

A Survey on Android Based Integrated Health Monitoring System

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Abstract- Advancements in In Integrated Circuit Technologies reduces the size of the chips and increase the performance of the chips by make use of these advancements we can analyse and capture the physical parameters of the humans with accuracy. Capturing the signals with accuracy will give significant improvement in healthcare systems. Most of the health care systems available in market are not compactible. The aim of this project is to design a compactible health care system with cost effectiveness. This paper utilize a compactible microcontroller to analyse and produce the results also it uses wearable sensors to capture the biological signals. For better performance and for speed android application is used to present the condition of the heart. This android app will keep the data's for future reference these data's are presented in the form, of graph.

Index Terms- android application, biological signals, Health care systems, IC technologies, wearable sensors

I INTRODUCTION:

Advancements in cultivation technologies leads to several diseases like Blood pressure, diabetes, heart diseases and cancer. These diseases needs continuous monitoring of the status. Number of available clinics limit the continuous monitoring process. So to ensure the continuous monitoring we need some special setup with latest technologies.

The advance communication technologies and the latest platforms like android makes this process easier. This project uses the Bluetooth technology to transfer data's and the android platform used to create attractive and user friendly Human Machine Interface (HMI)

II Hardware Frame:

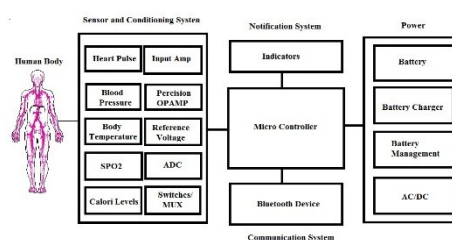


Fig 1 Hardware Architecture

Design of hardware should be of low power, low cost and small size. The main aim of this paper is to design a compactible patient monitoring system so all the hardware parts placed very closer so the high signal noising will happen for high common mode reject ratio is used (CMMR). The hardware setup was shown in Fig 1. It has 5 parts they are explained as follows.

A. Sensing and Conditioning Circuits

Sensing and Conditioning circuits are the data collecting elements, which has four sensors namely heart rate sensor, SPO2 sensor, blood pressure sensor and body temperature sensor. They will collect all the necessary data's from the human body the data's which are collected by the sensor are heartbeat, concentration of oxygen in blood, blood pressure and body temperature respectively. The conditioning circuits are the intermediates between the sensors and the controller. The conditioning system has input amplifier, precision operational amplifier, ADC and MUX also it has a reference voltage. These circuit are used to transform the raw data's into suitable form.

B. Indicators:

Indicators will notify the user about occurrence of an event. Battery full, low battery, transferring data, abnormal condition and power are the indicators used. The abnormal indicator (LED) will glow when the body condition is critical. Battery full and low battery indicators are used to show the battery levels. The indicators are very useful because of the absence of the display unit.

C. Microcontroller:

The selection of microcontroller for this paper must full fill the following conditions they are:

- i) Because of the low space we have to use the microcontroller which consumes less amount of space
- ii) The data's from the sensors have some digital signals so we need the DSP function to process those data's.

The ARM CortexM0 based mbed board has several features like inbuilt PWM generator, USB protocol, SPI protocol, I²C Protocol, Analog input, and also it has 5V DC output. It also has the following features

- Built in drag and drop USB programmer
- 40-pin 0.1" pitch DIP package, 54x26mm
- 5V USB, 4.5-9V supply or 2.4-3.3V battery
- Lightweight Online Compiler
- High level C/C++ SDK
- Cookbook of published libraries and projects

D. Communication System:

This paper use the Bluetooth to transfer the data's. Bluetooth is used because of low power and small size. This paper uses SESUB-PAN-T2541 which is an ultra-compact Bluetooth module, which has the footprint size of 4.6mm x 5.6mm x1.0mm. It reduces power consumption to about one quarter of that of classic Bluetooth devices. Enables easy implementation of Bluetooth connectivity simply by connecting it to power supply. This module is based on TDK's proprietary SESUB technology. The Bluetooth IC die is embedded into the thin substrate and all the peripheral circuitry, including a quartz resonator band pass filter and capacitors is integrated

on top. As a result this module is nearly 65% smaller than the other modules. Which supports Bluetooth 4.0 version. In this paper SESUB-PAN-T2541 module is used to transfer the data's between the device and the smartphones.

E. Power Module

This paper uses lithium polymer battery LP062030 of 3.7 v and 300mh. Normally it delivers the voltages up to 3.7 v at the current rating of 280mAh. It need 4.2 +/-0.03V and 60 mA to charge the battery it take nearly 6.5hr time for fully charge. It has the foot print about 6.1mm x 20.5mm x 32.5mm. For better battery life the power management module follows an algorithm called sleep and wait as per this algorithm the Bluetooth module is switched off when there is no data transmission, then the module is switched on when the device is try to send the data.

III Software Frame

The software frame consist of the layers namely hardware layer, device layer, application layer. Fig 2 shows the software framework.

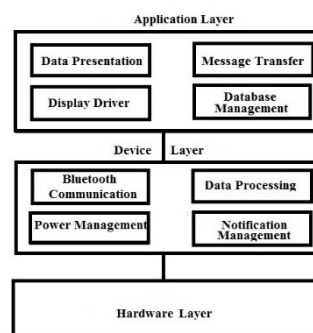


Fig 2 Software Framework

A. Hardware Layer:

The hardware layer consist of the codes called interfacing codes (device drivers) which acts like a translator between the device and the controller. The hardware layer has the codes for interfacing the Bluetooth module, heartbeat sensor, SPO2 sensor and the temperature sensor. These codes knows all the information about the hardware (device) like address, registers, baud rates and sampling frequency information.

B. Device Layer:

The device layer is responsible for data processing. This layer has the algorithms and the codes which are used to process the data's. The device layer has the following segments they are data processing, Bluetooth communication, power management and the notification management. In this the data processing segment responsible for processing and collecting all the data's from the sensors, this segment has several filters like band pass filters these filters are used to recover the original signals from the noise. After recovering the original signals the data's are processed with suitable algorithms. The heart rate sensor uses zero crossing algorithm to identify each pulses. Initially one counter is initialized and the zero crossing algorithm will increase the count value in the counter after one minute this counter will reset by this algorithm. The notification manager will manage the notification with reference to the information's from the other segments. This segment will alert the concern person when an abnormal condition is detected. The power manager segment will reduce the power consumption by switch off the inactive modules. Bluetooth communication segment take care of the Bluetooth communication. This segment will generate the authentication codes and also discover the other devices. This segment has the Bluetooth protocol IEEE802.11 standard and the data transmission will carried out as per the protocol.

C. Application Layer:

This layer is run on the user's smart phone. It is an android application and this will run on the top of the android operating system. This application is used to present the processed data. It will display heart rate, Blood Pressure level, oxygen level of blood, and body temperature level. This app gets the data through the Bluetooth and present the data also save the data for future references. This app will present the data in the form of graph.

IV Result and Discussion

This project is simulated with the help of Proteus version 7. In this the Heart beat variation is simulated with the help of a variable resistor, the Bluetooth communication is simulated by using the remote terminal window, notification is denoted by the two LED's. The entire setup is implemented in the

hardware and the parameters are monitored successfully.

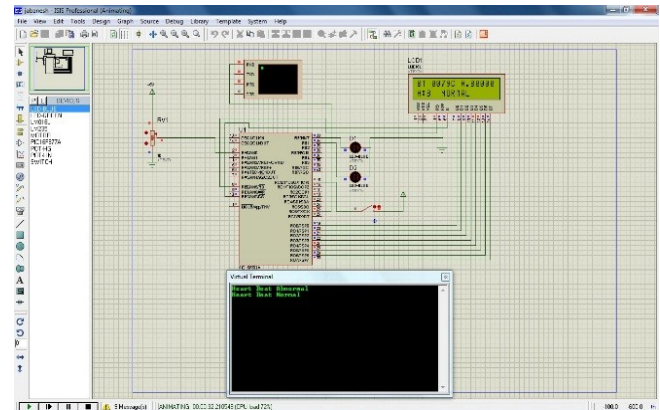


Fig 3 Simulation of the system

V Future Scope

Currently available systems are for monitoring physiological signals which suffer from technical limitations, resulting in the under exploitation of potentially life-saving data. This system is implemented partially with wireless technology. In future it can be replaced with wearable sensors and wireless technologies.

VI References

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