A REVIEW: REAL TIME ECG TRANSMISSION VIA WIRELESS COMMUNICATION

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ABSTRACT

India has need to access a specialist care and advice in rural and remote areas. Wireless communication System aims to fill up this gap. It is not necessary for the doctor to be physically present at the hospital centre, as it is required with most of the existing telemonitoring systems. One of the most widely used methods to test the human health condition is to measure his/her ECG.
In this paper we propose and built an ECG monitoring system that can measure user's ECG using wireless communication. The actual system will consist of ECG electrodes, amplifying circuitry and data acquisition i.e. data collection then transmission of data through wireless network.

INDEX TERMS – Electrocardiogram (ECG) signals, data acquisition, wireless monitoring.

INTRODUCTION

As per the survey of Indian Council of Medical Research, the Below Poverty Level (BPL) of people living in rural India has need to access specialist care and advice. This systems open up the possibility of using technology to bridge the gap and bring specialist care/advise to the door step of rural India. [1]Telemedicine may be defined as the use of electronic information and communication technologies to provide and support health care when the patient and the specialist are remotely located. Many of the existing telemedicine solutions are located centralized i.e. the patient reports from the remote areas are received at the hospital centre and the doctors need to be present there to provide consultation. However, the recent advances in technology for mobile phones add a new dimension to telemedicine by facilitating at any time anywhere computing. Now, the specialist located anywhere in the world could use his mobile device to access the patient reports via internet and provide the required advice. Simultaneously he can send his data to hospital for tele-consultation prescription or storing his data in data base for analysis. Because of this facility there is no need to stay at costly hospital which is big financial issue for rural people.

SYSTEM MODEL

Figure 1. Represents the overall system architecture of a Real time wireless ECG monitoring system that has been presented in this paper. Implementing a wireless sensor network requires development and integration of various hardware and software components [1]. This system is based on client-server architecture. The server is sited in a hospital which store and makes available the incoming vital signals came from the clients. The client is responsible for acquiring data from user monitors and transmitting them through Internet.
At any (remote) location, the user is connected to the patient monitor. So, the data acquisition system acquires the usual vital signals, such as ECG, heart rate, blood pressure, SPO2, respiration rate and temperature. next, the mobile phone connected to the monitor receives the information through the RS232 interface. [2]The signals are converted in packets and transmitted to the server using TCP/IP and/or UDP protocols. The server settled in hospital stores data in a relational database. Then, doctor monitors their patients using the server application. Also, signals can be send to files or printing.

TRANSMITTER SECTION (PATIENT'S HOUSE)

Generally the existing patient monitors system has traditional and reliable signals acquisition capabilities. this kind of equipment usually is not developed aiming the connectivity. [2]Most of these monitors are serial-port (RS232 standard) based [2]. Additionally, each manufacturer is used to develop its proprietary communication protocols. Thus, it becomes necessary to implement drivers for the different equipments. as developing them presents a hard task by itself and it is not inside the system's scope, a generic driver was modelled. It can be specialized for all protocols. In the current project, the driver was implemented and tested to communicate with an patient monitor [4]. The client application, including the communication protocol, runs over the mobile phone. It is implemented using the Java MIDP. MIDP stands for Mobile Information Device Profile. It provides the

core application functionality required by mobile applications including the user interface, network connectivity, local data storage, and application lifecycle management packaged as a standardized Java runtime environment and set of Java technology [2]. Once the client application is supposed to be utilized by patients, its interface should be simple. Therefore, the program was specified to have few commands and simple options, making easier to the user. Since the platform is a mobile phone, all the software was designed to not be different from the usual programs in this kind of device. Actually, the client side was projected with just four screens: main, setup, equipment and connect. The screens allow the choice of patient monitor, the patient's ID and the connection with the server.

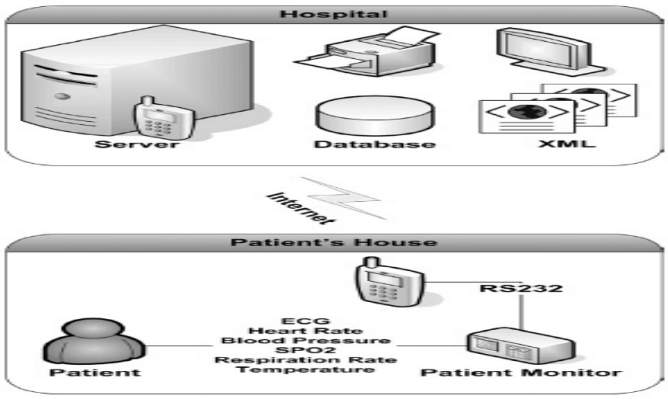

Figure 1: System Model

RECEIVER SECTION (HOSPITAL)

In the application of telemedicine, the medical information usually needs to be distributed among medical doctors and display, archival, and analysis devices [3]. Therefore, the server side was developed with the purpose of receiving, storing and distributing the vital sign data from patients. It was developed under Java technology too. So, many classes were reutilized. Basically, the server is composed of a Java application and a relational database. The application offers the follow features: a) list of patients; b) personal information about patients; c) visualization of vital signals; and d) data export. The doctor controlling the server has several tools to work with ECGs. It is possible to list, visualize (with a zoom option) and export to PNG format. The ECG can be also printed. Because XML [2] has becoming an important standard in computer science, it was utilized as an export format. The codification scheme implemented in XML is described elsewhere.
board is mostly popular with the sensors where it reads the sensors inputs and store their values in a database for further records. The processor of raspberry Pi is a 32-bit, 700 MHz system on chip (SoC), which is built on the ARM11 network architecture. Arm architecture comes in a variety of core configured to provide different capacity and different ranges.

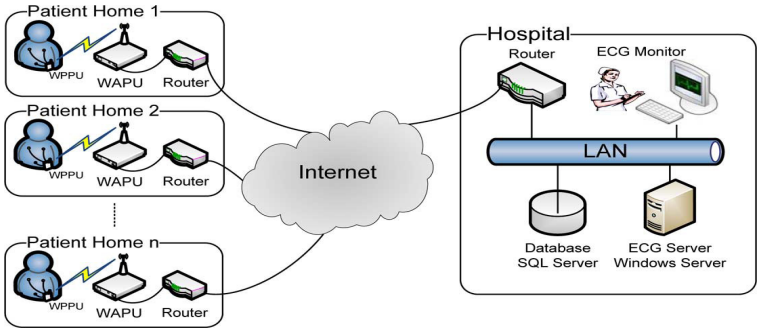

Figure 2: Monitoring system scenario

PROPOSED SYSTEM

We consider the monitoring system scenario shown in Figure. 2, It has two main sections in the system. The first section is the patient home where the ECG signals processing is done i.e. detection, amplification, digitization, and preparation in the form of packets which we call wireless packets to be transmitted to an access point via a wireless channel. Then access point assigns a number for each packet and merges all of them together and sends them via Internet to the hospital, which is the next part of the system. In the hospital section, signals are received and prepared for interpretation by clinicians. The patient home is connected to the hospital through the Internet. For wireless communication we have lots of channels like zigbee, IEEE 802.11 wireless protocols, aloha, FM/AM,GSM,CDMA and many more but the proper authetification and compatibility is necessary.

CONCLUSION

In India many hospitals and physicians have requirement for an integrated Real time wireless ECG monitoring system to observe real-time physiological signals from patients outside the hospital with high and reliable accuracy. Currently available systems for monitoring physiological Signals suffer from technical limitations. In this paper, a wireless ECG structure to monitor patients with chronic diseases in their own home through a remote monitoring system of physiological signals was presented. Moreover, there is no need for a PC. And it is an easy-to-use and configures access point for the systems. The proposed innovative approach creates a system for continual observation of physiological signals while the patients are at their homes. It also lowers the cost involved with monitoring patients and increases the efficient exploitation of physiological data. As a result of this system, patients will have access to the highest quality medical care in their own homes and, thus, avoid the distress and disruption caused by a lengthy stay in hospital

ACKNOWLEDGEMENT

The author would like to express his sincere gratitude to Mr M. V. M. Figueredo, Reza S. Dilmaghani, and Hossein Bobarshad for their work and also sincere gratitude to Dr.A.K.kureshi, Dr U.B.Shinde and Mr.A.M.Rawate for their constructive comments and guidelines.

REFERENCES

[1] M. V. M. Figueredo and J. S. Dias, "Mobile Telemedicine System for Home Care and Patient Monitoring," in Proc. 26th Annu. Intl. Conf. of the IEEE EMBS, San Francisco, CA, 2004, vol.2. (pp. 3387-3390).

[2]IEEE Transactions on biomedical circuits and systems Vol.5No.4 August 2011"Wireless Sensor Networks for monitoring physiological Signals of Multiple Patients"

[3] J. Mikael Eklund, Thomas Riisgaard Hansen, Jonathan Sprinkle and Shankar Sastry, "Information Technology for Assisted Living at Home: building a wireless infrastructure for assisted living," in Proc. 27th Annu. Conference, Shanghai, China, 2005, (pp. 250-255).

[4] Xiao, Y. Gagliano, D. LaMonte, M. Hu, P. Gaasch, W. Gunawadane, and R. Mackenzie, C. "Design and evaluation of a real-time mobile telemedicine system for ambulance transport," Journal Of High Speed

[5] Internet, www.google.com