main aim of the processing have been developed each of which overcomes the previous technology by means of reliability. PDAs can be designed by the wireless technology, due to which remote monitoring is possible. The system thus provides remote monitoring of patients wearing a portable device with wireless connectivity which is based on different technologies such as Bluetooth and WIFI .It is highly cost efficient technology with lesser utilization of power and area. Thus a highly accurate architecture is presented.
***Keywords*: ** PDAs, real-time, Pulse Rate, Wireless, WIFI.

I. INTRODUCTION

Electrocardiography (ECG or EKG) is the process of recording the electrical activity of the heart over a period of time using electrodes placed on a patient's body. These electrodes detect the tiny electrical changes on the skin that arise from the heart muscle depolarizing during each heart beat.

In a conventional 12 lead ECG, ten electrodes are placed on the patient's limbs and on the surface of the chest. The overall magnitude of the heart's electrical potential is then measured from twelve different angles ("leads") and is recorded over a period of time (usually 10 seconds). In this way, the overall magnitude and direction of the heart's electrical depolarization is captured at each moment throughout the cardiac cycle. Voltage versus time produced by this non-invasive medical procedure is an electrocardiogram (abbreviated ECG or EKG).

During each heartbeat, a healthy heart will have an orderly progression of depolarization that starts with pacemaker cells in the sino-atrial node, spreads out through the atrium, passes through the atrio-ventricular node down into the bundle of His and into the Purkinje fibres spreading down and to the left throughout the ventricles. This orderly pattern of depolarization gives rise to the characteristic ECG tracing. To the trained clinician, an ECG conveys a large amount of information about the structure of the heart and the function of its electrical conduction system. Among other things, an ECG can be used to measure the rate and rhythm of heartbeats, the size and position of the heart chambers, the presence of any damage to the heart's muscle cells or conduction system, the

Effects of cardiac drugs, and the function of implanted pacemakers.

II. LNA DESIGN

Low noise amplifiers are the building blocks of any communication system. The four most important parameters in LNA design are: gain, noise, on and impedance matching. The design for LNA is based mainly upon the S-parameters of a transistor. The steps required in designing an LNA are the following.

Broadly speaking, there are two large categories of transistor models to enable the design of low-noise amplifiers with standard circuit-design simulators: the small-signal models (typically S-parameters) and the large-signal models. A small-signal S-parameter model is a set of S-parameter measurements at different frequencies, but typically at a fixed bias point for the modelled device, which does not require any type of external biasing for preliminary simulations. Large-signal device models are a more physical representation of the physical transistors and to those an external bias must be applied. The majority of discrete surface-mount transistors provide small-signal S-parameter models, as they can be sufficient for LNA design.

1) Transducer

One of the crucial stages in designing a Low Noise Amplifier is proper selection of a transducer. The transducer selected should have a maximum gain and minimum noise figure (NF).

Stability check

While designing any amplifier, it is important to check the stability of the device chosen, or the amplifier may function as an oscillator. For determining stability, calculate Rollet's Stability factor, (represented as variable K) using S-parameters at a given frequency. For a transistor to be stable, parameters must satisfy $K>1$ and $|\Delta|<1$.

Stability enhancement

Some of the techniques for enhancing the stability are adding a series resistance and adding a Source Inductance. In the former, a small resistance may be added in series with gate of the transistor. This technique is not used in LNA design because the resistance generates thermal noise, increasing the noise figure of the amplifier. Alternatively, an inductor may be added in series with the transistor gate. As an ideal inductor has zero resistance, it generates no thermal noise. It improves stability by reducing the gain of the amplifier by a small factor.

As mentioned previously, the process of intercommunication is done through a TCP/IP interface protocol. Data privacy is a major issue in telemedicine systems, and mustbe taken care when the data is sent through a wide area network. No mechanisms for encryption has been included in the referred application prototype, but it can be achieved easily by means of the SSH tunnels and virtual private networks (VPN) like applications, both of which are supported by Linux operating system (OS). The different application modules whichare described in the previous sections has been developed as well as tested on a particular testing bed. However, it is highly expected to be portable to other platforms and thus adaptable to different scenarios. This section provides the summary of the reference framework onto which the application has been tested and the ARM7 processor provided by the Atmel is a 32 bit processor which is particularly used for mobile and low power device applications. The second one is MSP430 which is provided by Texas Instruments. It is a 16 bit microcontroller, and can be widely used for low power and the biomedical applications.

III. SATTELITE

In a satellite communications system, the ground station receiving antenna will connect to an LNA. The LNA is needed because the received signal is weak. The received signal is usually a little above background noise. Satellites have limited power so they use low power transmitters. The satellites are also distant and suffer path loss; low earth orbit satellites might be 200 km away; a geosynchronous satellite is 35 786 km away. A larger ground antenna would give a stronger signal, but a larger antenna can be more expensive than adding an LNA. The LNA boosts the antenna signal to compensate for the feed line losses between the (outdoor) antenna and the (indoor) receiver. In many satellite reception systems, the LNA includes a frequency block down converter that shifts the satellite downlink frequency (e.g., 11 GHz) that would have large feed line losses to a lower frequency (e.g., 1 GHz) with lower feed line losses. The LNA with a Down converter is called a low-noise block down converter (LNB). Satellite communications are usually done in the frequency range of 100 MHz (e.g. TIROS weather satellites) to tens of GHz (e.g., satellite television)

Operating supply voltage:

Usually LNA require less operating voltage in the range of 2 to10 V.

Operating supply current:

LNA require supply current in the range of mA, the supply current require for LNA is dependent on the design and the application for which it has to be used. The display units are used in analyzing the acquired waveform. During olden days a CRO was used in the analysis of the ECG waveform, but nowadays ECG waveforms are printed on graph papers. Also due to the advancement in modern technologies ECG waveform which is obtained from patient's body are directly displayed on the PCs , the LCD monitors and on the PDAs, also these PCs are provided with software that is too fast in the extraction of the different components of waveform. This software has the ability of doing high amount of signal processing in order to reduce the burden on humans and also to produce the results which can be easily interpreted by the specialist. Thus there are two options to transfer the obtained ECG to a PC, one is the wired option i-e; through a serial port and other is via a wireless (Bluetooth). The microcontroller unit is thus connected with the PC or LCD monitor by a serial communication port so as to display the results on it. Special types of hardware are being developed by a no. of companies as such the Texas Instruments, Analog Devices and many more for performing signal processing.

With the development of information technology, microelectronics and the communication technology, low power microprocessors, more efficient signal processors and obviously an efficient software platform/tool to analyse the results should be developed.

IV. PROPOSED SYSTEM

In the Proposed method we use a architecture that is compatible with the digital CMOS technology and thusis capable of operating with a lower supply voltage.

The acquisition server module isthus a process which is running in every PDA device, and is in charge of configurationof the acquisition hardware for the analog signal conditioning and the digitization process. This module performs alike operation in response to the requests sent by the client application through a socket interface. By making use of this socket the server can also transmit to the clients the samples which are acquired from the signal in real time processing. The server module can thus handle two different request groups: configuration commands which is used to setup the acquisition, i.e., the sampling period, number of analog channels, gain, single-encoder differential input, etc and the operation commands

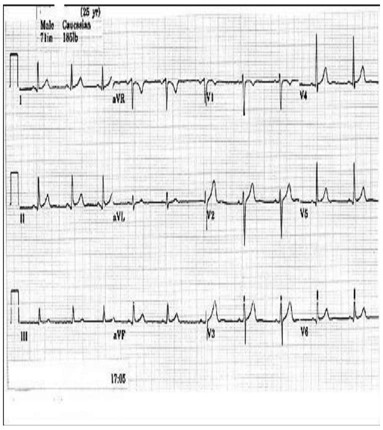

Fig 2:ECG Display

V. CONCLUSION

Wireless patient monitoring with the body sensor networking is thus an effective solution for the monitoring of remote patients. As this reduces the cost as well as times of both the doctor and the patient. At a single time doctor can monitor and track the bodily activity of multiple patients. The different body sensors thus continuously collect the body parameters and transfer details to the doctor. In this way the quality of treatment also gets improvised. Thus quality results are provided to increase the speed and accuracy.

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