

# Implementation of Zigbee Technology for Patient HealthCare Monitoring System

Shivachandra Hindinamani<sup>1</sup>, Anant Baliwant Bodas<sup>2</sup>

Assistant Professor, Department of Electrical Engineering, Yashoda Technical Campus, Satara, India<sup>1,2</sup>

**Abstract:** This paper deals with development of microcontroller based health monitoring system for heartbeat, temperature and oxygen using Zigbee. Now a days, nation population increases demands for caretaking because of these reason monitoring system are the most important system. In this paper we use wireless sensor network based on Zigbee technology. This monitoring system consists of Zigbee based network, microcontroller and three types of sensors which are heartbeat sensor, temperature sensor, oxygen sensor. These sensors are connected to the patient and the output is directly displayed on LCD through Zigbee. The output from the sensor is analog values it is converted to digital and processed by using microcontroller and it will be respond in LCD or computer display.

**Keywords:** Heartbeat sensor, Microcontroller, Oxygen sensor, Temperature sensor, Zigbee network.

## 1. INTROUCTION

Now a day, patient health care monitoring system is important topic and research field. These health monitoring system are developed for many application such as military, homecare unit and hospitals. This paper describes the Zigbee based health monitoring system. This system consists of microcontroller, Zigbee technology, heartbeat sensor, temperature sensor and oxygen sensor. The Zigbee is low cost technology. It's rang is 30 m to 1 km .The technology is intended to be simpler and less expensive than other WPAN's such as Bluetooth. Due to tiny size and low power consumption of microcontroller are applicable where miniaturization is key requirement such as access control and point of sale. This paper describes wireless sensor network on Zigbee technology. It is used for collecting and transferring various monitoring information about patient in hospital. The application consists of Zigbee based network, three sensor i.e. heartbeat sensor, temperature sensor, oxygen sensor.

## 2. BLOCK DIAGRAM

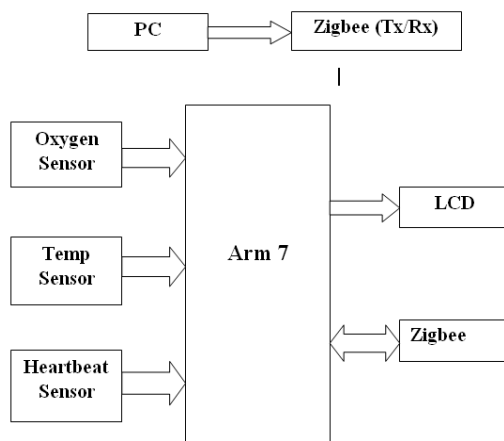


Fig.2.1 Block Diagram of Zigbee

## 3. BLOCK DIAGRAM DISCRPTION

### 3.1. Microcontroller (Arm 7)

ARM7 has a 32 bit data bus and a 32 bit address bus. The data types the processor supports are Bytes (8 bits) and Words (32 bits), where words must be aligned to four byte boundaries. Instructions are exactly oneword, and data operations (e.g. ADD) are only performed on word quantities. Load and store operations can transfer either bytes or words

ARM7 supports six modes of operation:

- (1) User mode: the normal program execution state
- (2) FIQ mode: designed to support a data transfer or channel process
- (3) IRQ mode: used for general purpose interrupt handling
- (4) Supervisor mode: a protected mode for the operating system
- (5) Abort mode: entered after a data or instruction prefetch abort
- (6) Undefined mode: entered when an undefined instruction is executed

### 3.2. Zigbee



Fig.3.1.Zigbee Module



Zigbee is low-cost and low-powered mesh network widely deployed for controlling and monitoring applications where it covers 10-100 meters within the range. This communication system is less expensive and simpler than the other proprietary short-range wireless sensor networks as Bluetooth and Wi-Fi.

Zigbee supports different network configurations for master to master or master to slave communications. And also, it can be operated in different modes as a result the battery power is conserved. Zigbee networks are extendable with the use of routers and allow many nodes to interconnect with each other for building a wider area network.

### 3.3. Oxygen Sensor



CM-0201

Fig.3.2.Oxygen Sensor

The O<sub>2</sub> sensor is mounted in the exhaust manifold to monitor how much unburned oxygen is in the exhaust as the exhaust exits the engine. Monitoring oxygen levels in the exhaust is a way of gauging the fuel mixture. It tells the computer if the fuel mixture is burning rich (less oxygen) or lean (more oxygen). An oxygen sensor (or lambda sensor) is an electronic device that measures the proportion of oxygen (O<sub>2</sub>) in the gas or liquid being.

### 3.4. Temperature Sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). It can measure temperature more accurately than using a thermistor. The sensor circuitry is sealed and not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The scale factor is .01V/°C.

The LM35 does not require any external calibration or trimming and maintains an accuracy of  $\pm 0.4^{\circ}\text{C}$  at room temperature and  $\pm 0.8^{\circ}\text{C}$  over a range of  $0^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$ .

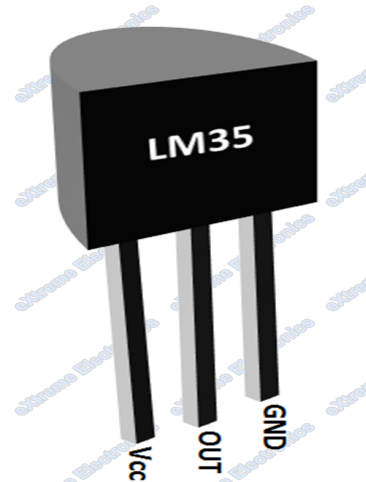


Fig.3.3.Temperature Sensor

Another important characteristic of the LM35 is that it draws only 60 micro amps from its supply and possesses a low self-heating capability.

The LM35 comes in many different packages such as TO-92 plastic transistor-like package, TO-46 metal can transistor-like package, 8-lead surface mount SO-8 small outline package.

### 3.5. Heartbeat Sensor

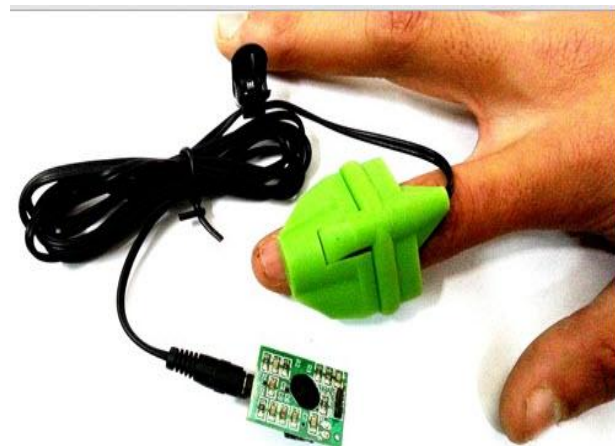
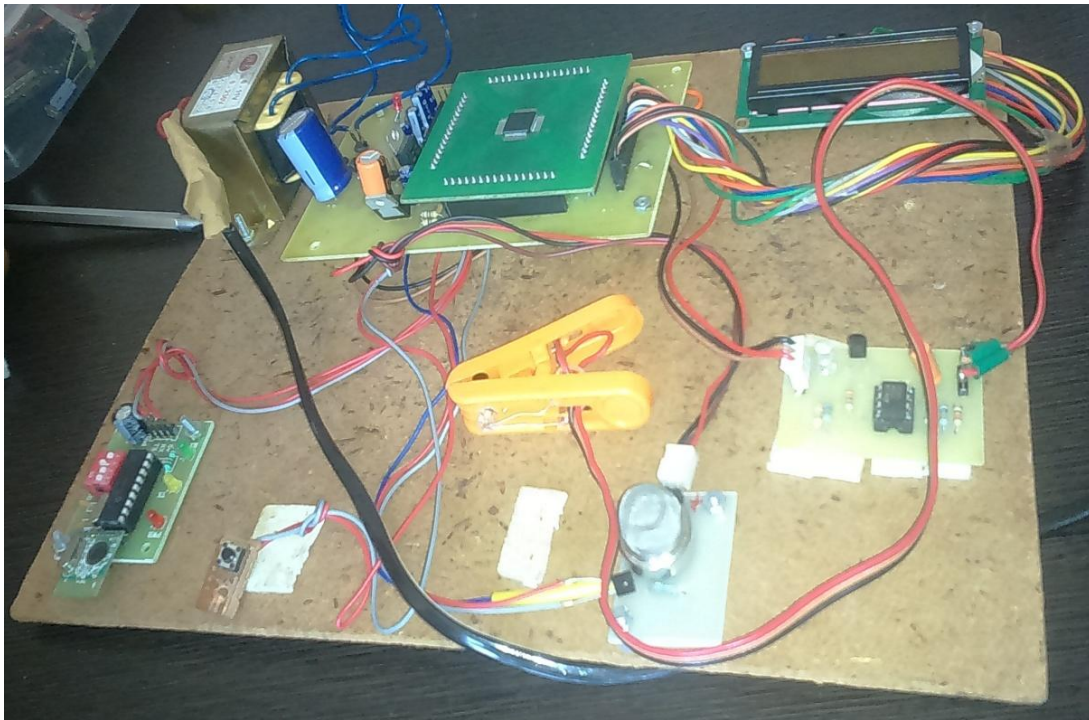


Fig.3.4.Heartbeat Sensor

Heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to a microcontroller directly to measure the Beats per Minute (BPM) rate.

It works on the principle of light modulation by blood flow through the finger at each pulse. It is applicable for Digital Heart Rate monitor, Patient Monitoring System, Bio-Feedback control of robotics and applications. The heartbeat is indicated by an LED. It has an instant output digital signal for directly connecting to a microcontroller. It has a compact size and its working voltage is +5V DC.

## 4. HARDWARE DIAGRAM



**Fig. 4.1 Hardware Prototype Model**

## 5. CONCLUSION

We have analyzed wireless health monitoring system of temperature, heartbeat and oxygen of human being using Zigbee based wireless health patient monitoring system. The wireless device is comfortable and reliable for patient as well as medical representative and the speed is high, low power consumption, more highly efficient system.

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## BIOGRAPHIES



**Prof. Shivachandra H.** was born in Belagavi district, K.A, India. He received B.E. in Electrical and Electronics Engineering from Basaveshwar Engineering College, Bagalkot (Dist), K.A, India. M. Tech in Energy Systems Engineering from N.M.A.M Institute of Technology,

Udupi, K.A, India. He has 5 years of teaching experience in reputed engineering colleges and he is presently working as Asst. Prof & HOD (EE) Yashoda Technical Campus, Satara(MH) He has various publications in National & International Journal/Conferences.



**Prof. Anant Bodas.** was born in Satara district, M.H, India. He received B.E. in Electrical Engineering from Dnyaneshwar Vidyapith, Pune (Dist), M.H, India. He has 6 years of teaching experience in reputed engineering colleges and also 16 years of industrial

experience and he is presently working as Asst. Prof (EE) Yashoda Technical Campus, Satara(MH) He has various publications in National & International Journal/Conferences.