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Voice Controlled Digital Thermometer for Medical Application Based on Arduino Mega and Zigbee

Vysakh H[1], Karthika Ramachandran[2]

PG Scholar, EASA College of Engineering and Technology, Coimbatore[1]

Assistant Professor, EASA College of Engineering and Technology, Coimbatore[2]

Abstract: Recently, the health care sensors are playing a vital role in hospitals. The patient monitoring systems is one of the major improvements because of its advanced technology. So we are here, just connecting the temperature sensor so that simultaneously we can monitor the patient's condition and hence ruling out the use of the thermometer and other devices to check the condition of the patient. This project describes the design of a simple, microcontroller based body temperature measuring device with LCD output. Heart rate of the subject is measured from the index finger using IRD (Infra-Red Device sensors and the rate is then averaged and displayed on a text based LCD).

Keywords: GSM network, Patient Monitoring System, Very Large Scale Integration (VLSI) technology, Long Term Arrangements (LTAs)

I. INTRODUCTION

In this fast pace of life, it is difficult for people to be constantly available for their near ones who might need them while they are suffering from a disease or physical disorder. So also constant monitoring of the patient's body parameters such as temperature, pulse rate, sugar level etc. becomes difficult. Hence to remove human error and to lessen the burden of monitoring patient's health from doctor's head, this paper presents the methodology for monitoring patients remotely using GSM network and Very Large Scale Integration (VLSI) technology. Patient monitoring systems measure physiological characteristics either continuously or at regular intervals of time.

Temperature monitoring devices are used from point of dispatch of vaccines to the point of use. They are used when shipping the vaccine from the manufacturer to primary vaccine stores, during storage at the primary vaccine stores, during transportation from Primary store to intermediate/district level stores and at Health Facilities (HFs). And out-reach services where vaccines are stored/transported and administered to the recipient. The range of products available on international markets is large. It is recommended that COs consult with Supply Division (SD) to ensure that reliable temperature monitoring devices are chosen that are fit for purpose and that, wherever possible and available, are World Health Organization (WHO) Performance, Quality and Safety (PQS) pre-qualified2. A number of Temperature Monitoring Devices are PQS prequalified, representing UNICEF's primary source of choice. Each Temperature Monitoring Device possesses specific properties and UNICEF has a number of Long Term Arrangements (LTAs) 3 for these to address individual country's user preferences.

II. PROPOSED SYSTEM

This project describes the design of a simple, microcontroller based heart rate & body temperature measuring device with LCD output. Heart rate of the subject is measured from the index finger using IRD (Infra-Red Device sensors and the rate is then averaged and displayed on a text based LCD). Also Saline Level is measured continuously for different levels. The device alarms when the heartbeat. The body temperature exceed the provided threshold value. This threshold value is defined by the programmer at the time of programming the microcontroller. The threshold value given for the project is as 20 to 120 pulses per minute for heart beat indication & 18°C to 38°C for temperature. This information i.e. the Heart Rate & the Body Temperature and saline level is then transmitted wirelessly to the doctor which in not in the vicinity of the patient through GSM technique. The sensors measure the information and transmit it through GSM Modem on the same frequency as on which cell phones work.

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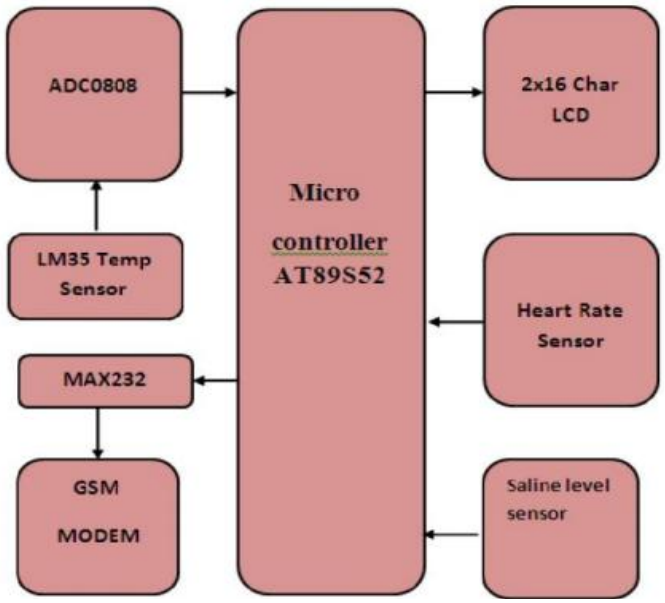

Figure 1: Block Diagram

III. ELEMENTS OF PMS

1. LM35 Temperature Sensor

The LM35 series are precision integrated-circuit LM35 temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 sensor thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 sensor does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level.

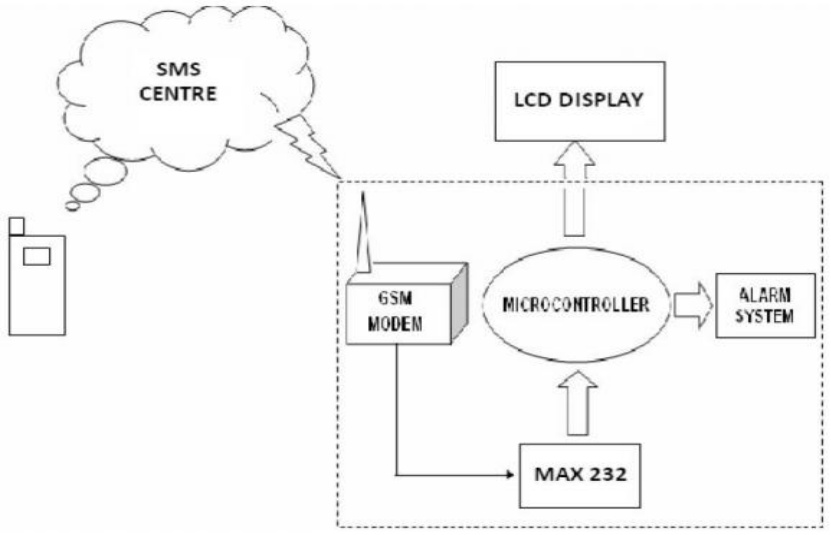

Fig 2:Schematic Diagram

The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C sensor is rated for a -40° to +110°C range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO92 transistor package. The LM35D sensor is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

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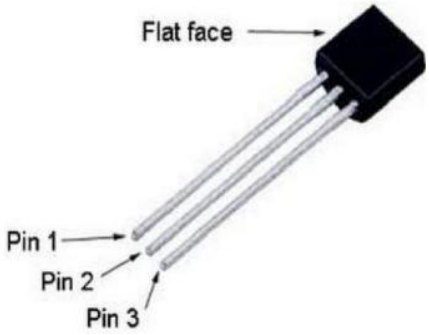

Figure 3: Temperature Sensor

Table: 1 Specifications

Parameters	Value
Supply Voltage (minimum)	4V
Quiescent Current	56 uA
Temperature (minimum)	-40,-55,0 Deg Celsius
Temperature (maximum)	100,110,150 Deg Celsius

IV. CONCLUSION

This paper reviews the product Patient Monitoring System Using GSM which is innovated to enable remote monitoring of patients. The key objective of developing patient monitoring systems is to reduce health care costs by reducing emergency room and physician office visits, hospitalizations, and diagnostic testing procedures. Many new wireless transmission protocols and technologies adapt easily to new applications.
Some technologies and protocols most applicable to RPM include:

- Bluetooth
- Zigbee
- Mobile phone protocols (GSM, CDMA, EVDO and EDGE)
- WiFi
- WiMax
- Radio frequency identification (RFID).

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