International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.07, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

IMPLEMENTATION OF PATIENT MONITORING SYSTEM USING ARDUINO UNO

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ABSTRACT

The overall view of this paper is to develop ICU patient health monitoring system. The system is used to measure physical parameters such as blood pressure (Systolic and Diastolic), heart beat pulse rate, body temperature of a human and movement of patient with the help of bio-medical sensors.ICU patient health is continuously monitored and same data will be continuously sent to the doctors and patient attender via Bluetooth, the patient position can also be seen with the help of display. If any abnormality occurs with the patient, the buzzer turns on, so that the doctors can attend the patient immediately. This paper provides cost efficient and flexible ICU patient monitoring system.

Keywords : Arduino Uno, Blood Pressure Sensor, Heart Beat Sensor, Temperature Sensor, and PIR Motion Sensor

I. INTRODUCTION

Now a days the population is increased continuously while the number of patients also increasing due to unhygienic foods. So for patient maintenance need huge number nurses in every hospital, especially in ICU ward.

In this word very sensitive condition patient are admitted so, that only doctors and nurses can be allowed inside. Nurse will be there in this ward to continuously monitor/take care of patients. We have designed such as system that does not need nurse in ICU continuously. Our system will take care of patient. The System contained BP, Heartbeat, temperature and PIR (Motion) sensor.The sensors continuously transmit the date from human body to arduino. Arduino will send the received data to Bluetooth via Bluetooth the doctors can be observe the patient conditions continuously, while sitting the cabin by the help of smart phone.

If the patient health status is abnormal then the buzzer will give a sound to indicating that the patient health status willgoing to abnormal, with the help of buzzer the doctors can attend the patient immediately.

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II. RELATED WORK

Recently many authors proposed patient health monitoring system. Monitoring of vital functions and functions of life support devices is essential for critically ill patients. However , modern patient monitors and implemented risk management must be constructed in accordance to approved. It was determined that 31.5% of the negative outcome could have been prevented by use of additional monitors. The authors concluded that monitoring with adequate thresholds appeared able to improve patient outcome, 70% of all anesthesia-related critical incidents were caused by human error. In evitable space mistakes may be corrected in time if detected by a monitoring system(including alarms) before physiological variables run out of range.

III. PROPOSED WORK

3.1 BLOCK DIAGRAM

ICU patient monitoring system consist of arduino uno, temperature sensors, blood pressure sensor, heart beat sensor, pir motion sensor, buzzer, Bluetooth, android phone, and power supply. The sensors are connected to arduino, the value sensed by the human body is send to the doctor via Bluetooth to android phone. If any abnormality found the buzzer turns "ON" so patient can get immediate treatment.

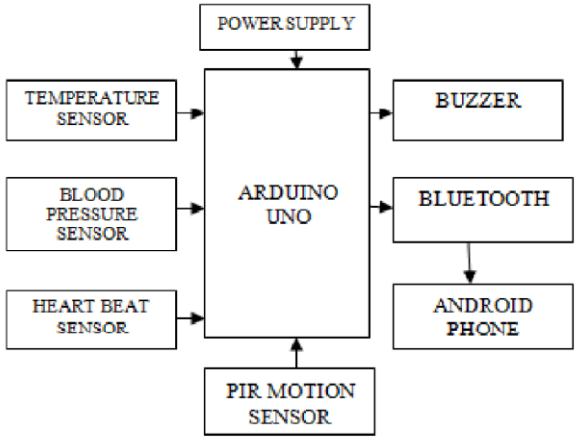

Fig 1: Block diagram

Arduino board designs use a variety of microprocessor and microcontroller. The boards are equipped with set of digital and analog input and output pins. The USB is used for loading programs from personal computer .The microcontroller are typically programmed using a dilate of features from the programming language C and C++

LM35 functional range between -40 degree Celsius to 150 degree Celsius, the application of simple semiconductor temperature sensor has good linearity and high sensitivity.Blood pressure sensor can provide continuous i.e. 24/7 monitoring. The blood pressure ranges usually tells in the form of numerator and denominator. The numerator is called as SYSTOLIC, when your heart beats it contract and pushes blood through arteries to rest of your body, this force creates pressure of arteries this is known as SYSTOLIC. The denominator is called DIASTOLIC, when your heart rest between beats is known as DIASTOLIC.

Heart beat sensor is planned to give output of heart beat when a finger is placed on it. When the heart beats the sensor sense the values and gives the output in the form of bpm.

PIR sensor is placed parallel to the patient, it senses any movement in the patient once the motion is detected the buzzer goes to "ON" mode and alert messages as "MOTION DETECTED" will be sent to the doctor.If the movement of patient stops the buzzer goes to "OFF" mode and alert a message as "MOTION ENDED".The PIR sensor can sense at a range of 6 meter.

HC-05 module is an easy to use Bluetooth serial port protocol. It is transparent wireless serial connection setup.Range is approximately 10 meters (30 feet).In android phone we are using Bluetooth terminal HC-05 application. This application is able to receive the data from Bluetooth and displayed in received data Bluetooth terminal HC-05 screen. Buzzer is a Piezo electric audio signaling device. A Piezo electric buzzer can be drive by an oscillating electronic circuit or Arduino source signal. They are low power consumption. It alerts the doctor that it has exceeded the normal range.

3.2: FLOW CHART

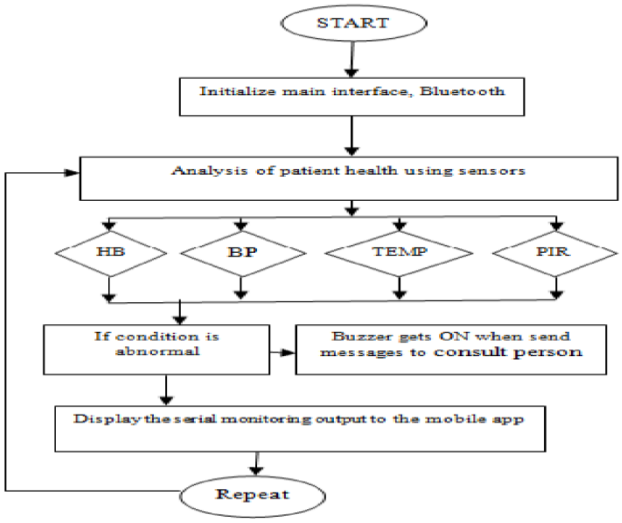

Fig 2: Flow chart

Table1: Human body health condition.

PARAMETERS	LOW	NORMAL	HIGH
Heart rate	120-139 bpm	140-179 Bpm	180 and above
Blood pressure	70/40 to 119/79	120/80 to 139/89	140/90 and above
Temperature	Less than 36.5 degree C	36.5 degree C to 37.5 degree C	Greater than 37.5 degree C above
Buzzer	ON	OFF	ON

IV. RESULTS

The below figure shows the working model of patient monitoring system, it consist of Arduino uno, UART blood pressure sensor, LM35 temperature sensor, pir motion sensor, heartbeat sensor, buzzer and 9V battery.

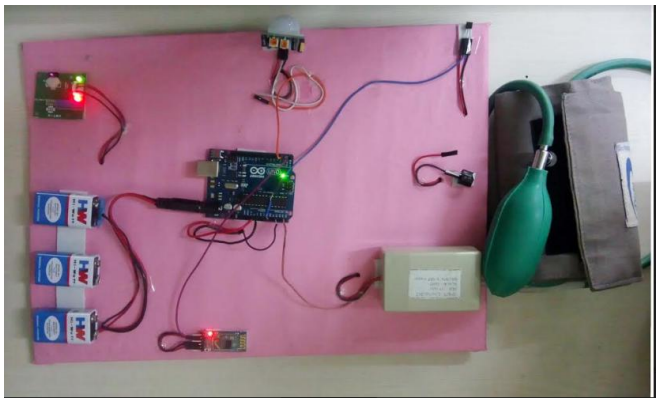

Fig 3: Model of patient monitoring system.

Figure below shows the outputs of UART blood pressure sensor, LM35 temperature sensor, pir motion sensor, heartbeat sensor, buzzer in serial monitor

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IJARSE
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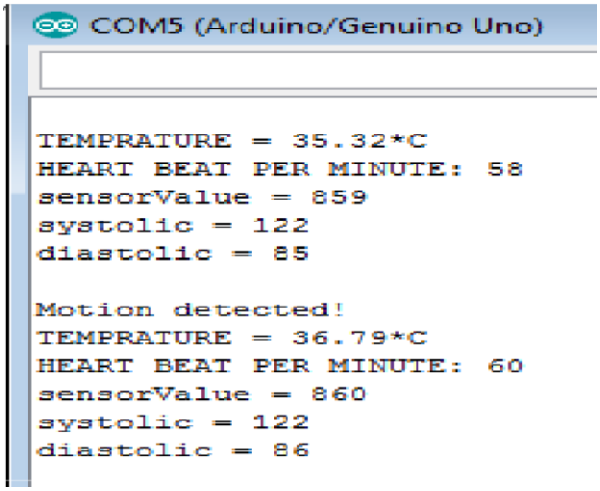

Fig 4: Merged outputs of all sensors.

Figure below shows the outputs of UART blood pressure sensor, LM35 temperature sensor, pir motion sensor, heartbeat sensor, buzzer via Bluetooth to android phone.

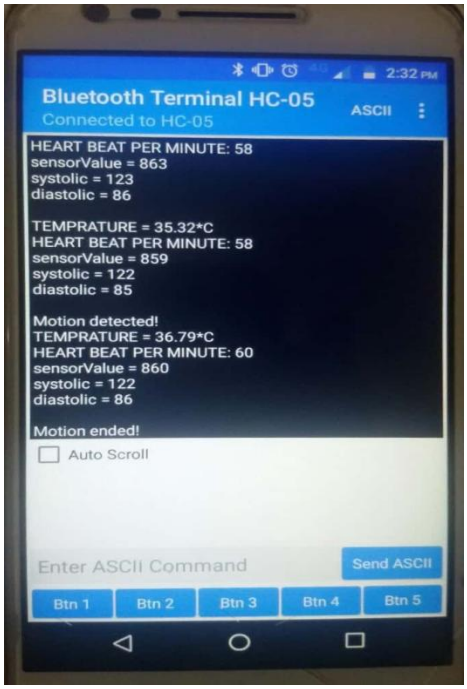

Fig 5: Via Bluetooth to Android phone.

V. CONCLUSION

This has presented a patient monitoring system architecture using wireless sensor nodes capable of monitoring several different environments: hospitals, home and ambulatory. The system enables medical doctors to watch their patient on site, to monitor their vital signs and to give them some advice for first-aid treatments. The ICU patient monitoring system is capable of measuringphysical parameters such as blood pressure (mmHg), heart beat (BPM), temperature (degree Celsius), and PIR motion detector, these all sensors values depends on human health condition, if these sensor values exceeds the normal range then the buzzer turns on and alert message sends to the concern staff, so the staffs can immediately attend patient.

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