ISSN 2395-1621

Wireless Patient Health Monitoring System

[#1]Someshwar Mashalkar, [#2]Saurabh Thote, [#3]Pravin Harsure

[1]somymashalkar@gmail.com
[2]thotesaurabh25@gmail.com
[3]h.pravinharsure@gmail.com

[#123]Dept. of Computer Engineering, RMDSSOE, Savitribai Phule Pune University, Maharashtra,India.

ABSTRACT

The project concentrates a selective section of patient monitoring: neonatal care. Several patient monitors are available in the market. Yet it is quite a daunting task in countries with high population like India, because of insufficient resource space availability. It is difficult to keep a track of several patients at a time from both inside and outside hospital premises/medical facility, which includes remote locations. The project involves with sensing the vitals of the newly born babies which are very different when compared to adult patients and transmit these signals to the computer monitor at the nursing station. Also based on the preset threshold values for the recorded values, an alarm system will be introduced with an immediate transfer of the corresponding patient data to the registered medical professional. This paper attempts to design and implement patient monitoring and real time feedback mechanism, equipped with wireless transmission via GSM and Zigbee. Using Zigbee for in-house monitoring and GSM for external correspondence is proposed. The proposed system is likely to be efficient, economical, easy to use, and portable, have wide application potential due to flexibility in the design and software.

ARTICLE INFO

Article History

Received :6th April 2016

Received in revised form :

8th April 2016

Accepted : 10th April 2016

Published online :

13th April 2016

Keywords: Bio signal Processing, Wireless health monitoring, zigbee, GSM, Wifi.

I. INTRODUCTION

In past years, at remote rural areas the peoples die, due to lack of and lack of availability of health monitoring devices and doctors, most of the countries in the world facing this type of problems. There are numbers of the system which can provide remote health care services but there have some limitation such as very costly, lack of patient data security and highly communicational and computational overhead.
According to the World Health Organization, the probability of dying between 15 and 60 years of age in male/female (per 1000 population) in India is nearly 250/169. In present years, the chronic diseases and the civilization diseases are introduced in the world, due to the changes in the environment. In order to avoid existing problem, the proposed system introduced integrated health monitoring devices with low cost and take an advantages to continuously monitor patient physiological parameter.

This system can comprise various types of small physiological Sensors, which enable continuous monitoring of a variety of Physiological parameters such as
Airflow control of patient
- Body temperature data.
- Body position detection.
- Monitoring ECG signal.
- Pulse and oxygen functions.
- Multiple data visualization systems.

Furthermore, due to embedded transmission modules and processing capabilities health monitoring system can facilitate low-cost solutions for continuous monitoring.
In the present paper, the parameters of Pulse and Temperature sensors incorporations are discussed.

II. HARWARE & WORKING

1.HEART BEAT SENSOR(ICLM358)

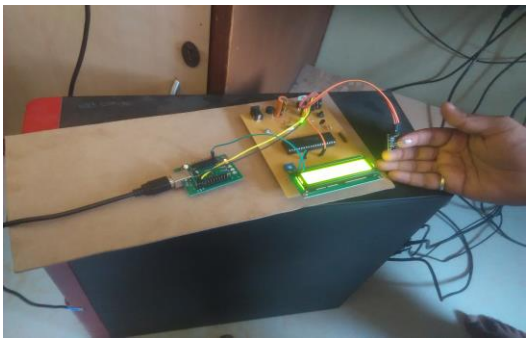

Figure1: Pulse sensor connected to Medical diagnostic platform

ICLM358 is a IR sensor (Fingerstick) which consists of a Bright red LED and a light detector. Finger is placed between the LED and the sensor in such a way that the light passes through the finger and is detected at the other end by the sensor. The pulse rate is determined based on the blood flow passing through the finger as the light passing through finger becomes slightly more opaque so less light reaches the detector. With each pulse detector signal varies. These variations are then converted to electrical pulse. These signals are amplified with the help of amplifier that outputs analog voltage between 0 to +5V logic level signal. Its principle is based on light modulation by blood flow through finger at each pulse.

2. TEMPERATURE SENSOR (LM35)

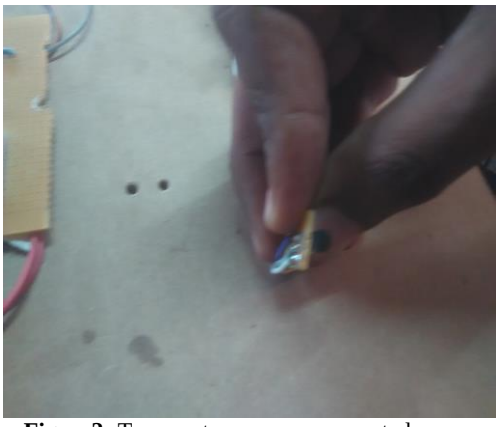

Figure2: Temperature sensor connected

LM35 is a precision integrated circuit sensor and its Output voltage is linearly proportional to the Celsius Temperature. It does not require any external calibration to provide accuracy. It can operate over 55o to 150oC Temperature range.

3. AMTEL PROCESSOR

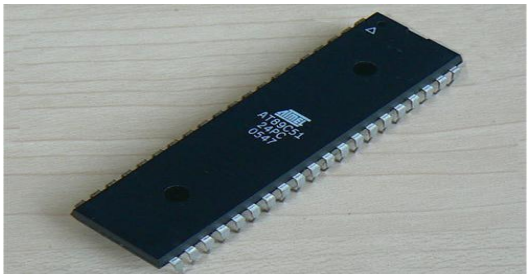

Figure3: Amtel Processor

ATMEL-AT89S52 is a 32 bit microcontroller which offers high performance and very low power consumption. The patient's health parameters are sensed using sensors and is then fed to the ATMEL processor for further processing. ATMEL processor does the work of both Microcontroller and a DSP. It is the heart of the system and is responsible for all the processes being executed. The code will be written in Embedded C and will be programmed into code memory.

4.ZIG-BEE

Figure4: Zigbee

ZigBee is a Wireless Networking Technology that creates a Wireless Personal Area Network (WPAN). As being wireless, ZigBee does not require any USB for Ethernet cable for connections. Data analysed by the ATMEL processor is sent using Transmitter ZigBee and is received wirelessly by Receiver end ZigBee. We are using ZNet 2.5 for our system. It requires less power supply and is reliable.

FIGURE5:XBEE

5. GSM MODULE

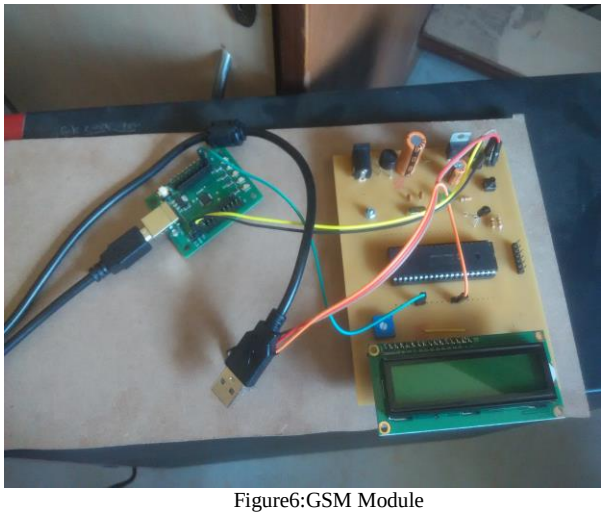

Figure6:GSM Module

GSM Module establishes communication between computer and a GSM system. GSM module is there with power supply for modulation. It requires a SIM (Subscriber Identity Module) to activate communication with the network. Also IMEI (International Mobile Equipment Identity) number is required for their identification. GSM sends alarming SMS to the doctor in case of critical condition of the patient. We are using SIM900 GSM module for our system.

6.OUTPUT ON LED SCREEN

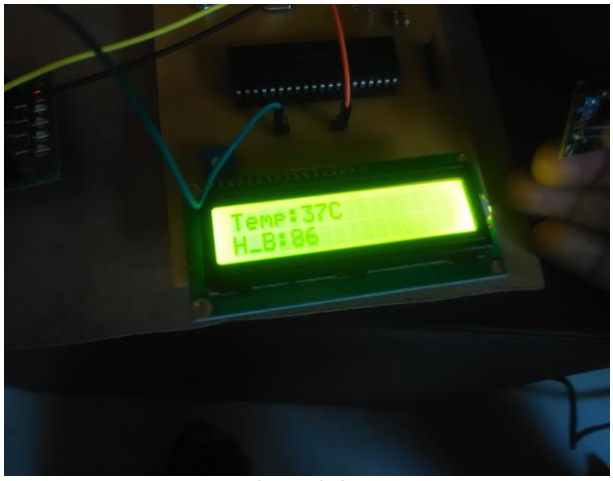

FIGURE8:OUTPUT

III.SOFTWARE MODEL

The software architecture of the system is split into 3 modules:

1. GSM module for interaction of external world with ARM server.
2. Zigbee module for interaction of patient with monitoring system.
3. Patient monitoring system for maintaining a log file.

Upon framework boot up, the wireless patient monitor framework will consistently monitor the patients essential parameters like Heart Beat, body temperature and so on and will intermittently send those parameters to a unified server utilizing ZigBee hub designed as co-organizer alongside the patient ID.

The patient data will be sent to the ARM controller to which a ZigBee hub is associated. The received parameters from the patient observing framework is parsed and the principal parameter of the data is received which is the patient ID (Bed No) from the information. Whatever is left of the parameters incorporate the patients crucial parameters like Pulse/Temperture and so on. All these parameters are initially signed in a standard log group in a record in JFFS document format which is then processed accordingly. Each log message comprises of a patient's data along with the time stamp of the message got took after by the specific patient's parameters.

On the off chance that a specific patient's wellbeing parameter falls underneath the threshold value, a ringer alert is activated by the ARM server. Alongside a robotized alert SMS is sent to the pre-specified Doctors portable number utilizing a standard GSM module interfaced to the ARM server. The Doctor is persistently associated with the ARM server utilizing GSM Module what's more, he/she can get a record of a specific patient's data by simply presenting a SMS message on the brought together ARM server. This will diminish treatment time, cost and power utilization to a more noteworthy degree. In the meantime, the effectiveness of looking at ward will be enhanced by making the framework more real time furthermore, strong.

On the off chance that a specific patient's data is required by the specialist, then he/she can send a SMS to the ARM server specifying the record number of a specific patient. The ARM server will first check for the doctors number which is given to the GSM module. If the number asked for by the specialist matches with the one present in the ARM server then a SMS reaction will be sent back to the specialist taking into account the demand made. The reaction incorporates the complete persistent record of the asked for patient. On the off chance that the portable number doesn't coordinate with the one arranged in the framework then such demand solicitations will be disregarded.

1.Device Driver Program

The Zigbee module interfaces with the ARM server utilizing a serial gadget driver program and on the other end the GSM module interfaces with the ARM server utilizing a USB Device interface. Both the serial and the USB gadget drivers are empowered as a matter of course as a section of standard Linux Kernel that is present inside of the ARM framework. A standard JFFS record framework backing is accommodated for event logging and error logging during the framework's operation.

2.Serial exchange protocol

A Serial Exchange Protocol (SEP) is outlined and actualized for information handling between the wireless patient monitoring framework and the ARM server. The information traded between the patient monitoring framework and the server will be of a string format containing individual fundamental persistent parameters like heart beat,temperature and so forth isolated by a delimiter. The typical format a SEP includes character string followed by related parameter value separated by delimiter.

IV.RESULTS

There is a cavity for measuring the pulse, which comprises of arrangement of LED and LDR. By setting your finger in the middle of a LED and LDR, we can distinguish the beats of heart, the simple voltages are further prepared with an operational intensifier LM 358, and this chip has two implicit OPAMPs. Result is shown on the LCD. This gathered information is transmitted utilizing ZigBee module. This information is gotten at the collector area utilizing same ZigBee module.

V.CONCLUSIONS

The developed prototype platform utilizes low cost/ economic components and constitutes a novel paradigm of how multiple wireless-enabled biosensors can be utilized for electronic health monitoring applications. The developed interfaces on both the smart-phone and the remote workstation allow the user to have a complete picture of the patient's health and to have instant access to real-time and past physiological data.

REFERENCES

[1] Sowmyasudhan S and Manjunath S, "A wireless based real-time Patient monitoring system", International Journal of Scientific & Engineering Research, vol. 2, no. I I, Nov. 2011.

[2] Edward Teaw, Guofeng Hou, Michael Gouzman, K . Wendy Tang, Matthew Kane, Amy Kesluk and Jason Farrell, "A Wireless Health Monitoring System", International Conference on Information Acquisition, Print ISBN: 0-7803-9303- 1 , June 27 - July 3 2005 .

[3] Zimu Li, Guodong Feng, Fenghe Liu, Jia Q Dong, Dr. Ridha Kamoua and Dr. Wendy Tang, "Wireless Health Monitoring System", Applications and Technology Conference (L1SAT), pp 1 -4, 2010 .

[4] Rubina.A.Shaikh,Sajid Shaikh, "Wireless Stand-Alone Real Time Remote Patient Health Monitoring System". International Journal of Innovative Technology and Exploring Engineering, Vol3 issue 7 December 2013.

[5] Jaiee Sitaram Adivarekar, Amisha Dilip Chordia, Harshada H Baviskar, Pooja Vijay Aher, Shaddha Gupta,"Patient Monitoring System Using GSM Technology". International Journal of Mathematics and Research, vol 1 issue 2 March 2013.

[6] H. Lee, S. Lee, K. Ha, H. Jang, W. Chung, J. Kim, Y. Chang, and D.Hoo, "Ubiquitous Healthcare Service Using ZigBee and Mobile for Elderly Patients," in International Journal of Medical Informatics, 78(3), 193-198, March 2009.

[7] Sahandi, R., Noroozi, S., Roushanbakhti, G., Heaslip,V. & Liu, Y., 2010. "Wireless technology in the evolution of patient monitoring on general hospital wards". Journal of Medical Engineering and Technology, 34(1), 51-63.

[8] Aliaksei Kerhet, Michele .M,Francesco .L, Andrea. B, Luca. B. "A lowpower wireless video sensor node for distributedobject detection," RealTime Image Proc (2007) 2: 331-342.

[9] IEEE TRANSACTIONS on Biomedical Circuits and Systems, VOL. 4, NO. 1, FEB 2010-11 "An Energy-Efficient ASIC for Wireless Body Sensor Networks inMedical Applications" Xiao Yu Zhang, Hanjun Jiang, Member, IEEE, Lingwei Zhang, Chun Zhang, Zhihua Wang, Senior Member, IEEE, and Xinkai Chen.

[10] "Design and Implementation of Wireless Biomedical Sensor Networks for ECG Home Health Monitoring", International Conference on Electronic Design December 1-3,2008, Penang, Malaysia Rozeha A. Rashid, MohdRozainiAbd Rahim, MohdAdibSarijari, NurhijaMahalin.

[11] 2011 International Conference on Information and Network Technology IACSIT Press, Singapore "Remote Patient Monitoring- An Implementation in ICU Ward", Arun,Marimuthu, Pradeep, Karthikeyan.

