

Review on Real Time Patient Monitoring System

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Abstract: ZigBee technology is the standard of choice among other wireless technologies due to its efficient low-power connectivity and ability to connect a large number of devices into a single network. ZigBee technology uses the globally available, license-free 2.4GHz frequency band. ZigBee Health Care provides an industry-wide standard for exchanging data between a variety of medical and non-medical devices. This paper, presents a Wireless Sensor Network (WSN) for monitoring patient's physiological conditions continuously using Zigbee. Here the physiological conditions of the patient's are monitored by sensors and the output of these sensors is transmitted via Zigbee and the same has to be sent to the remote wireless monitor for acquiring the observed patient's physiological signal. The remote wireless monitor is constructed of Zigbee and Personal Computer (PC). The measured signal has to be sent to the PC, which can be data collection. Although Bluetooth is better than Zigbee for transmission rate, Zigbee has lower power consumption. The first procedure of the system is that the wireless sensors are used to measure Heart rate, temperature and fall monitoring from human body using Zigbee. Next procedure of the system is to measure saline level in bottle using zigbee. The measured signal is sent to the PC via the RS-232 serial port communication interface. In particular, when measured signals cross the standard value, the personal computer will send a message to the caretaker's mobile phone.

Keywords: *Wireless Sensor Network, physiological signal, Zigbee, Microcontroller etc.*

I. Introduction

In the field of health monitoring the current most important user groups are those aged 40 and more. The group of 40+ users shows more diversity in their health conditions than younger people. There are ring-type pulses monitoring sensor available in the market in which the measured data are displayed in the LCD and cannot be transmitted out of the ring. Thus, it is not possible to continuously monitor the vital parameters such as temperature, pressure and pulse from a distant location. In a hospital either the nurse or the doctor has to move physically from one

person to another for health check, which may not be possible to monitor their conditions continuously. Thus any critical situations cannot be found easily unless the nurse or doctor checks the person's health at that moment.

This may be a strain for the doctors who have to take care of a lot number of people in the hospital. In order to keep in track of critical health conditions, a real time health monitoring system of patient based on Zigbee, GSM, and SMS is designed and developed in this project. This finds vast application

in the remote places where the people are out of reach from the experienced doctors; keeping this factor in mind best effort is done to implement some of the basic test of pathological data on the system[3][5]. Hence the entire project can be broadly divided into four sections firstly, the parameters measured from the patient and transmitted, secondly the signal processing and conversion to digital form; thirdly decision making with the help of an algorithm where they obtained signal values are compared with the standard values and finally the transmission of the condition of the patient to the doctor. A real time health monitoring system of remote patient developed is a wearable device. This device will be wearied by the patient and parameters such as ECG, Temperature and Heart Beat will be continuously transmitted and monitor through wireless technology Zigbee[4][5]. At the receiver side (doctor side) the data will be wirelessly received using Zigbee. The doctor will monitor the measured parameter on the GUI designed using Visual Basic on PC. The data from the patient is collected continuously and stored in the database designed using SQL (Structured Query Language) if the doctor is not present at that instant of time, he will be intimated through an SMS(Short Messaging Service)

II. Review of the patient monitoring system

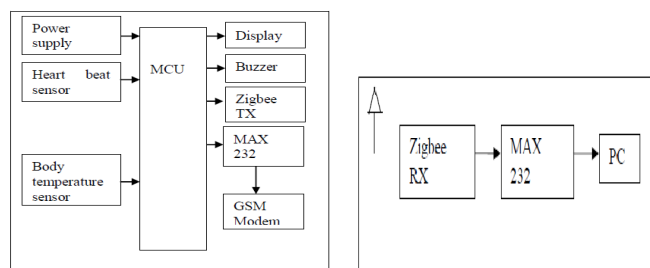


FIGURE 1: Basic block diagram of Patient

Section Transmitter & Receiver Section

Working:

Figure 1 shows basic block diagram of the patient monitoring system using zigbee in the Hospitals. In this, no of parameters are calculated as the heart beat is monitored with the pulse rate of the body. The high intensity light sensor senses the expansion and contraction of the heart with the help of the nerves. That beam will transmit the signal to the receiver and the minute change in the pulse is noticed as the heart beat. If there is any change in the pulses then it is noticed as the change in the heart and then the controller will get a disturbed pulse count which indicates the fault or malfunction of the heart. The controller is fixed for a no. of pulses initially. If there is any change in the any of the pulse count then it considers as a malfunction of the heart and then it transmits the pulse count with the patients ID to the doctor in the hospital and at the same to it can send a SMS to a fixed number in the microcontroller. This is convenient process to monitor the patients health conditions form any of the distance we present. If a particular patient's health Parameter falls below the threshold value, an automated alert is sent to the pre-configured Doctor's mobile number using a standard GSM module interfaced to the microcontroller. Here, we are using Zigbee for wireless transmission. The Doctor can get a record of a particular patient's information by just accessing the database of the patient on his PC which is continuously updated through Zigbee receiver module. The presented work deals with the development of health care monitoring system that can monitor the patient continuously and simultaneously transmit the physiological data to the doctors and other medical staff.

III. Various instruments required in the system

1. Heartbeat Sensor

Heartbeat sensor provides a simple way to study the function of the heart which can be measured based on the principle of psycho-physiological signal used as a stimulus for the virtual- reality system. The amount of the blood in the finger changes with respect to time.

Features:

- Indicates heartbeat by a LED
- Provides a direct output digital signal for connecting to a microcontroller
- Possesses compact Size
- Works with a working Voltage of +5V DC

2. Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin.

Features:

- Calibrated directly in ° Celsius (Centigrade)
- 0.5°C accuracy guarantee
- Rated for full –55° to +150°C range
- Suitable for remote applications

3. GSM Module

(Global System for Mobile Communications: originally from **Group Special Mobile**) is the world's most popular standard for mobile telephony systems. . GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. This GSM/GPRS TTL Modem has internal TCP/IP stack to enable User to connect with internet through GPRS feature. It is suitable for SMS as well as DATA transfer application in mobile phone to mobile phone interface.

The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature (serial communication).

4. Zigbee Module

Zigbee is a specification for a suite of high level communication protocols using small, low-power digital radios or Low-Rate Wireless Personal Area Networks (LR-WPANs). The technology defined by the Zigbee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. Zigbee is targeted at radio-frequency

(RF) applications that require a low data rate, long battery life, and secure networking.

5. Microcontroller (AT89S52)

A Microcontroller is a single-chip microcomputer that contains all the components such as the CPU, RAM, some form of ROM, I/O ports, and timers. The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The AT89s52 is a low power, high performance CMOS 8-bit micro computer with 8Kbytes of flash programmable and erasable read only memory (PEROM). By combining a versatile 8-bit CPU with flash on a monolithic chip, the Atmel AT89s52 Is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded controls applications.

6. ARM 7 Processor

The ARM7TDMI-S is a general purpose 32-bit microprocessor, offers high performance and very low power consumption. This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system.

7. LCD Display

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. For an 8-bit data bus, the display requires a +5V supply plus 11 I/O lines.

IV. Conclusion

From the above designed project I can conclude that we are able to transmit the data which is sensed from remote patient to the server PC by using wireless transmission technology Zigbee. Using Zigbee at receiver the data is received and displayed on the PC of doctor.

Also if doctor is not present in campuses he will receive SMS on his mobile phone in case any parameter of the goes beyond the normal range. Hence an attempt is made to design a device which not only acts as an alarm system but also can

measure the parameters of the body and the attempt made is successful.

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