

# Wireless Health Monitoring Using Sensors and Modules

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**ABSTRACT** This paper deals with design and development for remote patient monitoring in healthcare field. The primary function of this system is to constantly monitor patient's physiological parameters such as pulse rate, breathing rate, blood pressure rate and patient's body movement, and display the same information to the doctor. In hospitals, where patient's physiological parameters are needed to be constantly monitored, is usually done by a doctor or other paramedical staff for maintaining a record of it. It is a tedious method. In this proposed system transmitting module continuously reads patient's pulse rate or heart beat rate, breathing rate, patient body movement and blood pressure rate. The sensors are used to sense the information and Microcontroller is used to receive the data from the sensor. Using a Zigbee transmitter the retrieval information be send to corresponding receiver located at the computer. The Zigbee receiver receives the data from transmitter and finally displays record to doctors via web browser and provide notification message about the emergency to the physicians through GSM module. The main aim is to reduce the cost for monitoring patient health using different types of sensor.

**KEYWORDS:** Sensors, Zigbee transmitter, zigbee receiver, GSM.

## I. INTRODUCTION

This paper describes about to build a wireless healthcare monitoring system using GSM Technology and Zigbee. Remote monitoring is seen as an effective method of providing immediate care as it allows for continuous as well as emergency transmission of patient information to the doctor or healthcare providers. These new technologies enable us to monitor patients on a regular basis, replacing the need to frequently visit the local doctor for a recurring illness. Healthcare services can improve the living of patient, physical handicapped, elders, and chronically ill persons. So without frequently visit to the doctor, anyone can get proper treatment and improve his/her health conditions. This system send the health information of patient to the microcontroller then send to the PC via Zigbee communicating device. PC stores this data onto the local database. If there is any emergency, it displays an alert message on the screen and send notification message to the doctor by using GSM technology.

## II. PROPOSED SYSTEM

The proposed system would be beneficial for medical practitioners to do proper and better treatment and it would be useful for health care providers to improve disease management. The patient is monitored from ICU and data transferred to the PC is wired and also sent the same information to the doctor through mobile. Main module is connected to the computer to maintain the status of the patient. In the proposed system, patient's parameters such as temperature range, heartbeat rate, oxygen level and patient's body movement will be continuously transmitted and monitored through wireless technology Zigbee.

### III. SYSTEM ARCHITECTURE

This project is developed to monitor patient's health parameters such as heartbeat, temperature, patient's body movement, oxygen level.

In case of emergency and dangerous situations we have to alert the doctor immediately. For this we are using a Zigbee based network for doctor to patient communication in the hospital and even to communicate and indicate the status of the patient through SMS. This way of communication is actually done with Zigbee network and with the GSM network. Each patient will be given this module and with the help of this module the patient health condition is monitored and if there is any change in the condition of the health then it immediately sends that changed data through Zigbee to the local system where the main module is connected to the computer to maintain the status of the patient.

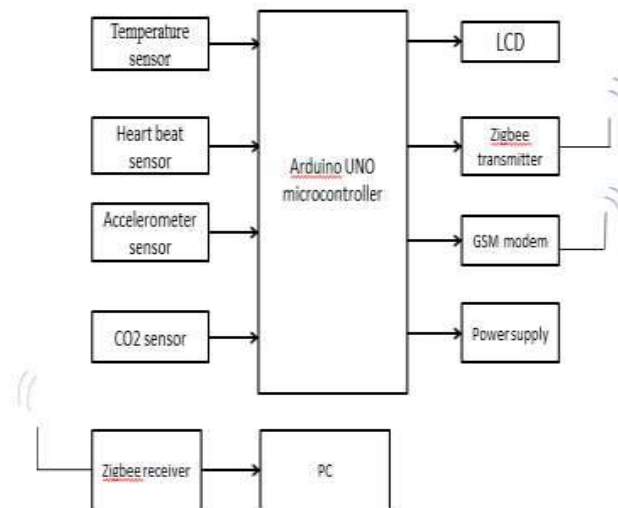


Fig 1 Block diagram

### ZIGBEE

ZigBee is an IEEE 802.15.4 based specification for a suite of high level communication protocols used to create personal area networks with small, low-power digital radios. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi.



Fig 2 zigbee

ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee has a defined rate of 250kbit/s, best suited for intermittent data transmissions from a sensor or input device. ZigBee was conceived in 1998, standardized in 2003, and revised in 2006. The name refers to the waggle dance of honey bees after their return to the beehive. The information sent by the Zigbee Module is received wirelessly by the other Zigbee Module at the receiver section. Arduino will match the limit predefined in the code of the micro-controller. If a mismatch occurs, that is if the collected data is more than the limit defined than alert signals are issued. Alert signals are issued in the form of SMS on doctors mobile to alert him so that he can.

### **GSM MODEM**

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

### **HEART BEAT SENSOR**

Heart beat sensor is designed to give digital output of heart beat when a finger is placed inside it. This digital output can be connected to arguing directly to measure the Beats Per minute (BPM) rate. It works on the principle of light modulation by blood flow through finger each pulse. ICLM358 is used for this sensor. Its dual low power operational amplifier consist of a super bright red LED and light detector. One will act as an amplifier and another will be used as a comparator. LED needs to be super bright as the light must pass through finger and detected at another end. When heart pumps a pulse of blood through blood vessels, finger become slightly more opaque so less light reaches the detector.

### **TEMPERATURE SENSOR**

The LM35 series are precision integrated- circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy.

### **ACCELEROMETER SENSOR**

Accelerometer sensor is used to sense patient's body movement. ADXL335 is accelerometer sensor which works on the principle of piezoelectric effect. Whenever we will tilt the sensor the ball is supposed to move in that direction because of Gravitational force. The walls are made of piezoelectric elements. So, every time ball is touching the wall an electric current will be produced which will be interpreted in the form of values in any 3D space. ADX1335 is a triple axis accelerometer i.e. it will give 3 values in output. BW is adjustable as it

has single capacitor per axis.

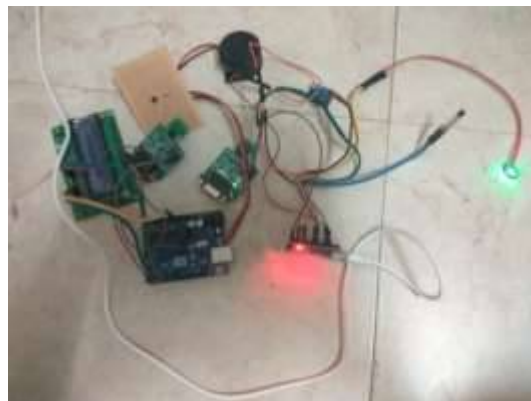
### C02 SENSOR

MQ-6 is the sensitive component and has a protection resistor and an adjustable resistor on board. The MQ-6 gas sensor is highly sensitive to LPG, iso-butane, and propane and less sensitive to alcohol, cooking fume and cigarette smoke.



Fig 3 C02 Sensor

## IV. RESULTS AND DISCUSSION



Our final output is to display the sensor values in LCD and send an intimation to the doctor about the health status of patient through GSM and zigbee.

## V. CONCLUSION

Our proposed system is very useful in case of emergency situation in hospitals. This system is used to avoid frequent visit of doctor and to continuous monitoring of patient. Zigbee is used for transmitting data from sensor devices to PC. Any abnormalities in health conditions are informed via SMS to the indicated mobile number through GSM.

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