GSM Based Patient Monitoring System

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Abstract- The paper describes the design of a medical device that can be used to monitor the human temperature, heartbeat rate and blood pressure using Arduino. In today, health care problems are increasing at very high pace. Hence it is a need, to overcome all such problem. In this system, the patient health is continuously monitored using different sensors which are connected to the Arduino board and the data is sent to family member or doctor. If any of the parameter values go beyond the threshold value and the alert message is given to the doctor. The GSM technology is used for reading and sending a message to the relevant person.

*Keywords*- Arduino board, sensors, mobile, GSM module.

I. INTRODUCTION

The electronics technology has entered in all aspects of day-to-day life, and the medical field is not an exception for this, so there is a need for well-equipped hospitals and diagnostic centers for people who are more conscious and attention about their health problems**.** But systems used in hospitals are also complex, that only certain people can understand them, recurrent systems also require one to be around to check the condition of the patient.

The goal of this system, we see the device that can detect ailments in a patient and inform them to the concern medical person using GSM technology. In this system, Body temperature, blood pressure, heartbeat rate is continuously monitoring using sensor and transmitting this data to the doctor or family member. Now wireless sensors play the main role in wireless technology.But there are different from traditional wireless networks offers miniature, speed, intelligence, sophistication, and new materials at lower cost, resulting in the development of various high-performance smart sensing system. hence, we are designing sensor which improvesthe quality of human life in terms of health which are either in direct contact with the human body (invasive) or indirectly (noninvasive).By the patient monitoring system, the patient health is continuously monitored through the current proposed system and the acquired data is transmitted to a microcontroller unit ARDUINO UNO server using Wireless Sensor Networks.

This project describes the design of simple, GSM-based heart rate, blood pressure &body temperature measuring device. The device alarms when the heartbeat, blood pressure & the body temperature exceed the provided threshold value. This threshold value is defined by the programmer at the time of programming. The threshold value given is as 20 to 120 pulses per minute for heartbeat indication & 18°C to 38°C for temperature. This information i.e. the Heart Rate, blood pressure & the Body Temperature is then transmitted wirelessly to the doctor who is not in the vicinity of the patient through GSM technique. Using GSM modem measured value is transmitted which is sensed by the sensor on the same frequency as on which cell phones work. The Arduino is programmed to know when there is an abnormality in the parameters and also to send the signals as an SMS.

II. BLOCK DIAGRAM
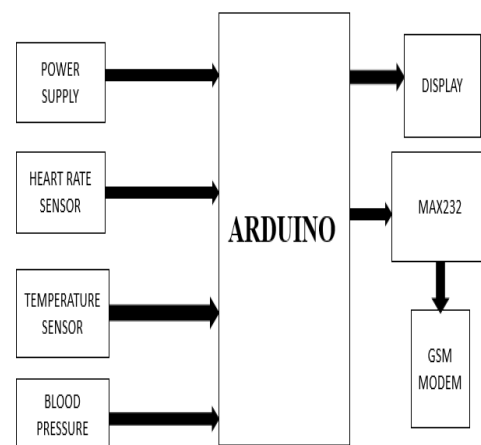
III. HARDWARE REQUIREMENT

1. Temperature sensor-

LM35 is a precision IC temperature sensor. The output voltage of this sensor is the linear relationship between the Celsius temperature scale of 0 0C, for every 1 0C increases in the output voltage of 10 mV. LM35 is an integrated circuit sensor used to measure temperature with an electrical output proportional to temperature in 0C and the temperature measurement more accurately than thermistor or any other temperature sensor device. Compare to thermocouple the

LM35 generates more output voltage and may not require that the output voltage is amplified; the scale factor is 0.01V/0C. The LM35 does not require any external calibration or trimming and an accuracy of +/- 0.40C at room temperature and +/- 0.80C over a range of 0 C to1000 C.

2. Blood pressure and pulse rate sensor-
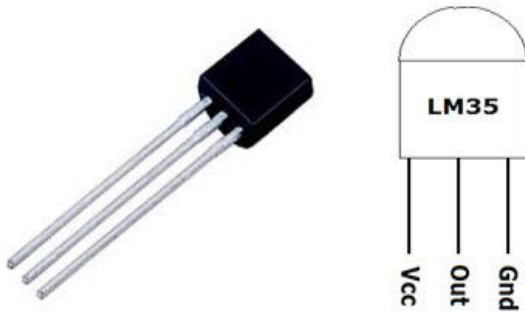
The sensor consists of piezoelectric crystals which pick the mechanical vibration from the body and it converts the vibration into the electrical signal. The sensor working voltage is +5V, 200 mA regulated. Sensor out pins are TX-OUT 0(Transmit output) as Output serial data of 3V logic level, connected to RXD pin of microcontrollers, regulated input of+5V, and Board common GND. The output format is serial data at 9600 baud rates. Sensing unit wire length is 2m. Pulse rate is work as a sensor hence it sensed and displayed on LCD as systolic, diastolic, pulse rate like as 129, 107, 095.

3. ARDUINO UNO-

The Arduino Uno is an 8-bit microcontroller board based on the ATmega328.It has 14 digital pins and 6 analog pins and other power pins such as, GND, VCC, it has 14 digital input/output pins (of which 6can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It has SRAM 2kb and flashes memory 32kb. EEPROM with 1KB.ARDUINO is open source hardware board which interface it on board microcontroller with external components like LCD, MAX232, temperature sensor, blood pressure and pulse rate sensor and many other things which are want to interface with ARDUINO Board. ARDUINO is a complete board which contains all things to connect with the external devices and to program through the computer. It contains everything needed to support the microcontroller. We either need to connect it to a computer using a USB cable or power it with an AC-to-DC (7-12v) adapter. The Arduino circuit acts as an interface between the software part and the hardware part of the project.

4. GSM modem-

The GSM modem offers high-speed wireless connection it is attached to the data adapter RS232 and can be used a stand-alone modem via the RS232, it can be connected to a personal computer or other devices such microcontroller. The GSM modem is used as short message server (SMS) device. It supports call forwarding, call restriction, call transfer, multiparty calling, and security option. In this application, GSM modem interfaces with Arduino. the modem receives a message from Arduino that contains the patient information such as temperature, blood pressure, heart rate. It will then transmit the information as an SMS to stored mobile phones. The receiver can be a healthcare personnel such as on-call physician, nurse or/and emergency aid worker. Also, it can receive SMS message from any one of the healthcare personnel acquiring more information.

IV. SOFTWARE REQUIREMENT

The smart micro controlling unit named as Arduino Uno can be programmed with the Arduino software there is no any requirement for installing other software rather than Arduino. Firstly, Select "Arduino Uno from the Tools, Board menu (according to the microcontroller on your board). The IC used which is ATmega328 on the Arduino Uno comes pre-burned with a boot loader that allows uploading new code to it without the use of an external hardware programmer.We can also bypass the boot loader and programs the microcontroller. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available.

The Arduino Uno is one of the smart microcontroller units. It contains a number of facilities for interfacing with another computer, Arduino, and microcontrollers. The ATmega328 provides UART TTL at (5Volt) with serial communication. It is available on digital pins number 0 (RX)

to receive the data and pin number 1 (TX) for transmitting the data. Arduino software contains a serial monitor which is allowed to send simple textual data to and from the Arduino board. The Receiver and Transmitter LEDs on the Arduino board will flash when data is being transmitted via USB to serial chip. A Software Serial library on any of the Uno's digital pins allows for serial communication. The ATmega328 supports I2C (TWI) and SPI communication. The Arduino software contains a Wire library for simplifying the use of the I2C bus. Arduino programs are written in C or C++ and the program code written for Arduino is called a sketch. The Arduino IDE uses the GNU toolchain and AVR Libc for compiling programs, and for uploading the programs it is used avrdude. The Arduino platform uses Atmel microcontrollers, Atmel's development environment, AVR Studio or the newer Atmel Studio, may also be used to develop software for the Arduino.

V. CONCLUSION

A prototype of the GSM-based mobile patient has been designing developed and tested using off the shelf components. The device gives more freedom for patients to roam around the GSM network coverage area and allow the health personnel to keep in touch with a patient without being around the hospital bedside. The system is scalable and extended to have up to eight different signals from the patient.

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