



Automatic Patient Monitoring Using Embedded Sensor Network

M. Meenatchi

II-Msc [Computer Science],
Government Arts College (Autonomous),
Karur, Tamilnadu, India

Dr. V. Baby Deepa

Assistant Professor
Government Arts College (Autonomous),
Karur, Tamilnadu, India

Abstract: *It is a working model which incorporates sensors to measure parameters like body temperature, heart beat rate. A micro-controller board is used for analyzing the inputs from the patient and any abnormality felt by the patient causes the monitoring system to give an alarm. Also all the process parameters within an interval selectable by the user are recorded online. This is very useful for future analysis and review of patient's health condition. For more versatile medical applications, this project can be improvised, heart beat sensors and annunciation systems, thereby making it useful in hospitals as a very efficient and dedicated patient care system. Hospitals are maintaining the patient's details. All the patients' results are showing a system using embedded sensor. When the patient health is to be changed the report will be producing the alarm. Also the doctor monitoring the patient's health condition. Finally, we propose patient's health changing details and producing the alarm signal.*

Key words: *patient monitoring, health alert alarm, hospital sensing, heart beat sensor, temperature sensor*

I. INTRODUCTION

The embedded health monitoring is to assessing the health changes based on the individual patient health condition. This methodology for monitoring patients remotely using sensor embedded network. The sensor to assessing the patient health conditions. It is very useful for the patient's and the hospitals. The sensor embedded in the environment is used to collect the behavior and activity patterns for the purpose of detecting the patient's health changes. Patient monitoring system consist of equipment, devices and supplies that measure, display and record human characteristics, including blood pressure, body temperature, heart activity, bodily substances (e.g. Cholesterol, glucose, etc..) pulse rate, respiration rate and other health-related criteria. The patient monitoring systems is one of the major improvements because of its advanced technology.

A patient monitoring system for providing continuous monitoring of a data acquisition and the day-to-day activities are watching. This unit may be bedside display unit to display the physiological condition of the patient. The objective of Patient Monitoring system is to have a quantitative assessment of the important physiological variables of patients during critical periods of biological functions. The following table1 shows the patient heart beat levels.

Table 1: heart beat level

Heart beat	Level Range
Low	45-90
Normal	90-120
High	120-159
Very high	160 above

A sensor patient monitoring system to measure heartbeat and body temperature of the patient by using embedded network. Just connecting the temperature sensor and heartbeat sensor producing the health condition details. The device alarms when the heart beat and the body temperature exceed the threshold value. This threshold value is defined by the programmer at the time of programming the micro-controller Atmega8. The threshold value given for the project is as 20 to120 pulses per minute for heart beat indication and 18°C to 38°C for temperature.

The heart beat and the Body Temperature is transmitted wirelessly to the doctor which has to be using the GSM technique. The sensor measure the information and translating the patient details through the system. An application of this method includes better accuracy, productivity, speed and flexibility.

II. SENSOR DESCRIPTION

Sensor Network

The project has to be developed a sensor monitoring system for embedded health assessment in the hospital as following patient heartbeat and temperature sensor and bed sensor and PIR sensor.

Patient Heartbeat and Temperature Sensor

Temperature sensor:

A temperature sensor is a device, typically, a thermocouple or RTD, that provides for temperature measurement through an electrical signal. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in oC).

Wide range, low power temperature sensor outputs an analog voltage that is proportional to the ambient temperature. To use, connect pin 1 (left) to power (between 2.7 and 5.5V), pin 3 (right) to ground, and pin 2 to analog in on your microcontroller. The voltage out is 0V at -50°C and 1.75V at 125°C. Easily calculate the temperature from the voltage in millivolts

This sensor is used for finding the patient temperature level. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.

Heart beat sensor:

The sensor consists of a super bright red LED and light detector. The LED needs to be super bright as the maximum light must pass spread in finger and detected by detector. When the heart pumps a blood through the blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified through an amplifier which outputs analog voltage between 0 to +5V logic level signal. It works on the principle of light modulation by blood flow through finger at each pulse.



Figure 1: Patient monitoring system

Applications of Heartbeat sensor

1. Digital Heart Rate monitor
2. Patient Monitoring System
3. Bio-Feedback control of robotics and applications

Table 2: Parameters

Parameter	Value
Operating Voltage	+5V DC Regulated
Operating Current	100 Ma
Output Data Level	5V TTL Level
Heart Beat Detection	Analog Out
Light Source	660 nm super red LED
Detector	Photo Diode

555 Timer

555 is a very commonly used IC for generating accurate timing pulses. It is an 8 pin timer IC and has mainly two modes of operation: monostable and astable. In monostable mode time delay of the pulses can be precisely controlled by an external resistor and a capacitor whereas in astable mode the frequency and duty cycle are controlled by two external resistors and a capacitor. 555 is very commonly used for generating time delays and pulses.

Features of 555

- Direct replacement for SE555/NE555
- Timing from microseconds through hours
- Operates in both astable and monostable modes
- Adjustable duty cycle
- Output can source or sink 200 mA
- Output and supply TTL compatible
- Temperature stability better than 0.005% per °C
- Normally on and normally off output
- Available in 8-pin MSOP package

555 Applications

- Precision timing
- Pulse generation
- Sequential timing
- Time delay generation
- Pulse width modulation

III. WIRELESS PATIENT MONITORING

The health care sensors are playing a vital role in hospitals. The patient monitoring systems is one of the major improvements because of its advanced technology. A wireless patient monitoring system to measure heartbeat and body temperature of the patient by using embedded technology is developed.

So we just connecting the temperature sensor and heartbeat sensor so that simultaneously we can monitor the patient's condition and hence ruling out the use of the thermometer and other devices to check the condition of the patient.

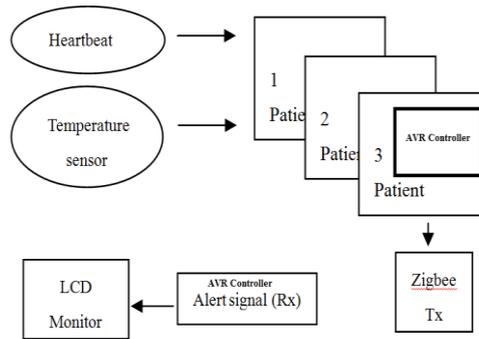


Figure 2: Patient monitoring sensors

It describes the design of a simple, low-cost microcontroller based heart rate and body temperature measuring device with LCD output. Heart rate of the subject is measured from the index finger using IRD (Infra Red Device sensors and the rate is then averaged and displayed on a text based LCD).

The device alarms when the heart beat and the body temperature exceed the provided threshold value. This threshold value is defined by the programmer at the time of programming the microcontroller Atmega8 controller. This information i.e. the Heart Rate and the Body Temperature is transmitted wirelessly to the doctor which is not in the vicinity of the patient through GSM technique or RF technology.

The patient monitoring system figure 1 shows the Patient monitoring System using heart beat sensor. These sensors are very effective and finding the patient heart beat levels are low or high. Transformer to transmitting the voltage power to rectifier to filtering the alternative current to Digital current. Regulator maintaining the DC signal. ATMEGA8 microcontroller controlling all the signals. Then transmitting the patient details to transmitter. Finally the receiver receives all the patient details through the system.

Transmitter Block:

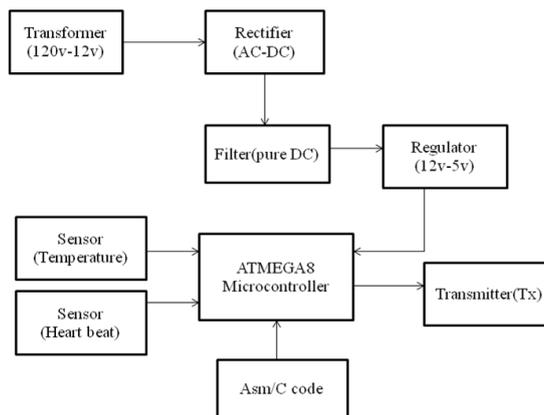


Figure 3: Transmitter block

Receiver Block:

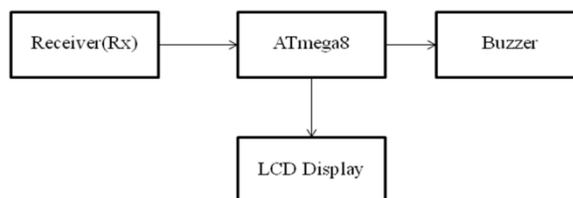
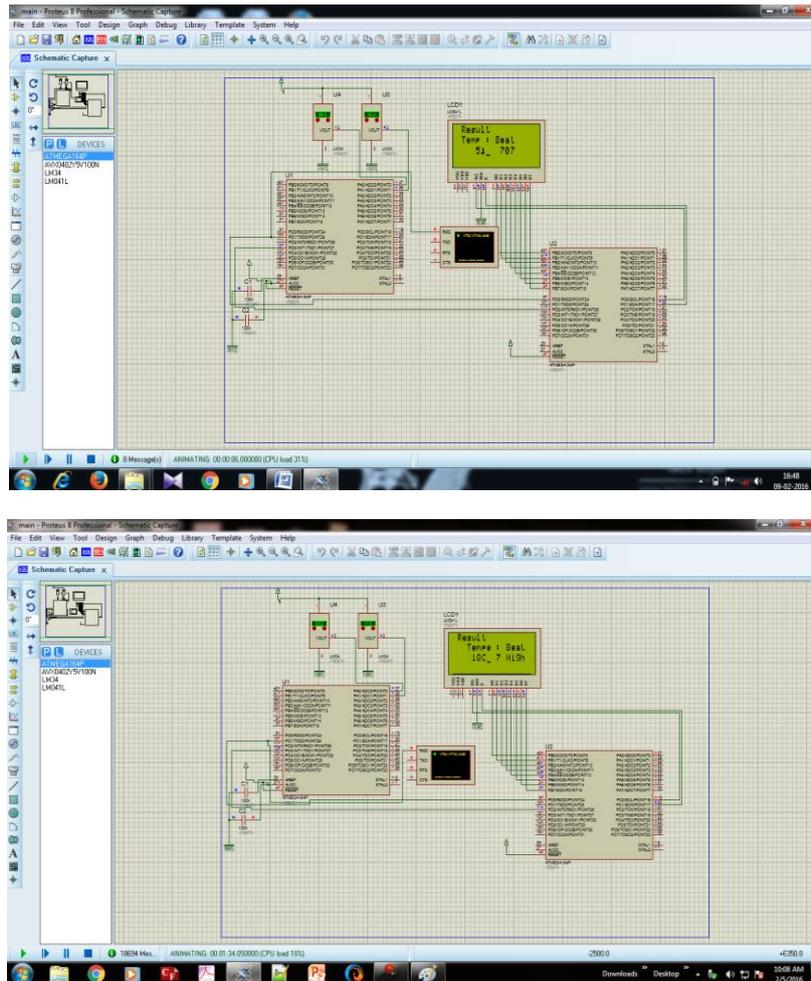


Figure 4: Receiver block

Output:



IV. CONCLUSION

In addition to the system can also provide more than one numbers so that more than one user can receive emergency message.

According to availability of sensors or development in biomedical trend more parameter can be sense and monitor which will drastically improve the efficiency of the wireless monitoring system in biomedical field.

REFERENCES

- [1] Ovidiu Apostu, Bogdan Hagi, Sever PSaşa, Wireless ECG Monitoring and Alarm System Using ZigBee”2011 The International Symposium on ADVANCED TOPIC IN ELECTRICAL ENGINEERING2068-7966/ATEE 2011.
- [2] Warsuzarina Mat Jubadi, Siti Faridatul Aisyah Mohd ahak”,Heartbeat Monitoring Alert via SMS”, 978- 1-4244-4683-4/09/\$25.00 ©2009 IEEE.
- [3] Goutam Motika, Abinash Prusty,” Wireless Fetal Heartbeat Monitoring System Using ZigBee & IEEE 802.15.4 Standard”, 2011 Second International Conference on Emerging Applications of Information Technology, 978-0-7695-4329-1/11 \$26.00 © 2011 IEEE DOI 10.1109/EAIT.2011.89
- [4] Kenneth J. Ayala, The 8051 Microcontroller ARCHITECTURE, PROGRAMMING and APPLICATIONS, WEST PUBLISHING COMPANY, Page:131-197.
- [5] Michael J. Pont, Embedded C, Edition 2002, Addison Wesley, Page: 57-87,217.
- [6] Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits, 4th Edition, Prentice-Hall, Page:342, 417, 455.S