International Engineering Journal For Research & Development
Vol.5
Issue 5

E-ISSN NO:-2349-0721

Impact factor : 6.549

E-HEALTH MONITORING AND ALERT SYSTEM USING ZIGBEE AND GSM

[1]Rahul Kanase, [2]Akash Kumavat, [3]Kaushal Karande, [4]Sakshi Somani
Department of Electronics Engineering Ramrao Adik Institute of Technology Nerul, Navi Mumbai, Maharashtra, India
Email:rahulkanase2600@gmail.com[1],kumavatakash001@gmail.com[2],
kaushalkarande24@gmail.com[3],sssomanisakshi@gmail.com[4].

ABSTRACT

In recent years, waiting time in hospitals, issue of emergency admissions and charge for medical treatment are more. It increases the workload of doctors as well as hospital staff. Managing the quality treatment providing to patient is issue in fitness care. To overcome this, the need of patient monitoring system arises. In this system human body parameters are monitored in different ways through various type of sensors, wearable electronic devices. The main aim of this technology is to continuously keep the track of patient's physiological parameters and reflect the accurate records to the doctor personal computer or Smartphone. Now the days in hospitals, patient's physiological parameters are constantly monitored by doctors or by different group of hospital paramedical staff for tracking continuous record of patient. It's a monotonous technique which not useful for nowadays. In this proposed system transmitting module continuously detects patient's physiological parameter using the network of sensor and detectors. The zigbee module is used for transmitting and receiving the data and at last it displays on doctors monitor or cell phone. It also gives notifications about the critical condition of patient to the doctor's smart phone through gsm module.

Keywords: Sensors, Atmega 16 processor, GSM module, ZigBee module.

INTRODUCTION

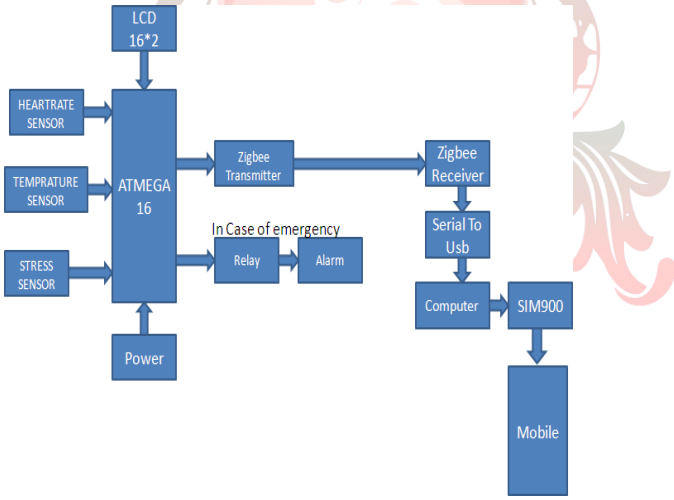
Now a days cost of bed side hospital care is more and by using current modern technologies in less energy integrated circuits and sensors are combined with low power consumption conventions like Zigbee and GSM which is used by researchers to learn the formation& use of wireless network as medium to transmit data to doctor's monitor. Wireless monitoring system enhances quality of life by providing problem to the solution in budget friendly manner. This wireless technology becomes useful as population increases. The tremendous growth in the telecommunication area and mobile technology is been geared up. Wireless sensor network with GSM and ZigBee adds higher network docility and an immense number of nodes, with preferable transmission range and energy savings. In recent time, ZigBee and GSM module have various application in various fields. The work conferred here mainly focus to explore or examine the pertinence, versatility, and sensibility of utilizing wireless-zig bee for monitoring patient's health in the vicinity of hospital by a device instead of giving regular visits to patients. The handed on explanation determines to be uncomplicated, profitable and hopefully causes less involvement with the movability of patient and convenience. An unit of sensors which arewearable, are connected to the patient's, which calculates and processes vital readings to a mobile ZigBee-based smart device which actually acts as receiver and gives the received data to the assigned doctor or attendant, another advantage of this is all this data is stored in database which can be accessed anytime when there is a need. Advance applications comprises the collection of the study of patient's performance in a centralized database or access throughinternet.[3]

LITERATURE SURVEY

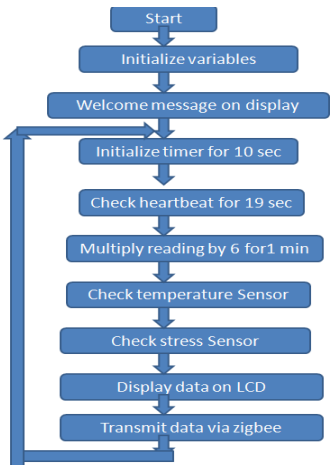
In past years a person's heartbeat was used to measure by doctor by connecting stethoscopes on patient's chest. This creates an issue to maintain a track on patient's performance record and give appropriate medications at times of extremity. By old methods doctors need to regularly visit and measure the patient's heartbeat and temperature using thermometer and stethoscopes. To overcome these restrictions the paper has proposed a system which has a ability for accessing of patient's statistics and biological information. Here the ZigBee is used to have a informative interaction between hospital staff and patient. Currently, a number of studies have been proposed to patient's physiological parameter monitoring over wirelesstransmission.[3]

PROPOSEDWORK

First, we use controller that is ATmega16 AVR controller. When we use controller start with give the power supply, clock and reset. After that connect LCD display (16*2) to shows the sensor value or it work properly. The sensors output gives directly to controller, in controller built in ADC to convert analog to digital output. And this output give to ZigBee module. Zigbee module send date wirelessly. Any problem in circuit we give controller output to relay and buzzer will turn on. The ZigBee transmitter send date to another ZigBee module to receive the data and covert to serial to USB and give to all information pc or laptop. At receiver side there is Zigbee receiver which receives data and displays on doctor's desktop.

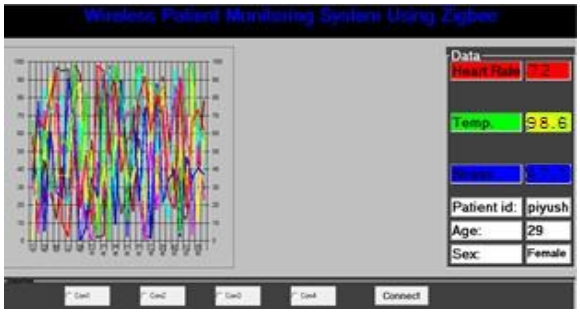


METHODOLOGY-



This paper shows patient vital parameters using sensor indicate physiological states of patient's body. The various parameter detected by sensor are processed by software and send to the transmitter side of module that is ZigBee transmitter module near patient room. The data will be received by ZigBee receiver module which is been available with doctor. Whereas, in case of any emergency conditions, there is a GSM module which will provide an alert notification to all contacts defined while software implementation. The emergency and serious events will be based on the data received from the Temperature sensor, stress sensor and the heartbeatsensor.[2]

- SOFTWARE REQUIRED-



We use Visual basic 6 software and using that we show the current parameters at doctors' desktop.

1. Atmega16:-

Atmega 16 (8-bit IC) has low power consumption and comparatively is a high-performance chip. RISC architecture is used by Atmega16 which allows execution of multiple instruction within few machine cycles. Maximum Frequency of atmega16 is 16 MHz(megahertz). Its Programmable Flash memory size is of 16KB, 1 KB SRAM and EEPROM of 512 bytes which can be used for storing the program and execution of instruction.It has 40 pin IC with 32 are GPIO pins which are further divided into four 8-bit Ports named as PORT A, B, C, D respectively. This IC is characterized with various built-in peripherals such as USART, ADC, analog comparator, SPI, JTAG, etc. Each pin of this IC is multiplexed and has alternatefunctions.[1][4]

2. Zigbee Module:-

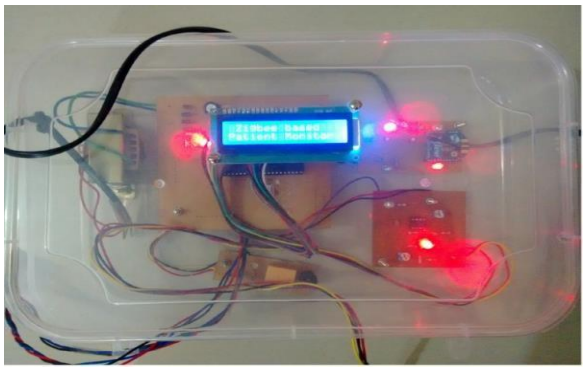
ZigBee is a wireless networking tool that particularly aims at isolated control and sensing purpose. It is a robust tool hence it can work properly in rigid surroundings and gives us maximum security and flexibility.(Anon., n.d.) The distance between the transmitting station to the next station can be upto 70m (meters). We can increase this distance by sending data through nodes from one station to another. Transmission of data is done in packets where the largest size available is 128 bytes, permitting maximum of 104 bytes. The Zigbee supports 64-bit IEEE addresses and 16-bit short addresses. Devices are particularly identified by their IP addresses, similarly the IEEE address which is of 64 bit identifies every device and after the network is build up use of short address is done.[5]

3. GSM Sensor:-

The GSM/GPRS module along with communication interface RS232 has a 2 Band engine – SIM 900A, that work on frequencies of 900MHz and 1800MHz respectively. With the help of the AT commands we can set the baud rate from 9600 to 115200. It has the TCP/IP stack that connects you with the internet with the help pf the GPRS modem. This module is provided with the on-board regulated power supply

which enables us to connect with many unregulated power supply. We can use this module we can make audio calls, messages, catch incoming calls, make use of Internet, etc.[1]

HARDWARE IMPLEMENTATION



FUTURE SCOPE

The parameters collected by the system can be used in future for determining: - blood pressure, MAX 30100 pulse oximeter (oxygen level), galvanic skin resistance (GSR) and amenia. The sensors for above mentioned parameters are available. Sensors like SY- HS220 which is a humidity sensor can be used to keep a track on patient's humidity level suffering from asthma. Various sensors like the ECG monitoring sensor, spO2 sensor for measuring oxygen saturation, saline level sensor, etc. can also be included under the monitoring systems in future development of theproject.[7]

Under emergency conditions for the patient located at a remote place, the location can be traced with the help of the GPS and the nearest hospital can be informed. The patient handling capacity for this project is only one person at a time but by enhancing the system in future we can develop an android application which will support multiple patient monitoring, which means the doctor can monitor and take actions for a faraway situated patient and inform to the hospital staff. [6]

The android app developed will wirelessly connect to the ZigBee module and the data will be made available to the doctor on any handheld device such as a mobile phone, tablet, laptop,etc.

PROBLEM FACED

In this system we use Zigbee and GSM module for communication between patient and doctor, working with both simultaneously is difficult. Sometimes sensor not work properly. Sometimes there is a problem in the network while sending the SMS through GSM module, this is the only limitation while running this setup.[8]

CONCLUSION

Using the wireless technology (ZigBee) we conclude that we are successfully capable to send data collected from the patient through sensors to the hospital. The data is displayed on the PC through the ZigBee module at the receiver side. If any parameter obtained from the patient goes beyond the specified values, SMSindication is sent to the mobile informing about the same even if the doctor in not available in the hospital. We have studied the process of collecting data from sensor and transmitting it with the help of GSM module and processing the received data which helps in monitoring the patient's health. In modern times human life is prone to diseases and hence a proper and early treatment is the crucial need and through the design of this project we can help in monitoring and treatment of the patients with comparatively lessefforts.

ADVANTAGES

1. Patients can be monitored remotely so doctors don't have to check every person manually. This can save the time ofdoctor.

2. Using SMS alert system, doctors can be informed about patient's emergency anywhere at anytime.

3. As patient information is stored in database, doctors or nurse can analyze the patient's health based on past parameters.

REFERENCES

[1] Deepa and P. N. Kumar, "Patient health monitoring based on ZigBee module," *2013 International Conference on Optical Imaging Sensor and Security (ICOSS)*, Coimbatore,2013, pp.1-4. doi: 10.1109/ICOISS.2013.6678411

[2] M. Imdoukh, Y. Khalil, A. Rady and M. Khanafer, "Zealth: ZigBee-Based WBAN System for e-Health Monitoring," *2017 9th IEEE-GCC Conference and Exhibition (GCCCE)*, Manama, 2017, pp. 1-9. doi:10.1109/IEEEGCC.2017.8448094

[3] K. D. Singh and A. K. Joshi, "Cost effective open source wireless body sensor networking through zigBee," *2017 International Conference on Communication and Signal Processing (ICCSP)*, Chennai, 2017, pp. 0866-0869. doi:10.1109/ICCSP.2017.8286491

[4] O. Apostu, B. Hagiu and S. Paşca, "Wireless ECG monitoring and alarm system using ZigBee," *2011 7TH INTERNATIONAL SYMPOSIUM ON ADVANCED TOPICS IN ELECTRICAL ENGINEERING (ATEE)*, Bucharest, 2011, pp.1-4.

[5] T. Kim and D. Kim, "Opportunistic Shortcut Tree Routing in ZigBee Networks," in *IEEE Sensors Journal*, vol. 16, no. 12, pp. 5107- 5115, June15, 2016. doi: 10.1109/JSEN.2016.2557344

[6] S. Majumder, M. A. Rahman, M. S. Islam and D. Ghosh, "Design and Implementation of a Wireless Health Monitoring System for Remotely Located Patients," *2018 4th International Conference on Electrical Engineering and Information & Communication Technology (iCEEiCT)*, Dhaka, Bangladesh, 2018, pp. 86-91. doi:10.1109/CEEICT.2018.8628077

[7] A.Sagahyroon,F.Aloul,A.R.Al-Ali,M.S. Bahrololoum, F. Makhsoos and N. Hussein, "Monitoring patients' signs wirelessly," *2011 1st Middle East Conference on Biomedical Engineering*, Sharjah, 2011, pp. 283-286.doi: 10.1109/MECBME.2011.5752121

[8] Purneema punitsingh, Zigbee and GSM based , Patient health care monitoring system 2014. 2014 International Conference on Electronics Communication systems (ICECS) Coimbatore, 2014 G. Airij, R. Sudirman and U. U. Sheikh,"GSM and GPS Based Real-Time Remote Physiological Signals Monitoring and Stress Analysis, Processing and Systems (ICBAPS), Kuching, 2018, pp.130-135, doi: 10.1109/ICBAPS.2018.8527406

[9] Kim, S. H. Kim, J. Yang, S. Yoo and D.Kim, "Neighbor Table Based Shortcut Tree Routing in ZigBee Wireless Networks," in IEEE Transactions on Parallel andDistributed Systems, vol. 25, no. 3, pp. 706-716, March 2014. Doi: 10.1109/TPDS.2014.9