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Research Article

COMPARISON OF ECG WAVEFORMS FROM DIFFERENT MODULES

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ABSTRACT

Electrocardiogram is a Technique for evaluating and recording the Electrical Activity produced by cardiac muscles. ECG is performed by using a device called an Electrocardiography, to produce a record called an Electrocardiogram. Electrocardiogram has long been used in the hospital environment to diagnose cardiac arrhythmias and screen for heart disease. However, until recently patients had to be detecting to the ECG machine by a few feet of wires. The wireless ECG system is an electrocardiogram with wireless data transmission capabilities, and a monitoring base station using the receive data. With the comparison of mobile ECG from the different modules, patients can freely move around their environment, allowing their care givers easily to monitor the patient's status at any situation

INTRODUCTION

The Electrocardiogram is a medical telemetry instrument used by medical person to monitor a patient's ECG signal while allowing the patient to remain fully mobile and comfortable. This ECG measures small electrical signals from the patient's chest caused by the heart beating. Using these signals, doctors and other medical staff can monitor the patient's well being and predict future problems. While ECG are commonly used in hospitals, many patients would benefit from the ability to perform usual tasks while remaining monitored on an ECG. In environments such as nursing homes and assisted living centres this technology would allow the elderly to retain their freedom of movement and still allow nursing staff to monitor important cases and patients. The wireless data relay ability would allow many patients to be monitored from a single base station with limited staff. This feature would be valuable to hospital administrators and management. With a small fleet of these devices an entire nursing home or hospital floor could be well looked after by a small nursing staff.

This design team has completed a prototype for the wireless ECG unit as well as developed software for the wireless transmission and base station. This unit can be worn by the patient, and can measure heart rhythm data, digitize it, and transfer it wirelessly back to the base station. At the base station the software can store the data and allow medical staff to view the ECG reading and heartbeats per minute measurement. The monitoring of vital physiological signals has proven to be one of the most efficient ways for continuous and remote tracking of the health status of patients. Electrocardiogram monitors are often used in many medical service centers and hospitals to diagnose and monitor a person's health status by measuring their cardiac activity. An ECG is a noninvasive monitor, which can be utilized to evaluate the heart electrical activity, measure the rate and regularity of heartbeats, the position of the chambers, identify any damage to the heart and investigate the effect of drugs and devices used to regulate the heart. This procedure is very useful for monitoring people with (or susceptible to) impairments in their cardiac activity.

MATERIALS AND METHOD

Xbee Module

Xbee is the brand name of a family of form factor compatible radio modules from Digital Information. The first Xbee radios were introduced under the Maxstream brand in 2005 and were based on the standard designed for point-to-point and star communications at over-the-air baud rates of 250 kbit/s. Two models were initially introduced a lower cost 1 mW Xbee and the higher power 100 mW. Since the initial introduction, a number of new Xbee radios have been introduced and all XBee are now marketed and sold under the Digital brand.

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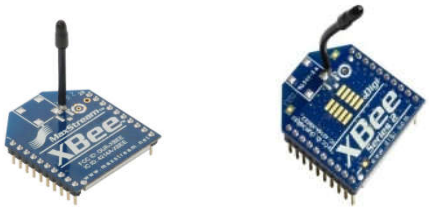

Figure 1 Xbee Transmitter and Receiver

Radio Frequency Module

An RF Module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical Communication or through radio frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and/or receiver.

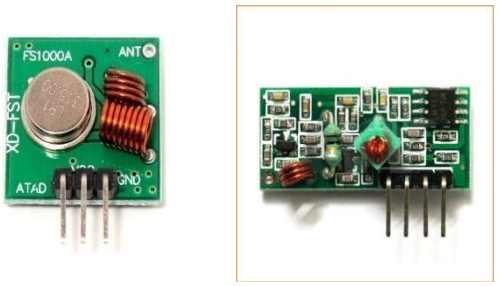

Figure 2 RF Transmitter and Receiver

Bluetooth Module

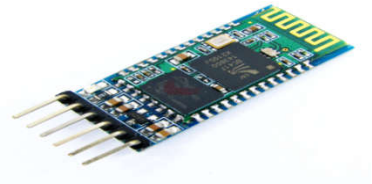

Figure 3 Bluetooth Transmitter and Receiver

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz from fixed and mobile devices, and building personal area networks. Invented by telecom vendor Ericson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization. Bluetooth is managed by the Bluetooth special Interest Group which has more than 25,000 member companies in the areas of telecommunication, computing, networking,

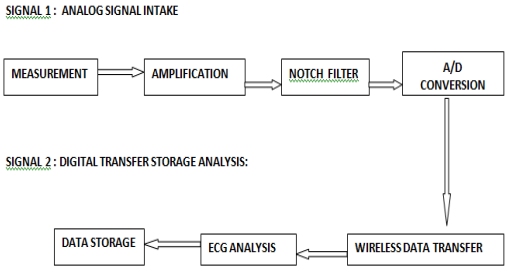

Figure 4 Block diagram for data transfer

The analog signal input can further be divided into parts consisting of signal measurement, amplification, signal filtering, safety isolation, and the A/D conversion. The signal is measured using two electrode leads attached to the body with a medical adhesive. Pre-prepared electrode leads were purchased and used for this function. Figure 4 displays the lead placement on the body. The leads are named after the appendage to which they are closest (RA for Right Arm).

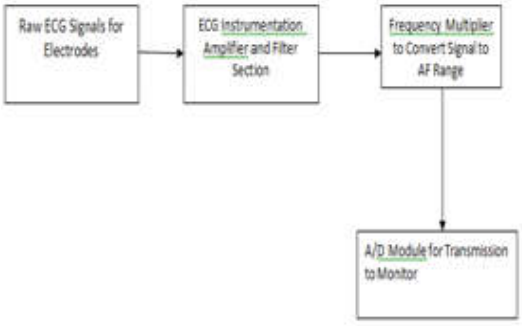

Figure 5 Estimate block diagram for WET

RESULTS AND DISCUSSION

Signal such as ECG, blood pressure and body temperature are normally used to monitor a patient. Out of these signals we acquire only the ECG of the patient using miniature wearable chest equipment termed Wireless ECG Transmitter (WET). These signals are amplified, conditioned and transmitted to the mobile phone which is Bluetooth enabled. The mobile phone has an in built ECG analyzer. It receives the ECG signal and processes it and calculates the heart rate of the patient in beats per minute (BPM). This output in BPM is fed to a microcontroller. The ECG analyzer and microcontroller are designed to be present inside the mobile phone. The microcontroller declares panic situation in any of the following cases. The beat per minute value is not between 60 and 100. Relatively fluctuating BPM for every heartbeat. The R-amplitude falls below the minimum required by a healthy heart. Once the panic situation is declared by the microcontroller, the panic switch is closed and the automatic call function is triggered. Hence, the mobile phone establishes contact with the nearest medical centre's server. Only under panic condition, one minute sample of ECG signal of the patient is sent via the mobile network to the doctor using GPRS and an alerting SMS is given to the caretaker.

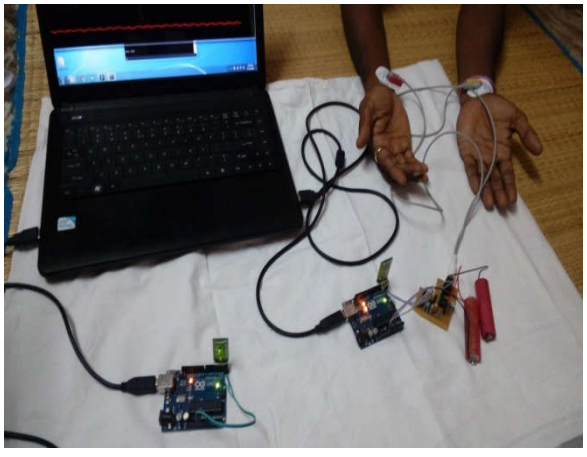

Figure 6 Result for Bluetooth

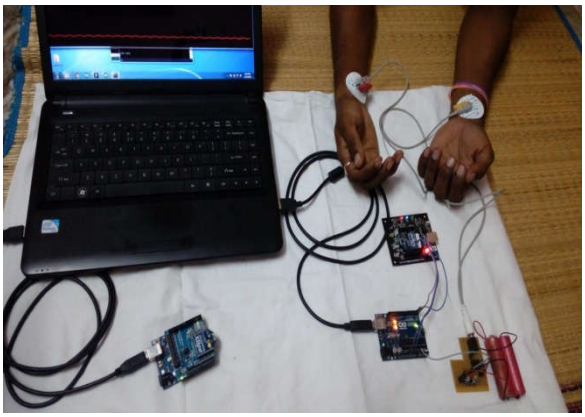

Figure 7 Result for Xbee

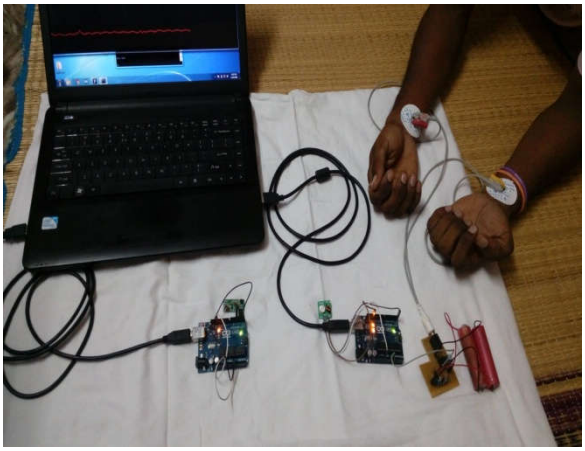

Figure 8 Result for Radio Frequency

The software used here was Intel WML language to simulate the mobile telemedicine, now at a prototype stage has been tested for acquiring and transmitting the ECG signal to the ECG analyzer using simulation software. According to the software, the designed system was able to successfully transmit the ECG signals through Bluetooth dongle. For test purpose, test software has been used in the PC. By using this language we can make emulators of mobile phone.

CONCULISION

Mobile with some physiological sensor will give a better way of telemedicine such that we can get diagnosed by sitting in your home itself.

The advancements of 3G technologies in mobile communications make the higher data transmission rates and advancements in IC technologies make the mobile processor more and more effective and powerful. With the Bluetooth technology we can combine the mobile and physiological sensor more and easier and can eliminate wires fully. User feel free without wires and it is comfortable.

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