International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE)
ISSN: 0976-1353 Volume 8 Issue 1 –APRIL 2014.

REMOTE MONITORING OF HEART RATE, BLOOD PRESSURE AND TEMPERATURE OF A PERSON

Sandeep Banka[#], Mrs. Anitha Mary X[*]
[#]*M.Tech, Department of Electronics and Instrumentation Engineering, Karunya University, Coimbatore, India*
[*] *Assistant Professor, Department of Electronics and Instrumentation Engineering, Karunya University, Coimbatore, India*

***Abstract*- The condition of a human body is assessed by measuring the vital signs. The main vital signs routinely monitored by medical experts and healthcare professionals are body temperature, pulse rate [1], blood pressure [3] (Blood pressure is not considered a vital sign, but gives much information regarding the flow of blood.) Vital signs are very much useful in understanding the health status and for detecting the medical problems of a person. These parameters can be measured in a medical setup, at home, at the site of a medical emergency, or elsewhere. Patient's data regarding the vital signs is assessed through temperature sensor LM35, heart rate sensor, blood pressure sensor which has SPD100G as the sensing element interfaced with PIC micro controller and finally the data is transferred through ZigBee [2] module.**

Index terms: LM35, PIC 16F877A, LM35, SPD100G, ZIGBEE.

I. INTRODUCTION

Problem statement:
1. Manual operation of controlling devices [1]
2. Communication between devices for short distances [4]

Knowing the physical status of a person is very important for understanding the body condition of a person. Vital signs that play an important role for understanding the condition of human system are heart rate, temperature and blood pressure of a person. In this method we had made use of three sensors LM35, heart rate sensor, blood pressure sensor which has the sensing element as SPD100G. These three sensors are connected to the PIC micro controller. The measured values are displayed on the LCD. The measured parameters are transferred to the PC through ZigBee module. In this method we can know the health status of a person from farther distance.

II. PROPOSED METHOD

In this method the sensors are connected to an 8 bit PIC 16F877A [1] micro controller. The reason for choosing PIC is it is of low cost and it consumes low power. It's a 33 pin micro controller where we have ports distributed as 6, 8, 8, 8, 3 pins. The data is displayed on the LCD screen. The program is written in Embedded C language and the software that had been used is MPLAB [5]. The vital sign values are displayed on the LCD. These parameters are transmitted to a remote area PC through ZigBee module and they are displayed on the PC by making use of Visual Basic. The data that is obtained is stored in the data base

III. SYSTEM IMPLEMENTATION

The body temperature is measured by LM35, a precision integrated-circuit temperature sensor whose output value is proportional to the Celsius temperature. It's a three pin IC where we have supply output and ground connections. Heart beat sensor is of clip mode where we can assess the heart beat by placing our finger the pulse will be calculated for one minute. Blood pressure sensor makes use of sensing element SPD100G. Toggle switch is used to display the values when the switch is high temperature and heart rate values are displayed on the LCD when the switch is low Systolic and Diastolic pressures are displayed. The block diagram for the setup has the sensors interfaced to the micro controller. There are two separate power supplies. The temperature sensor and heart beat sensor needs 5v of power supply

whereas the blood pressure sensor needs plus or minus 12v [4]. A single step down transformer is used to provide different power supplies to the sensor modules, PIC micro controller and the Zigbee module. For rectification and conversion of pulsating DC to pure DC we had made use of ordinary PN junction diodes and capacitors. MPLAB is the standard software that is used for PIC microcontroller. Embedded C language was employed for programming and visual basic is used for display of the values on the physicians PC. The data regarding the vital parameters of the person is transmitted to the physician through Zigbee module which can transfer data wirelessly up to 100 meters.

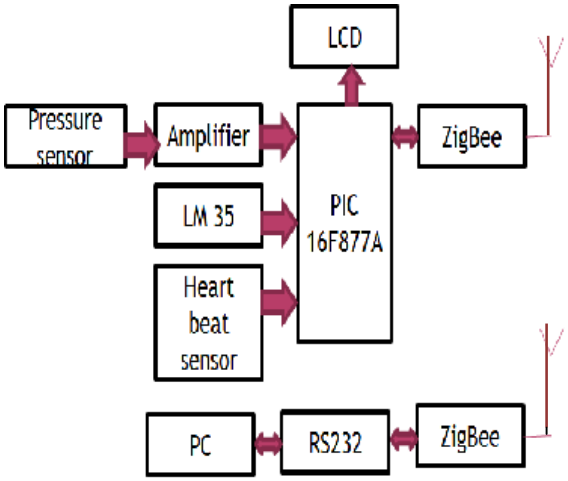

Figure 1: Block-diagram

IV. PHYSIOLOGICAL SIGNALS MEASUREMENT

A. Blood Pressure

The blood pressure measurement is divided as invasive method and non-invasive method. We used the oscillation method of non-invasive blood pressure measurement. The method uses the inflatable cuff to tie the human's arm and aerated to the inflatable cuff. The pressure is increased until the circulation of blood in the finger flows off which is indicated by continuous glow of LED there we note the systolic pressure [3] later the valve is released slowly at a certain point the LED again starts blinking at this point we will note Diastolic pressure.

B. Heart Rate

Heart rate is measured using the blood circulation flow through the finger. The IR Transmitter and Receiver part are arranged in a clip and attached the tip of finger [1]. The pulse is calculated for 10 seconds and the readings are multiplied with 6 to get the heart rate per minute.

C. Temperature

Temperature is measured using LM35 sensor. The human body temperature is assessed by placing hand on the sensor [5] it reads the value and gives an ADC value which is converted to the Celsius degrees.

V. TRANSMISSION

A. ZigBee Overview

The nomenclature ZigBee is attained from the zigzag path followed by bees which forms a network among flowers. ZigBee protocol is based on the IEEE standards as IEEE802.15.4 low rate, wireless personal area network standard. It employs the mesh network principles. It is mostly preferred for the applications which make use of low data rate and very good battery life. The IEEE802.15.4 were defined by the physical layer and the media access layer. Three radio bands were supported by the physical layer distributed across the world as worldwide, Americas and European zones , which are individually defined as 2.4 GHz ISM band (worldwide) about 16 channels, 915 MHz ISM band (Americas) about 10 channels and 868MHz band (Europe) with a unique channel. The data rates are different and they are defined as 250Kbps at 2.4 GHz, 40Kbps at 915 MHz and 20 Kbps at 868MHz. The Media Access Control layer employs Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA) mechanism for accessing the radio channel. The range of transmission is about 1-100 meters. The ZigBee defines devices as Full Function Devices (FFD) and Reduced Function Devices (RFD) which can serve as network coordinator or a regular device. As ZigBee nodes sleep most of the time average power consumption will be low which results in long battery life

VI. RESULTS AND DISCUSSIONS

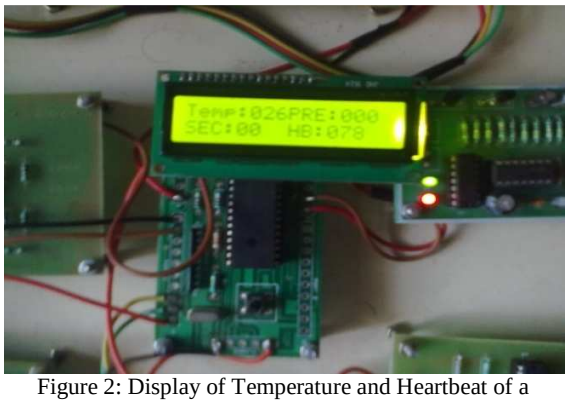

Figure 2: Display of Temperature and Heartbeat of a Person

The health status of a person is assessed by knowing the vital signs of a person. These parameters are displayed on the LCD so that the patient can see them and then they are transmitted to the physician through **ZigBee** where he can monitor the condition of the patient. The data is stored in a database for future as a record.

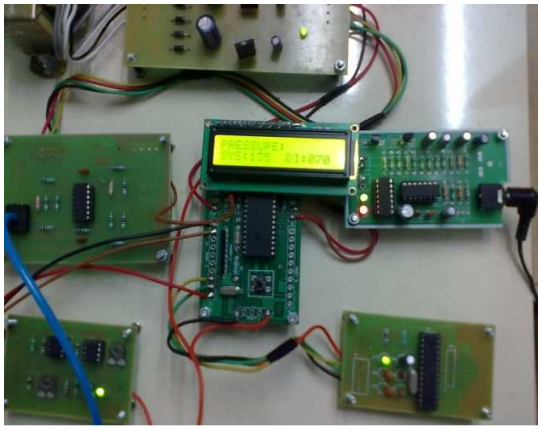

Figure 3: Display of Blood pressure of a person

Cost of the equipment is further reduced by constructing a ZigBee module by making use of ATmega microcontroller instead of going for direct module. The power consumption is very low the equipment can be carried from one place to another place with much ease. These displayed values are sent to the physician through ZigBee module.

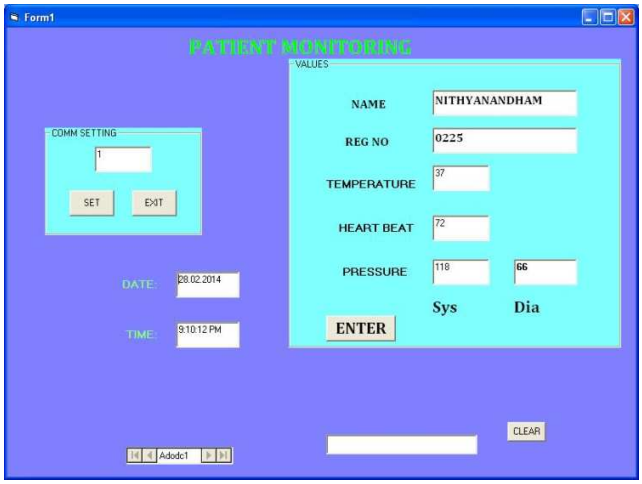

Figure 4: Visual Basic page on Physicians PC

VI. CONCLUSIONS

Remote wireless monitoring of heart rate, blood pressure and temperature of a person is done with very minimal cost. The values can be viewed by the patient and the physician at the same time. This system gives more accurate values of systolic and diastolic pressure which play a vital role during the diagnosis of a patient. Three more sensors can be interfaced to the microcontroller to assess any further data.

ACKNOWLEDGEMENT

I express my sincere gratitude to the management of Karunya University for their valuable support and encouragement.

REFERENCES

[1] Ramalatha Marimuthu,V. Deepak, S. Gowtham, V. Ram Prasad "Remote Heart Rate Monitoring System", International Journal of Electronics & Communication Engineering Research (IJECER)Vol. 1 Issue 3, August – 2013

[2] P.Murali Krishna, Dr.K.Padma Priya, "Remote Wireless Health Care Monitoring System Using ZIGBEE", International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181Vol.1Issue6, August – 2012

[3] S. M. Mahalle, P. V. Ingole," Design and Implementation of Wireless Body Area Sensor Network Based Health Monitoring System", International Journal of Engineering Research & Technology (IJERT)ISSN: 2278-0181 IJERT Vol. 2 Issue 6, June – 2013

[4] [4] Gang Ding, Sahinoglu Z., Orlik P., Jinyun Zhang, Bhargava B., "Tree-Based Data Broadcast in IEEE 802.15.4

and ZigBee Networks", published by the IEEE transactions on mobile computing, Volume 38, No. 11, Nov. 2006, pp. 1561-1574.

[5] AleksandarMilenkovic, Chris Otto, Emil Jovanov, Wireless sensor networks for personal health monitoring: Issues andan implementation, Computer Comm. 29, pp2521–2533, (2006)

Sandeep Banka received his B.Tech degree in Electronics and Communication Engineering from G. Pulla Reddy Engineering College, Andhra Pradesh in 2006 and is pursuing Masters degree specialized in Embedded Systems from Karunya University, Coimbatore. His areas of interest include Microcontroller Applications, Digital Signal Processing.

Mrs. X. Anitha Mary received her B.E degree in Electronics and Communication Engineering from Karunya Institute of Technology and Sciences, Coimbatore in 2001, M.Tech from Anna University in 2009, currently doing doctoral work in Control Systems. Her areas of interest include Embedded Systems, VLSI Design and Control Systems.