WEARABLE MULTI-PARAMETER HEALTH MONITORING SYSTEM USING SMARTPHONE

PROJECT REFERENCE NO.: 38S0046

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AIM:
To design a wearable multi-parameter health monitoring system using Smartphone.

SCOPE:
The need of this project is for continuous monitoring of the patient’s body temperature, pulse rate and saline(glucose) bottle level. The device takes the physiological signals from the body and it measures parameters of the body such as pulse rate, level of saline content and body temperature in a single device. The measured parameters are sent to the Smartphone using GSM technology.

This instrument allows the patients to monitor their health constantly without the need to visit the clinic for checkup. None of available devices measures above parameters in single device. It's costlier to purchase all the devices separately. This project is focused on making a device which measures multi-parameter like temperature, pulse rate and saline content level.

The main aim is to demonstrate such a device which is compact, portable, low cost, energy efficient, user friendly and relatively. The accuracy can be enhanced by improving detection algorithm.

The budget of this project is to be around Rs. 10,000/- .
KEYWORDS:
Body Temperature, Pulse rate, quantity of saline content, GSM module and Smartphone

OBJECTIVES:

- To provide accurate measurements of patient’s parameters.
- To ensure reliability and low cost.
- To measure health parameters using a single device.
- To design to develop a compact, portable and user friendly device.
- To provide safe environment by communication through sensor network.

INTRODUCTION

Health monitoring systems have developed into an important research field today. Researches on the monitoring were developed for many applications such as military, homecare unit, hospital, sports training and emergency monitoring system. To develop a wearable and real-time monitoring system of some critical vital signs for elderly people is the need of the day. That system may help doctor or people in family to monitor the emergency alarm from patient or elderly people. It considers five parameters of the vital signs which are body temperature, heart rate and quantity of saline content.

A system which consists of android application on client side and an online service which will manage the server related operations. The heart rate of the patient is measured from the index finger using IRD and temperature measured by using DS18B20 temperature sensor. For this device the required resources are very cheap. The speed of the device is high and it is easy to use. Depending on the situation the Smart phone can automatically alert pre assigned caregivers or call the ambulance. It is also used to give advice or to reassure the Patient based on the sensors and environmental data prevention. The sensors measure the information and transmit it through GSM Modem on the same frequency as on which cell phones work. An android application was developed to perform data to discover important health facts. Using android application, one can view his medical history date wise, event wise etc. android application can perform data mining on a particular patient data to discover important facts. These systems can provide non-invasive physiological measurements such as heart rate, quantity of the saline bottle and skin surface temperature.

METHODOLOGY:

The the main part of our project is the microcontroller. Here, we are using the 8051 based Philips P89V51RD2 microcontroller. The P89V51RD2 are 80C51 microcontrollers with 64kB flash and 1024B data RAM. A key feature of the P89V51RD2 is its X2 mode option. The design engineer can choose to run the application with the conventional 80C51 clock rate. Our 8051 IC consists of 40pins which controls all the operations to determine the temperature, heart rate and to inform emptiness of the saline content in the bottle.
DS18B20 temperature sensor is used to determine the body temperature. DS18B20 is a 1-wire digital temperature sensor which offers 9 digit temperature information and it can measure temperature from -55°C to +125°C and has measurement precision of 0.625°C. Mainly it has a 3 pins VCC, GND and DATA.

The heart rate module consists of 2 LED which are operating at different wavelengths (660nm and 940nm) which are placed opposite to the photo detector that detects the light from the LED. Normally, healthy person’s heart beats 72 beats per minute. Our device takes the information of human heart beat for every 5 seconds and adds an array of 12 to give heart rate information.

The IR module is used to indicate or to inform the emptiness of saline content in the bottle. The transmitter part of the sensor is an infrared LED which transmits continuous IR rays to the IR receiver. The output of the receiver varies depending upon its reception of IR rays. Since variation cannot be analyzed hence the output fed to a comparator. Thus if the output of the comparator is low and LED glows hence saline content is empty and output is displayed on LCD.

The Global System for Mobile communication (GSM) is the most popular standard for mobile telephone system is used for displaying information via smart phones. In the proposed system, physiological parameters of the patients are sensed by the sensor and converted into digital form and displayed on LCD and message is sent to the Smartphone.

**FUTURE SCOPE:**

- To Store the measured values, so that they can be used further.
- To measure blood oxygen concentration of the patient a pulse oximeter sensor may be used.
- Android application will developed to display results in Smartphone.
- System can maintain the individual database of each patient.
RESULTS OBTAINED:
A device is expected to be low cost, reliable and user friendly which can measure temperature, pulse rate and saline content level with minor deviation compare to exact values and it is displayed on LCD and message will be sent to Smartphone in case of emergency and by ringing a buzzer.