



ARDUINO BASED HEALTH MONITORING SYSTEM

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Abstract — This project is about wireless biomedical parameters monitoring system based on different biomedical sensors and microcontroller unit Arduino UNO with Zigbee. The system can be used to measure physiological parameters, such as Pulse rate, ECG monitoring, Temperature of a human subject. Using several sensors to measure different vital signs, the person is wirelessly monitored within his own home. There are number of techniques available for the ICU patient's health monitoring system with wired communication technology. In the novel system the patient health is continuously monitored using wireless sensor networks and the acquired data is transmitted to a microcontroller unit Arduino UNO and then to Zigbee. At the receiver side the data is collected with Zigbee and Arduino and displayed on relevant displays.

Keywords-component: Arduino uno , Zigbee , sensors: Pulse rate sensor , ECG sensor , Temperature sensor.

I. INTRODUCTION

The electronics technology has entered in all aspects of day-to-day life, and the medical field is not exception for this, so the need for well-equipped hospitals and diagnostic centers is increasing day by day as people are becoming more conscious and attentionful about their health problems. Today's hospitals are huge and with large areas in buildings. They occupy number of floors in one building. Different wards are situated at different places such as men's ward, women's ward, maternity ward, general ward, special rooms and more importantly ICU's. Doctor's need to keep monitoring all the patients in these wards continuously, and this requires more number of skilled nurses and concerned employees. It is not feasible for the doctors to go to each ward and monitor each patient frequently say after each half an hour. Keeping all these in mind we have proposed a wireless biomedical parameter based monitoring system.

In this system we are continuously monitoring the patient's different health parameters such as body temperature, pulse rate, ECG monitoring and transmitting data to the doctor. Sensor plays a vital role in the research and technological community. But they are different from traditional wireless networks as well as computer networks. Recently progress in science and technology offers miniaturization, speed, intelligence, sophistication, and new materials at lower cost resulting in the development of various high-performance smart sensing system. Many new researches is focused at improving quality of human life in terms of health by designing and fabricating sensors which are either in direct contact with the human body (invasive) or indirect (noninvasive).

II. EXISTING SYSTEM

In intensive care units it is necessary to monitor continuously the patient health parameters and keep their record. There is possibility of human errors. There are some shortcomings present in existing system. Currently there are number of health monitoring systems available for the ICU patients which can be used only when the patient is on bed.

III. DISADVANTAGES OF EXISTING SYSTEM

In many existing system they are only two parameters used for monitoring the health of the patient such as body temperature and blood pressure. The other system can only detect the health parameter of the patient aged between 18-66 only.

IV.BLOCK DIAGRAM AND DESCRIPTION

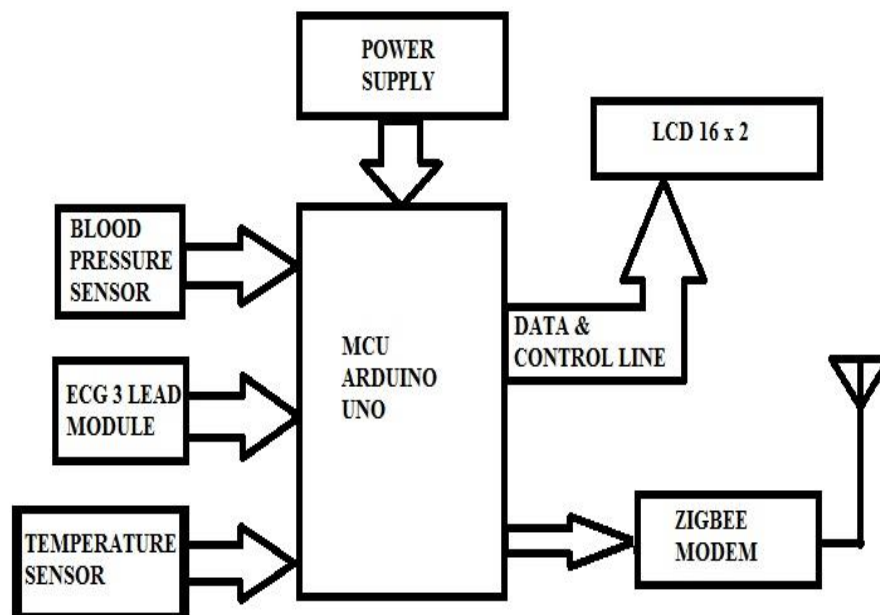


Fig. Transmitter block diagram

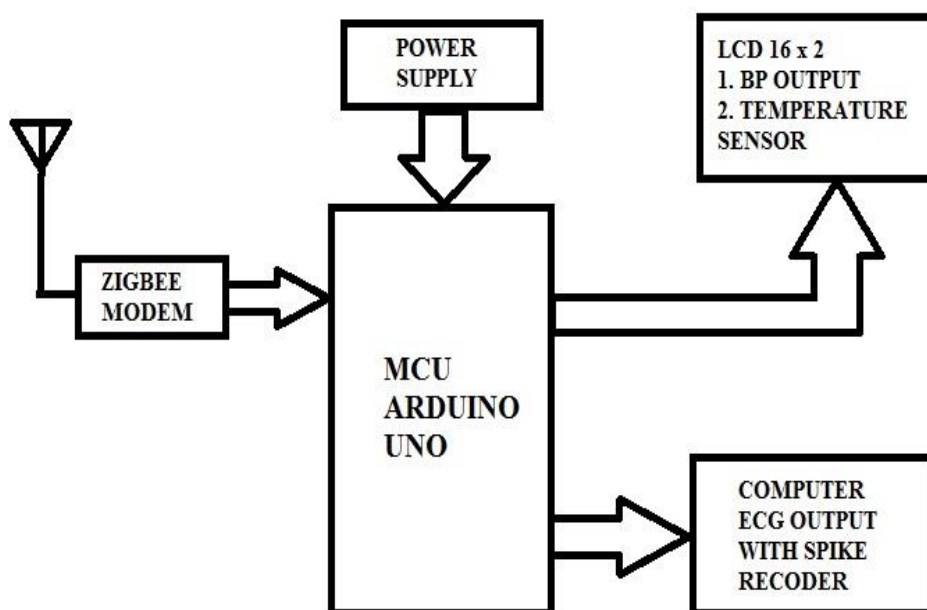


Fig. Receiver Block Diagram

Transmitter section:

The transmitter section consists of two sensors (i.e. blood pressure sensor and temperature sensor), ECG 3 lead module, zigbee is used for transmission of the data and lcd screen is used to display the digital data of pulse rate and temperature.

Blood pressure sensor is non-invasive sensor designed to measure human blood pressure the data of blood pressure sensor is given to arduino which is in analog form and is converted into digital and the output is seen on the lcd screen. The output will given in bpm(beats per minute) normal heart rate of a person is 60-100bpm.

Temperature sensor is a contact sensor that on touching the object(skin) measure the temperature of the object. When any person keeps his finger on the temperature sensor it measure the body temperature of that person. Lm35 is a temperature sensor used to measure body temperature in analog form after converting to digital the data is in degree Celsius. The normal body temperature of the is 37 degree Celsius.

ECG module is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an Electrocardiogram and output is in analog form. There are three electrodes connected to ECG module that are applied on body near to the heart this electrodes measures the heart activity.

Arduino is a microcontroller board it operates on 7 to 12 volts. It takes the analog input of the two device used such as blood pressure sensor and temperature sensor and convert the input into digital displaying it on the lcd screen. It also takes the ECG input in analog form and sends all this data using zigbee.

Receiver section:

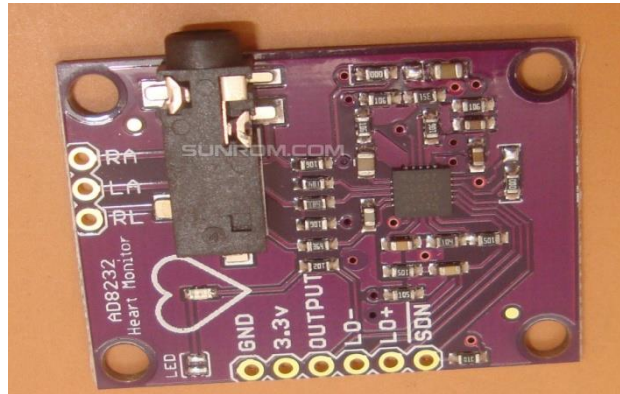
In receiver section zigbee modem is used to collect the data by transmitter. The arduino converts the received data into digital form and send it to the lcd 16 x 2 and analog signal to the spike recoder. The lcd shows the output of blood pressure and the spike recoder shows the output of ECG in analog form.

A. ARDUINO UNO



Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or Breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

B. ECG SENSOR



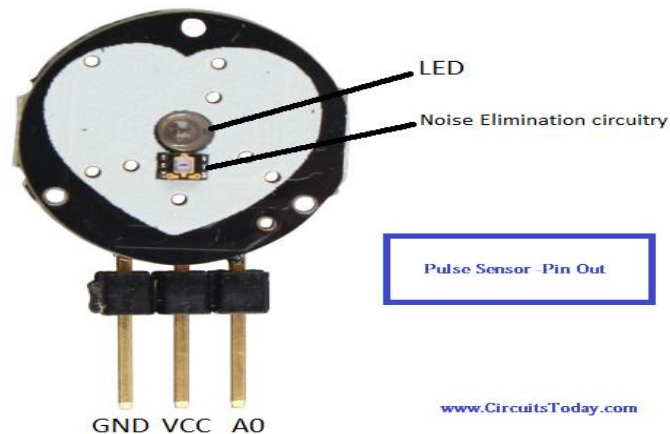
To measure the electrical activity of the heart is analyze with the advanced module AD8232 Single Lead Heart Rate Monitor. The electrical activity of the heart is analog in nature and charted as an ECG or Electrocardiogram. The signals of ECG are extremely noisy so with the help of AD8232 acts as an op amp for getting clear signals from the PR and QT intervals. The AD8232 having an integrated signal conditioning block for Electrocardiogram and other biopotential measurement applications. . AD8232 is designed in such a way that it is capable of extracting, amplifying and filtering weak biopotential signals form noisy signals. Its Operating Voltage is 3.3V, output is analog in nature.

C. TEMPERATURE SENSOR



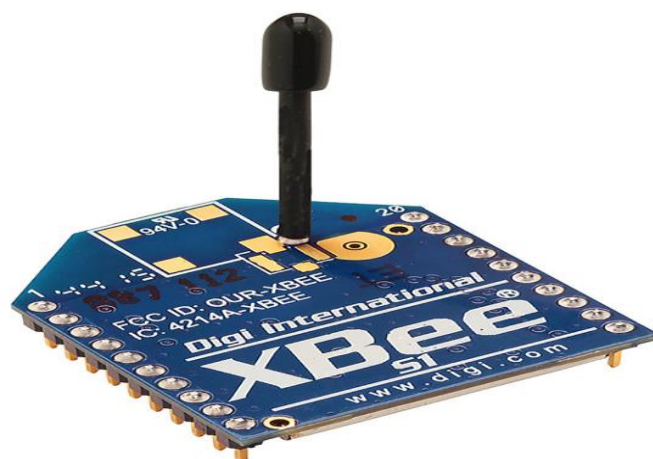
The DS18B20 communicates over a 1-Wire bus by definition requires That only one data line (and ground) for communication with Arduino. It has an operating temperature range of -55°C to $+125^{\circ}\text{C}$ and is accurate to $\pm 0.5^{\circ}\text{C}$ over the range of -10°C to $+85^{\circ}\text{C}$. In Addition, the DS18B20 can derive power Directly from the data line ("parasite power"), Eliminating the need for an external power supply. Converts temperature to 12-bit digital word in 750ms (max.).

D. PULSE RATE SENSOR



This pulse sensor fits over a fingertip and uses the amount of infrared light reflected by the blood circulating inside to do just that. When the heart pumps, blood pressure rises sharply, and so does the amount of infrared light from the emitter that gets reflected back to the detector. The sensor itself consists of an infrared emitter and detector mounted side-by-side and pressed closely against the skin. When the heart pumps, blood pressure rises sharply, and so does amount of infrared light from the emitter that gets reflected back to the detector. The detector passes more current when it receives more light, which in turn causes a voltage drop to enter the amplifier circuitry.

E. 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, such as for home automation, medical device data collection, and other low-power low-bandwidth needs, designed for small scale projects which need wireless connection. Hence, Zigbee is a low-power, low data rate, and close proximity (i.e., personal area) wireless ad hoc network.

V. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- [1]. It is a low cost health monitoring system then the others at the hospitals.
- [2]. It is portable and can be used anywhere.
- [3]. Associating the gap between the patients and the doctor.
- [4]. Best to be used in rural areas for multipurpose. So that all the conditions are simply measured.
- [5]. Operation of this device is very simple.
- [6]. It gives a good performance when we compare with compact sensor.

DISADVANTAGES:

- [1]. If power supply fails circuit won't work.

VI. CONCLUSION

As this system is based on different bio-sensors, micro-controller & Zigbee technology is used to transmit data wirelessly, as great use in the field of medicine and helps the doctor to keep a keen eye on the patient's health. So a system is used to monitor the overall health of patient, which needs constant care, the data at receiver which can be used to analyse the patients overall health condition. Thus the, pulse rate, temperature, ECG signal is measured from the different biosensors and respective diagnosis can be done by doctors.

VII. REFERENCE

- [1]. Kim Chriscaden, Preventing disease through healthy environment, World health organization, 2016.
- [2]. Rupa Chandra, *GSM based health monitoring system*. Pune: Army institute of technology , 2014.
- [3]. Harshavardhan Patil, *Arduino based wireless biomedical parameter monitoring system using zigbee* . SSGMCE: Shegaon, 2015.
- [4]. Vivek Pardeshi, *Health monitoring system using IOT* .SSPACE: Wardha , 2017.
- [5]. Priyanka Kakaria, *A real time health monitoring system*. School of engineering and technology: Thailand, 2015.
- [6] Wikipedia.