

CONTINUOUS PATIENT HEALTH PARAMETER MONITORING BASED ON BIOAURA

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ABSTRACT

It has been always a challenging task for the researchers to incorporate information technology advancement in medical profession especially in Patient continues health monitoring system. Health monitoring of patients is a common task in healthcare areas from nursing homes to hospitals. Medical staff needs to monitor patients closely and collects their monitoring body parameters. This proposal will help the medical staff to control the overall state of monitored patients in autonomous, real-time and remotely way. In this paper describes the continuous monitoring of patients by using Wearable Sensors. This Sensor-based technology has invaded medical devices to replace thousands of wires connected to these devices found in hospitals. It replaces the manual information collection and intimation by introducing Wireless technology for information passing and monitoring.

Keywords: LPC2148, Sensors, Bluetooth.

I. INTRODUCTION

The problem found in most hospitals is that the physician has to frequently visit the patient and asses his/her condition by measuring the parameters such as temperature, blood pressure, drip level etc. In case of emergencies, the nurse intimates the doctor through some means of communication like mobile phone. A growing selection of innovative electronic monitoring devices is available, but meaningful communication and decision supports are also needed for both patients and clinicians. Health care monitoring systems can help people by providing healthcare services such as medical monitoring, memory enhancement, medical data access, and communication with the healthcare provider in emergency situations through the SMS or GPRS. Continuous health monitoring with wearable or clothing-embedded transducers and implantable body sensor networks will increase detection of emergency conditions in at risk patients. Not only the patient, but also their families will benefit from these. In this Paper, the system was designed and developed for the patient health monitoring using Bluetooth. The primary function of this system is to monitor the Temperature, ECG, B.P and Pulse of the patient. The data collected by the sensors is in the analog form and it is sent to the microcontroller. The microcontroller further sends the data to the LCD and at the same time Bluetooth module receives this data. This data is continuously transmitted to the doctor using Bluetooth. The Doctor can get a record of a particular patient's information by just accessing the database of the patient in the developed Android application in his mobile phone which is continuously updated through Bluetooth receiver module. The alarm will also ring if the threshold values of parameters are crossed.

II. LITERATURE REVIEW

A smart shirt has been designed in [7]. The shirt can measure electrocardiogram (ECG) and acceleration signals for continuous and real time health monitoring of a patient. The shirt mainly consists of sensors and conductive fabrics to get the body signal. The measured body signals are transmitted to a base station and server PC via IEEE 802.15.4 network. The wearable devices consume low power and they are small enough to fit into a shirt. To reduce the noise associated with the ECG signal an adaptive filtering method has also been proposed in this work.

While few authors presented the development of a microcontroller based system for wireless heartbeat and temperature monitoring using ZigBee. The system is developed for home use by patients that are not in a critical condition but need to be constant or periodically monitored by clinician or family. In any critical condition the SMS is send to the doctor or any family member. So that we can easily save many lives by providing them quick service. [8].

VeyselAslantas, RifatKurban and tuba Caglikantar [1] created a Pocket pc based, low-cost, portable, wireless health monitoring and alarm system. Human’s electrocardiogram (ECG), temperature and pulse data are acquired and sent to a personal digital assistant (PDA) using IEEE 802.15.1 Bluetooth. Although this approach appeared well rounded and convenient as it serves a portable way to monitor electrocardiogram (ECG), temperature and pulse data, in the present day and age, there are several devices that don’t need any extra device that needs carrying around. Purnima, et. al, presents an Zigbee and GSM Based Patient Health Monitoring System Care of critically ill patient, requires spontaneous & accurate decisions so that life-protecting & lifesaving therapy can be properly applied. Statistics reveal that every minute a human is losing his/her life across the globe. More close in India, everyday many lives are affected by heart attacks and more importantly because the patients did not get timely and proper help. This paper is based on monitoring of patients. We have designed and developed a reliable, energy efficient patient monitoring system. It is able to send parameters of patient in real time. It enables the doctors to monitor patient’s health parameters (temp, heartbeat, ECG, position) in real time. Here the parameters of patient are measured continuously (temp, heartbeat, ECG) and wirelessly transmitted using Zigbee. This project provides a solution for enhancing the reliability and flexibility by improving the performance and power management of the patient monitoring system.

Demerits in these Existing systems

In existing system patient needs to be hospitalized. Regular monitoring of patient is not possible once he/she is discharged from hospitals. These systems cannot be used at individual level. Existing systems are bulky in size and their maintenance and cost pose a hurdle. Most of the Existing systems use wired communication which is too tedious for long distance communications.

III.DESIGN OF PROPOSED HARDWARE

The System Architecture has two sections. They are 1. Patient Section, 2. Monitor Section

Patient Section: The different biomedical signals are collected continuously with the help of wearable medical devices and those signal values are continuously monitored and processed and then sent to the Smartphone. Wearable medical devices can be in the form of either wrist watches or belts that are not harmful to human body. Here, four parameters/signals are considered due to variation in human body such as Blood Pressure, pulse rate, Body Temperature, ECG etc. This helps in reducing the error as much as possible. Based on the processed values of the signals authorization is provided. Also, the collected data can be continuously monitored by the health monitoring person and provide information regarding the variation of the health of the user.

Fig.1. Components of a Continuous patient monitoring system.

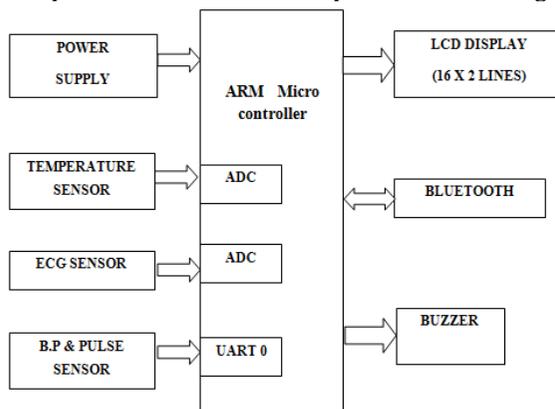


Fig. 1. Patients Section

Monitor Section

In monitoring section we are using Android mobile. In this we are using Connection terminal android .apk file. It continuously receives the data from the patient section that will be displayed on the app.

Working Model:

Mainly the block diagram of the project consists of microcontroller, sensors, Bluetooth module, and power supply which is shown in Figure

In case of emergency and dangerous situations we have to alert the doctor immediately. For this we are using a Wireless network for doctor to patient communication in the hospital. This way of communication is actually done with Bluetooth module.

Each patient will be given this module and with the help of this module the patient health condition is monitored.

In this module having the wearable sensors this sensors are attached to the patient. Here we are using temperature sensor it is used for measuring the body temperature of the patient. Here we are using thermistor 103 as a temperature sensor. It will be constructing like voltage divider network. The output of this sensor is in the form of analog so it will be interfaced to the microcontroller's analog pin for converting into digital data. Similarly to measure the ECG we are using electrode attached to the patient's body and it also produces analog output it is also connected to analog pin of the microcontroller. To measure the B.P and Pulse of the patient we are using sunroom B.P Module it is placed to the wrist of the patient. It measures the value and it will be interfaced to the microcontroller by using UART Protocol. All this information will be displayed in the LCD and simultaneously updated into the doctor's mobile by using Bluetooth technology.

IV. MODULES USED IN THIS PROJECT

Technologies used in our project to get effective data of a patient health details are:

B.P and Pulse sensor

For the Measurement of Pulse rate and BP values we have taken Sunrom's Sensor which will give sensors data in UART TTL logic mode. To get the Data from sensor module, interface to the UART of the controller. Blood Pressure & Pulse sensor is used to measure the Blood Pressure and pulse rate of the patient. It has shown readings on display with serial out for external projects of embedded circuit processing and display. Shows Systolic, Diastolic and Pulse Readings. Compact design fits over your wrist like a watch. Easy to use wrist style eliminates pumping.



Fig. 2. BP and Pulse Sensor

ECG:

The ECG sensor measures electrical potentials produced by the heart (Electro-cardiogram). These small voltages are measured at the skin of the wrists and elbow through electrodes. The ECG sensor can also be used to measure the electrical potentials generated by muscle cells when these cells contract and relax (Electromyogram). For safety reasons the sensor uses an optical coupler to avoid any direct electrical contact between the person whose ECG is measured and the measurement interface or computer. The ECG sensor is delivered together with a package of 100 electrode patches.



Fig. 3. ECG Sensor

Thermistor

A **thermistor** is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. The word is a portmanteau of thermal and resistor. Thermistors are widely used as inrush current limiters, temperature sensors, self-resetting over current protectors, and self-regulating heating elements. Thermistors differ from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is

also different; RTDs are useful over larger temperature ranges, while thermistors typically achieve a higher precision within a limited temperature range, typically -90°C to 130°C .



Fig.4. Temperature sensor

Bluetooth Module

To transfer the patient information from Patient to doctor we are using Bluetooth technology. It is a wireless technology used to transfer data between different electronic devices. Bluetooth technology requires that a low-cost transceiver chip be included in each device. The transceiver transmits and receives frequency band of 2.45 GHz that is available globally. To perform this Bluetooth operation we are using HC-05 module.

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH. It is interfaced to the microcontroller by using Asynchronous serial Protocol.

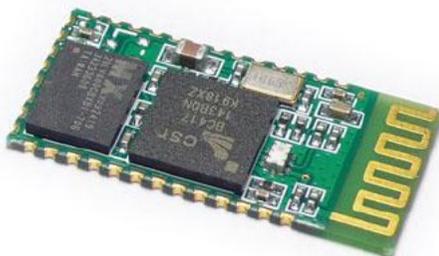


Fig.5.HC-05 Bluetooth Module

V. RESULTS

When the patient is connected to sensors the readings of patient's body temperature, ECG, blood pressure and pulse rate are all appeared in the LCD display.



Fig.6. Temperature and ECG Readings



Fig.7. Blood Pressure and Pulse Readings

VI. CONCLUSION

The system is design to provide continuous monitoring human health parameter such as B.P., Heart beat rate, and ECG monitoring and inform through wireless communication. The goal of the project is to reduced the hospitalization and assistance cost. This proposed system with low complexity, reliable, low power consumption, and highly portable to monitor human health parameter in real time. The use of wireless technology is to increase the functionality of the whole system. By sending the irregularities of the patient's health .It also beneficial in reducing or minimize to avoid human error, to maintain past data.

VII. FUTURE ENHANCEMENT

There is always chance to improve any system as research & development is an endless process.

From the above designed project it can be concluded that we are able to transmit the data which is sensed from patient to the server PC by using wireless transmission technology. We extend this data transmission by using GPRS technology And also we added extra sensors like blood glucose level sensors, EEG sensors add for better monitoring patient condition. And also we added GPS module for sending location of the patient.

Along with this, expanding the project to allow two way communications between doctors and patients will be beneficiary in many cases where patient needs to communicate directly to the doctor. This will allow doctors to send messages to the patients, and thus make the consultation and service provision more transparent and effective.

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