

Implementation of Health Monitoring System for remote patient with Android Phone

¹K.Kousalya, ²Karthik Kumar

¹M.Tech, Balaji Institute of Technology & Science, Telanagana, India

²Assistant Professor, Dept. of ECE, Balaji Institute of Technology & Science, India

ABSTRACT: In the earlier methods, the doctors need to be present physically or in several cases SMS will be sent using GSM. In the earlier case the history of the patient cannot be displayed, only current data is displayed. The recent popularity of android mobile influenced us to develop an android application to monitor the patient health through various wireless medical sensor devices. Main purpose of our System is to develop an application to monitor heart beat and temperature of a user of the system and guide him/her for a treatment, and to help the user by providing a list of hospitals of nearest locations and by giving health tips according to the threshold values. We design a system which is able to send the vital data to administrator via Bluetooth module. Our proposed idea is used to provide a better understanding of wireless sensing devices and their interfaces to the android mobile.

Index Terms— Microcontroller, Sensors, Bluetooth, Transmitter and Receiver, Buzzer, Bluetooth API.

I. INTRODUCTION

In intensive care units, there are provisions for continually monitoring patients. Their heart rates, temperatures, ECG and many others are constantly monitored. But in lots of cases, patients get well and are available again to residence from hospital facility. But the disease may return, he may just get infected with a brand new disorder, there could also be a surprising attack that will rationale his death. So in many cases, patient's are launched from hospital however nonetheless they are strongly informed to be under relaxation and remark for some period of time (from a number of days to a couple of months). In these circumstances, our system can also be rather useful. Patient's data (temperature, heart rate, ECG and many others.) will be almost always measured and despatched to server. Period of sending (say each 3 min) can also be set. Heart rates will also be despatched every minute and temperatures can be despatched after half of an hour and so forth. But these will also be parameterized to be certain that once a patient is

natural, now not many readings shall be despatched in order that sensors have a longer life-time. However when the patient is ill, readings will probably be taken mostly and sent to server. Monitoring person learns patient detailed threshold. Say the person body temperature of a patient is 37⁰c whereas one character feels feverish if his body temperature is 37⁰c. By using using an averaging procedure over a moderately long time, Observer can be trained these thresholds for patients. Utilizing android utility, we'll be able to view his clinical history date sensible, event sensible and so forth. Android application can perform data mining on a special patients data to notice essential details. Consider a man or woman has medium high temperature that begins at evening and lasts till nighttime. If this phenomenon continues for a few days, observer can observe this reality and inform to medical professionals saying "You in general have short-period fever that could be a symptom of a bad sickness. Seek advice patient immediately". This process can transmit always data. Feel a patient has come back dwelling after cardiac surgery. If the sufferer has cardiac problems like arrhythmia, then there might be irregular variation of heart signal. This could occur simplest once or twice a day. But when system transmits steady data, such editions can be instantly detected and alerts will likely be issued.

Early detection and analysis of potentially deadly physiological conditions corresponding to heart attack require steady monitoring of patients health following switch from health facility to dwelling. Experiences have proven that 30% of patients with a discharge diagnosis of heart failure are readmitted as a minimum once within 90 days with readmission premiums ranging from 25 to 54% inside 3–6 months. In line with these forms of needs, residence situated wellness monitoring systems are being proposed as a low price solution.

Any such approach contains physiological data that retailers, method and keep up a correspondence by way of a neighborhood manner akin to smartphones, personal desktops. Such techniques will have to fulfill strict security, safety, reliability, and longterm real-time operation specifications.

II. LITERATURE SURVEY

“Health Monitoring Laboratories by Interfacing Physiological Sensors to Mobile Android Devices” Suhaz Ranganath-Mahesh K. Banavar Photini Spanias Deepta Rajan, Andreas Spanias et al, [1]

This paper describes, Android Java-DSP (AJDSP) as a mobile application that interfaces with sensors and enables simulation. This also helped in visualization of signal processing. In this system firstly there is creation of interface between both external sensors and on-board device sensors for monitoring the physiological parameter of human being. This paper also explored the trend of mobile sensing and adapted it towards improving digital signal processing (DSP), by building interfaces to medical sensor and external sensors. In this paper there is use of SHIMMER. It is a small wireless low-power sensor platform that can record and transmit physiological (Health related like ECG) and kinematic data in realtime. The drawback of this system is that it only monitors the patient which is admitted in the hospital. In this low power sensor are used.

“Smart Elderly Home Monitoring System with an Android Phone” Kenny T.H. Chieng Dr. Lee JerVui, Chuah Yea-Dat et al, [2]

This paper considers or takes into account certain facts, which are heart attack and stroke as they are the major cause of hospitalization of the elder people. There is more chances of survival if the older people gets the treatment within an hour. SHEMS had also been developed. An android smart phone with accelerometer is used to detect a fall of the carrier, and this android device is known as healthcare device. The android phone is then connected to the monitoring system by using the TCP/IP protocol through WiFi. Because of this system, elderly and chronically ill patients can stay independently in their own home and secure in the knowledge that they are being monitored.

The drawback of this system is that it only considers elder people as there is more chances of sudden (emergency situation) outbreak in them like heart attack and stroke.

“Design and Implementation of Wearable ECG System” Byungkook Jeon, Jundong Lee, Jaehong Choi et al,[3]

The paper describes the design and implementation part of wearable ECG with the smart phone for the real time monitoring of health. In this system smart shirt are developed with ECG sensors and can be worn by any type of patient for monitoring his or her health in real time and get required treatment or prescription. These systems are mainly developed considering elder people in mind as they live alone in their homes. Therefore this system basically monitors the elderly people for self diagnosis purpose. The result of this system was the system could monitor and diagnose patients' heart conditions in real time, when they wear a sports-shirt with a ECG sensor in it. In addition to this, the system also provides graphical information with history management tools and an automatic emergency call system to the patient to get the required treatment in time. The drawback of the system is that it only concentrates on elder people and it includes shirt (ECG sensor) for wearing which cost a lot.

“Remote Patient Monitoring System” Yedu Manmadhan Anand V. R. M. J. Jayashree Sherin Sebastian, Neethu Rachel Jacob et al,[4]

This paper provides the image based system which acquires the ECG signal via digital camera; this information is performed on the tool like MATLAB and data sending through the internet network and stored in database. Then the original image is then availed to the doctor via Android mobiles. The purpose of this system is the vital sings and parameters from the ICU monitoring system and makes this data to be available to the doctor who may not be in the hospital and in the country. In case of any abnormality, the doctor is alerted by sending a notification from C2DM server to his mobile. The drawback of this paper is that, due to the slow internet connection the data will not be send to the doctor which is located

remotely. The image is captured through the camera, which must be HD which cost a lot.

“Hospital Health Care Monitoring System using Wireless Sensors Network” Naji HR Aminian M. A .el al,[5]

In this paper there is continuous observation of the patient’s physiological parameters such as blood pressure of patient as well as heart rate. This system is mainly useful for pregnant women to measure the various parameters like blood pressure, heart beat and fatal movement to control the health issue. This system has to monitoring more than one patient at a time and easily able to sense the blood pressure (BP) and heart rate of the patients. In this system, there is a sensor node attached to body of patient to measure signals from the wireless sensors and sends these signal to the database. This system can detect the abnormal conditions of the patient, raise an alarm to the patient and sends a SMS/Email to the doctor for treatment. The main advantage of this system is to increase the freedom for enhancing patient’s quality of life. The demerit of this system is that in this the patients need to get admitted in the hospital for continuous monitoring of the patient physiological parameters. This WSN gets complicated if number of patient is admitted in the hospital beyond the specified limit.

III. PROPOSED FRAMEWORK

The proposed diagram in Fig.1 describes an overview of the approach. Process is working as follows- The ECG monitor Hardware displays the heart beat price (per min) via heartbeat sensor and temperature through Temperature sensor [3, 7]. It gives signal to the system when values are going below threshold. The signal goes through the ADC channel which is attached to the Microcontroller Board. When user sends alarm, it goes by way of Buffer and Drivers.



Fig.1. Architecture diagram

It is connected to the Microcontroller Board and Microcontroller Board is attached to the personal computer. PC maintains a patient Log which means it maintains a whole log of patients in the type of power database or documents. The computer can be connected to the Bluetooth by way of USB/Serial Interface. The user can send or acquire data to/from the approach via Bluetooth.

The Arduino Uno is a microcontroller board based on the ATmega328. It has a 16 MHz ceramic resonator, 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection, a power jack, an ICSP header, and a reset button.

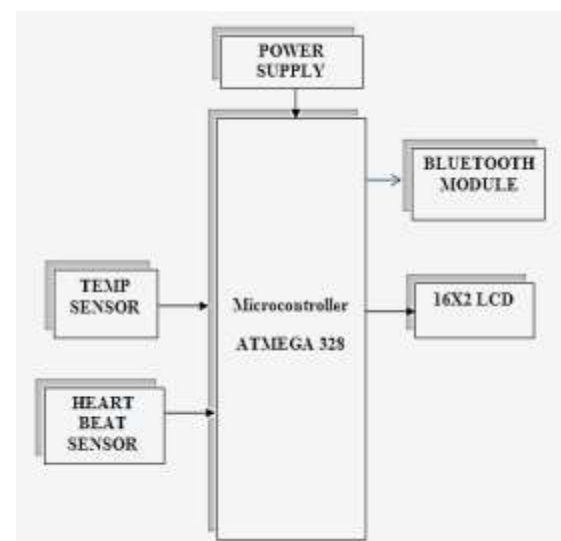




Fig.2: Basic Functional Architecture of healthcare system

As shown in Fig.2 user can contribute in various functions like login in method, create interface with hardware devices and android smartphone, patient offers the physiological parameters from scientific sensor instruments in the form of heartbeat, temperature and receive output to take suitable measure. Admin of our process can make choice of best threshold values for the system. Sensor devices are used to actual measurement of quite a lot of parameters of the users like temperature, heart beat. Prescription is given by the health practitioner. If users undergo irregular condition then raises alarm and provide record of nearest hospitals. patient's data and hospitals data stored in database for future use.

A. LM35 temperature sensor

The body temperature can be calculated by putting sensor in contact with body. In the arrangement the body temperature sensor is used LM35. The LM35 is meticulousness integrated circuit temperature sensor, whose output voltage is linearly to the celsius (centigrade) temperature. It can measure the temperature more precisely than the thermistors and it possess low self heating ability and it does not need any outside calibration or trimming. The LM35 is rated to operate over a 0° to +150°C temperature range. As the body temperature can't reach 150°C the LM35 can be used efficiently.

B. Pulse Rate Counter

Pulse rate of a body can be counted by change in blood flow in blood vessels. In the system the IR led and IR detector is used to fulfil the requirements of pulse rate counter. Fig.3 shows the positioning of IR LED and IR detector.

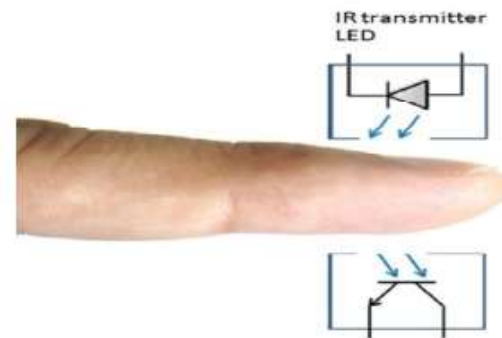


Fig. 3. IR LED and detector position

Putting any finger between the gaps causes change in IR light to be received at receive. The light must pass through finger and detected at other end. Now, when the heart pumps a pulse of blood through the blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and pulses are counted.

C. Bluetooth Module

In this project data is to be transmitted to remote location as per our main requirement. There are different communication technologies are used for data transmission these are WiFi, Zigbee, GPRS, GSM and Bluetooth. Because of Low cost and error corection meachanism in this project used Bluetooth.

Arduino-Uno board doesn't support Bluetooth connection on its own, which makes the idea of connecting it wirelessly to an Android device impossible. So a medium between the Arduino-Uno board and android device is needed and in this project it is a Bluetooth module specifically the HC-06 Bluetooth module. The HC-05/06 is a user friendly need only basic knowledge and it is programmable using the AT commands. It comes only in one fixed mode either master or slave. In this project the slave module was used.



Fig.4. IR LED and detector position

IV. EXPERIMENTAL RESULTS

Here developed an an android application for receiving the medical parameters and displayed on android mobile with the help of Bluetooth Module. After opening the android app in mobile it shows the list of bluetooth modules shows in Fig.5 then connected the required Bluetooth module that is connected with the system hardware.



Fig. 5 List Bluetooth Modules Paired with Android Phone

Afer connecting the required Bluetooth Module (Fig.6) shows Android app received data from system



Fig.6: Results read fom Android App

V. CONCLUSION

The system is very usable for patient as patient can go wherever he wants along with system. Also the parents and doctors will ensure the patient's safeties as if any problem occurred, the system will immediately inform them. Also it is useful for doctor as he can check each details of patient whenever necessary. As the system is movable there is no longer need to stay in hospitals for patient. So he will be in relief. As a summary, the presented monitoring system will be a cost effective, flexible and robust solution supportive a unique mobile based computational platform.

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