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DEVELOPMENT OF LOW COST WIRELESS PHYSIOLOGICAL MONITORING SYSTEM

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Abstract

Wireless physiological monitoring system (WPMS) and wireless wearable physiological monitoring system are widely used for the purpose of quick and remotely diagnosing method. From the last decade the usage of telemedicine system is moderately increasing to reduce the physician requirement in the field of diagnosis. The currently available diagnostic methods are very expensive and rarely available in developing countries. The present experiment we have developed to reduce the cost of the patient monitoring system and user friendly version of WPMS. and develop affordable low-cost wireless physiological monitoring system for patient diagnosis.

Key Words: Zigbee, Telemedicine, Matlab.

Introduction

In recent times, home healthcare related to the elderly people has attracted more and more attention. For aged people living at home, physiological parameter measurement is often a basic possibility to let immediately know about sudden health state changes or accidental injury. However, such non-clinical applications of biomedical signal monitoring require various improvements not only in terms of size and comfort of the acquisition systems, but also in terms of their power dissipation. Important parameters for design are portability, comfort to wear, long duration, and monitored signals. wireless sensor networks are used to structure home-care system in many researches[1]. Wireless sensor networks application for physiological signals communication transmission has many technologies. Such as the Infrared, Bluetooth and ZigBee,etc. Because the angle limit problem of the infrared transmission, and the infrared have not be used for Physiological signal transmission. Although Bluetooth is better than ZigBee for transmission rate, but ZigBee has lower

power consumption. Hence, ZigBee is generally used for 24 hours monitor of communication transmission systems**.** Compared to Bluetooth, ZigBee provides higher network flexibility and a larger number of nodes, and a better transmission range with low power consumption. Large number of nodes enables the expansion of such systems. Recently, ZigBee-based wireless networks were tested in various applications[2][3].

Method

In the proposed system, patients ECG signals will be continuously transmitted and monitored through wireless technology Zigbee. This system does not require the patient to be confined to his bed and allows him to move around freely in his room within a specific distance from the doctors monitor. Depending on the size of the hospital, several such nodes might be required resulting in a much higher system infrastructure cost. A ZigBee node is connected to every patient monitor system that consumes very low power and is extremely small in size. These slave nodes are specifically designed for low power consumption, with minimal circuit components. Moreover, such protocols are meant for moderate to high bandwidth applications where relatively large packets of data need to be transmitted and received. In the case of patient vital sign monitoring[9][10].

MATLAB® is used to further analyze the acquired ECG biopotentials on a PC, by decoding the digital signal received from zigbee. Real time ECG signals can be acquired in MATLAB® using 3 different interfaces, serial port (RS232),USB or DAQ card (analog line). Every time the MATLAB® program is debugged, two .dat files are created for the patient: that stores the ECG data. The graphical user is implemented to start or stop data acquisition without unplugging the device, the corresponding .dat files are updated accordingly while keeping the record of previous acquisitions. Therefore, the cardiac activity of a subject can be recalled by uploading previously recorded ECG data.[11,12].

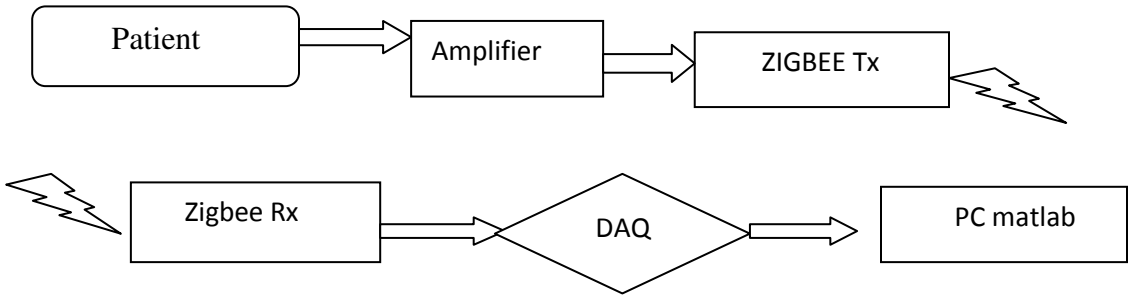

Figure 1: Block diagram of transmission signals.

Results

We have conducted the Electro Cardio Gram (ECG) test in five normal subjects, the data were acquired and ECG signals recorded by WPMS. The processed signals were transmitted by the ZigBee mobile station; the data were visualized and recorded in real-time observations through internet connected computers. The advantages of our WPMS are it consuming low power with highly flexible wireless applications.[13-15]

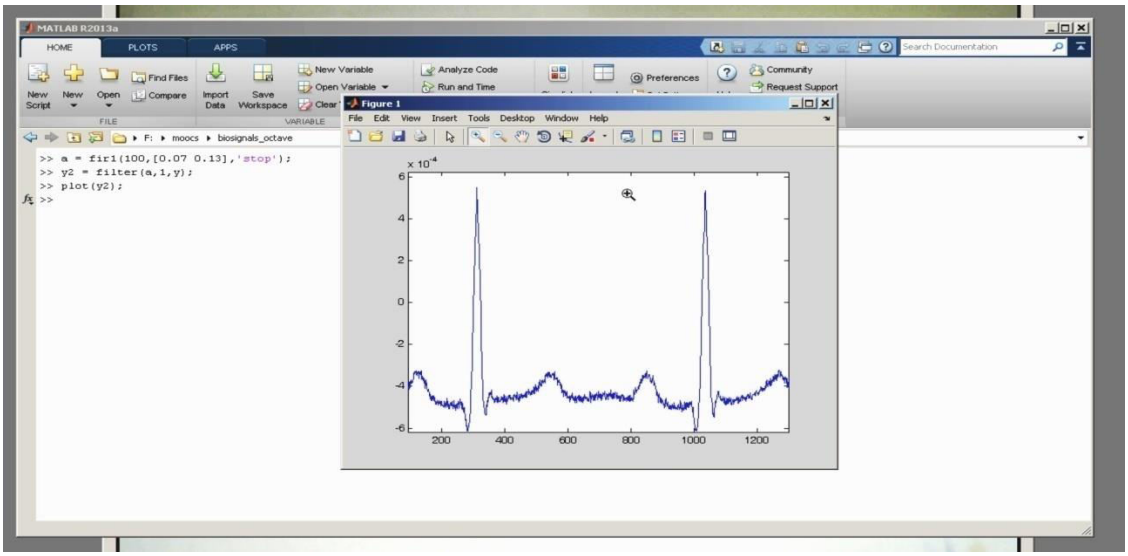

Figure 2: The realtime ECG signals generated on pc using matlab.

Conclusions

Our preliminary experiment may helpful to develop the applications of WPMS; it might play pivotal roles in development of onsite patient monitoring system and various applications of telemedicine for example in remote locations and also extreme weather conditions.

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