Patient Temperature Monitoring System Using Bluetooth Communication

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***Abstract*— Now-a-days it became very complex for taking care of small kids and elder peoples. We have to measure temperature in intervals of peoples who are sick. For that purpose they must stay on bed. This paper demonstrates Portable Wireless Biomedical Temperature Monitoring System. In which we measure the temperature of the body of the patient and transmit temperature using wireless communication. It initiates immediate alarm in case of emergency. The system interfaces other two devises such as cell phone to enable remote monitoring.**

***Keywords*— Wireless communication, Bluetooth, microcontroller, temperature measurement.**

I. INTRODUCTION

This paper proposes the measuring the temperature of the body and transmit them wirelessly with the help of Bluetooth. Since we are using Bluetooth we can receive the data to our mobile phone also in emergency. Here at transmitter section we have microcontroller, LM35 temperature sensor which communicate in analogue voltage.

It also contains buzzer which is used in emergency purpose by programming we can program such that alarm raises when the temperature exceeds the range of the body temperature or decreases the body temperature range. At the same time we find out the temperature of more than one person. Here we connect an LM35 IC which consists of three pins. In which one is VCC, GND OUTPUT. The output is in analogue voltage and increase in temperature results in increase in voltage and vice versa. The temperature output Is connected to the Analogue to Digital converter input of the lpc2148.

The lpc2148 consists of 10bit analogue to digital converter. In which we can calculate the temperature of the body. Then data is transferred to the Bluetooth module which is connected the lpc2148. The data is communicated through serial communication. In Bluetooth communication we have to connect the device. The connection is unique and it can't be interfered with other Bluetooth device. We have LCD in which we can find the temperature. Since we got an 10bit Analogue to Digital converter we can get an high accurate temperature.

II. DESCRIPTION

LM35:

It consists of three pin, which are VCC, OUTPUT, GND respectively. The output is in analogue farm, which can be converted to digital later. The increment in analogue voltage is 10mv/^{o}C. It has range of -50^{o}C to +150^{o}C.

Fig: 1 LM 35

LPC2148:

ARM 9 microcontrollers can also be used by this system making the system more sophisticated and makes use of interrupts to control the switching ON and OFF of the ignition system. ARM 7(LPC2148) from Phillips is a powerful yet easy-to-program (only few single word instructions) 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package

- 16 kB on-chip Static RAM data memory.
- 128/256 kB on-chip Flash Program Memory.
- 128-bit wide interface / accelerator, enables high speed 60 MHz operation.
- In-System Programming (ISP) and In-Application Programming (IAP) via on-chip
- 512 bytes of flash programmable mammary.
- Embedded ICE-RT interface enables breakpoints and watch points.
- 2 interconnected CAN interfaces with advanced acceptance.
- Consists of 14 channel analogue to digital converter in which port 0 consists of 6 channels and 8 channel. Each channel consists of 10 bit accuracy.

- Multiple serial interfaces including two of each UART's, I2C, SPI.
- Vectored Interrupted Controller with configurable priorities and vector addresses.
- Two 32-bit timers (with 4 capture and 4 compare channels), PWM unit (6 outputs), RTC and Watchdog.

LCD: It consists of 16*2 characters Liquid Crystal Diode. It consists of 16 characters in upper line and 16 characters in lower line. We can display total of 32 characters in LCD. It consists of 8 bit data lines and RS, Enable for controlling the data.

Buzzer:

Buzzer is frequently used as alarming device. It consists of two terminals on is VCC and other is GND. Buzzer has an operating voltage of 5v-12v. Buzzer has simple architecture and it is very easy to handle instead of speaker. Unlike the speaker Buzzer can operate with the DC voltage directly.

Bluetooth Module:

Bluetooth module works on Bluetooth wireless communication which is well known. To communicate with the android mobile phones we require only on Bluetooth module which is placed at the project terminal otherwise when communicates with the PC we require two Bluetooth modules which are placed at project terminal and other one at PC. To communicate with the Bluetooth we need to establish the communicating link between two modules before we transmit the data.

III. Principle of the Device

The alarming device consists of a controller, temperature sensor LM35, LCD, Buzzer, Bluetooth, PC. The design schematic of the device is shown in Fig. 1.

Transmitter section:

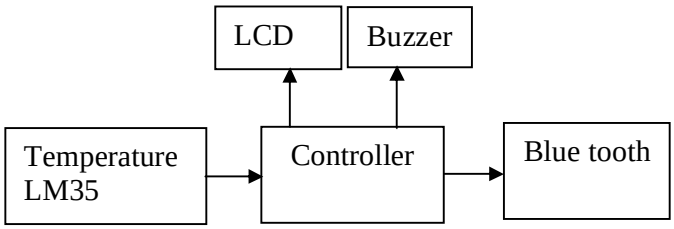

Fig: 2 Transmitter Section

Receiver section:

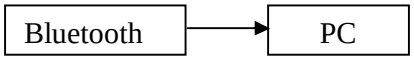

Fig.3. Design Schematic of Temperature monitoring devise

The temperature sensor contains the range of -67°F to 302°F. It has accuracy of 10mv/°C. When we use 10bit analogue to digital converter we can get an accuracy of 0.9°F which is enough for measurement of our body temperature. The out of the analogue voltage is given to the analogue channel of lpc2148. By some calculations we can get the body temperature of the patient.

The temperature is displayed in LCD. The temperature is monitored by the lpc2148 weather the temperature is in normal range or not. If the temperature is exceeds or decreased the controller switch on the buzzer and transmits emergency message to the PC.

Data is communicated through Bluetooth modules. On both sides we have Bluetooth modules and we have to communicate them with the serial communication. First we have to give the command to Bluetooth module so that both of the modules are connected.

IV. Detection Algorithm

We fix a 3 pin IC which is called as LM35 to the patient body. This is well known as temperature sensor. LM35 is capable of measuring the temperature from -50°C to +150°C. Since the output voltage is in analog farm we have to collect the analog voltage and for calculation we need an digital voltage. We give analog voltage to the AtoD converter of lpc2148. We need to calculate the temperature with the help of the digital values which are ranging from 0 to 1024 in decimal. After that we compare the temperature value with the normal body temperature values. If the temperature value is high or low than the normal body temperature ratings then alarm (Buzzer) is triggered.

After that we need to establish the connection with the devices which we have to communicate. Example: we want to communicate with the android mobile so that we have to send the couple of commands to the android mobile. After that temperature values are sent to the android mobile. It triggers alarm and sends and emergency message to the mobile or PC.

With the help of the received values in mobile we can easily find the health status of the children. By that we can take precautions to prevent the high temperature of the patient.

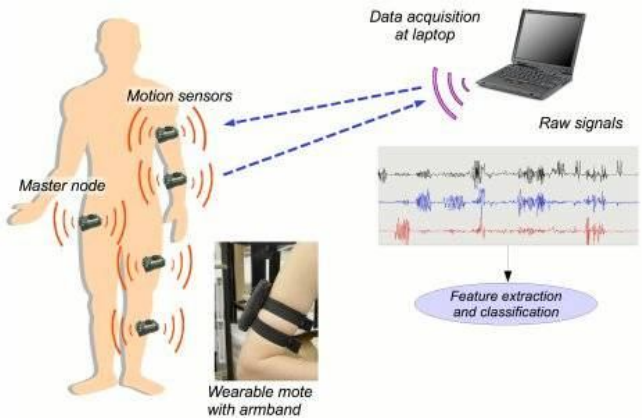

Fig: 4 overview of the working process

V. CONCLUSIONS

This paper represents the principle of the alarming device and puts forward the detection algorithm for detecting occurrence of high temperature range of the patient body. It continuously transmits the temperature of the patient body through wireless communication. It tigers the alarm whenever the body temperature is higher or lower than the normal body temperature. It also sends emergency message to the receiver.

VI. REFERENCES

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