Design of Embedded System in Telemedicine using ARM-7

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Abstract

With the rapid aging of population and more attention about our health, it’s more important to do the physical examination every day, especially for old people. But India is dealing more with this problem. However, as we all know, it’s very difficult to have a physical examination in hospital, waiting for half a day is not only a waste of time, but also a challenge to weak ones. So we can use this system, which can collect kinds of physiological signal and convey it using internet, including ECG and temperature, Pulse rate, GPS location. ARM-7 is used in this project; it is real industry-specific processor, with high Performance, small space, low power, can suit most embedded applications. The people in India, particularly in rural and remote areas, are found struggling to receive timely medical treatment. The region of the country is characterized by densely populated communities spread over vast distances and there is a lack of expert physicians in certain sectors of the health service. Telemedicine originally emerged to serve rural populations or anyone who is geographically dispersed, where time and cost of travel make it difficult to receive the best medical care. Nowadays, telemedicine is forming a new structure in health-care services. By using information and communication technologies, in the proposed home based health monitoring system using ARM-7 includes the aspects of acquisition of medical parameters like Body temperature, Pulse rate and ECG. Processing of a collected data using ARM-7(LPC2148) processor and processed data is then displayed on doctors or relatives android mobile phones. Also the data can be displayed on LCD Display. The system is utilizing a low cost component to transmit data like ECG to physician for monitoring; diagnosis and patients care at significantly low cost, regardless of patient’s location.

Keywords- Body temperature, pulse rate, ECG, GSM modem, Android Smartphone

I. INTRODUCTION

In intensive care units, there are provisions for continuously monitoring patients. Their heart rates temperatures, ECG etc. are continuously monitored. But in many cases, patients get well and come back to home from hospital. But the disease may return, he may get infected with a new Disease, there may be a sudden attack that may cause his death. So in many cases, patients are released from hospital but still they are strongly advised to be under rest and observation for some period of time (from several days to several months). In these cases, our system can be quite handy. Patient's data (temperature, heart rate, ECG etc.) will be frequently measured and sent to server. Period of sending (say every 3 min) can be set. Heart rates can be sent every minute and temperatures can be sent after half an hour etc. But these can be parameterized to ensure that when a patient is normal, not many readings will be sent so that sensors have a longer life-time. But when the patient is ill, readings will be taken frequently and sent to server. Monitoring person learns patient specific threshold. Say the regular body temperature of a patient is 37°C whereas one person feels feverish if his body temperature is 37°C. By employing an averaging technique over a relatively long time, Observer can learn these thresholds for patients. For startup of any GSM module AT commands are necessary. Programming is done in a “C” language with use of AT commands.

II. SYSTEM CONCEPT

In this paper we present a novel system using micro electro mechanical systems (MEMS), ECG, GPS, and GSM. MEMS are used to measure temperature, blood pressure of the person. ECG is used to measure the heart beat rate of the person. GPS will turn on to find out the location in the form of latitude and longitude. Once the controller gets the information from these devices it sends fall information to specialist as well as family members using GSM and internet. Our system is designed by using ARM 32-bit microprocessor and developing for patients. The main advantage of this system is it reduces unnecessary wastage of memory storage as well as it saves power. At receiving end android mobile to be used to receive all the data of patient. The information is continuously shown on LCD & transfer to the GSM. Through GSM continuously the updated information is given to the concern person.
A. Software Implementation of System

1) Algorithm

To implement the system using microcontroller the flow of the program i.e. algorithm which we are going to implement is as follows:

1) Initialize the microcontroller ARM7.
2) Select the input parameter.
3) Generate the start of conversion (SOC) signal for ADC through the microcontroller.
4) Wait for end of conversion (EOC) signal from the ADC.
5) Read the equivalent digital data of the parameter selected.
6) Display the received data.
7) Send the received data.
8) Select the next parameter.
9) Send values to LCD.
10) If any value exceeds threshold send SMS
In the system physiological parameters such as ECG, Pulse rate and Temperature are obtained, processed using ARM-7 LPC 2148 processor and displayed in a Dot Net graphical user interface. If any vital parameter goes out of normal range then alert SMS will be sent to Doctor Mobile.

III. Future Scope

The pre-processing of the signal can be done by programming in MySQL while storing the data in database. We can set the alarm, if doctor does not respond in particular range of time. Many more features can be added on android side. The home based health monitoring application is presented which allows doctor to view his patient's medical parameter remotely and dynamically in a Web page in real time and does not need to have any special requirement on his PC or mobile; all he needs is an internet access. In future we can create and save the database of the patient, if patient could come after 1, 2 years then doctor can treat the patient very well.
IV. CONCLUSION

Having worked on a Multi-Parameter Monitor System, our proposed idea in designing Telemedicine using ARM-7 based on patient monitoring system for hospitals with features of storing the data in web database is viable. Android based patient monitoring system may be a better solution for a doctor to work from offline in case of emergency. With this system we can detect multi parameter of the body such as ECG, heart rate, blood pressure, temperature sensor. The advantages of this system are the system is portable, mobility, compact, low power consumption, storing the data in database and is very simple application. In this study, we report the frame work for implementation of Multi-Parameter monitor. This system can be a powerful tool for doctors and nurse.

REFERENCES