

Patient Health Monitoring by GSM & ZIGBEE Communications

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Abstract: In the recent trends, the healthcare industry is to provide better healthcare to people anytime and anywhere in the world in a more economic and patient friendly manner. The paper describes the Monitoring Terminal and it can detect the patient's real-time body temperature, heart rate and other physiological information, and transmit them to the local area monitoring unit and to the doctor remotely in the emergency conditions. In the present paper the physiological parameters such as ECG, Pulse rate and Temperature are obtained, processed using ARM7LPC 2138 processor and displayed on PC. If any vital parameter goes out of normal range then alert SMS will be sent to Doctor Mobile. This system is utilizing Teamviewer software and low cost component to transmit ECG data to physicians for monitoring, diagnosis and patients care at a significantly low cost, regardless of patient's location.

Keywords: ECG, pulse Rate, Temperature, ARM, PC

1. Introduction

The electronics technology has entered almost in all aspects of day-to-day life, and the medical field is no exception for that. The need for well-equipped hospitals and diagnostic centers is increasing day by day as the people are becoming more conscious about their health problems. In biomedical fields special units are used, such as intensive care unit or coronary care unit. All of these units are designed to offer the advantage of the low Nurse – Patient ratio and concentration of the equipment and the resources needed; to take care of critically ill or seriously injured units. The medical world today faces two basic problems when it comes to patient monitoring, firstly the need of healthcare provider's present bedside the patient and secondly the patient is restricted to bed and wired to large machines.

In order to achieve better quality patient care, the above cited problems have to be solved. As the technologies are advancing it has become feasible to design a home-based vital sign monitoring system to display, record and transmit signals from human body to any other location. Firstly on Doctors computer and secondly on Android Mobile which contains a Teamviewer application. This system is expected to monitor patient under critical care more conveniently and accurately for diagnosing which can be interfaced with computer to bring it under a network system widely for the doctor to monitor the patient's condition sitting in his own office without being physically present near to the patient's bed. In second section describes system representation, third section describes Hardware description of system, fourth section describes implementation of system algorithm using arm7LPC2138, fifth section describes simulation of ECG waveform, sixth section describes result and last section describes future scope and conclusion.

2. System Design Model

The block diagram of system shown in fig.1. The system contains hardware and software components. The body parameters are processed by ARM processor, it will display to the patient on LCD and Waveforms on Patient side Personal Computer. The same data on computer it can be

viewed by physician in two ways. Firstly on Personal Computer using Remote Desktop sharing and secondly on Android mobile having application of Remote Desktop sharing. If any parameter goes abnormal then the system will send an alert SMS to the doctor through GSM modem. Reports indicating that system have been a great concern for physicians with a passion for technology, and barriers still remain for a low cost, comprehensive and integrated use in the daily operations. This system reduces costs by enabling in-home monitoring of patients, eliminating the need for utilization of expensive facilities, and reducing the need for transportation of patients to physicians and medical centers.

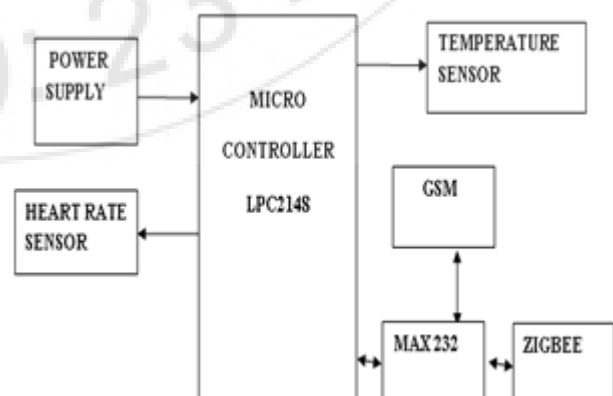


Figure 1: Block Diagram of System transmission section

The hardware design includes designing of, Temperature, Pulse rate and ECG measurement. The temperature sensing is performed by using a ICLM35. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LED needs to be super right as 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.

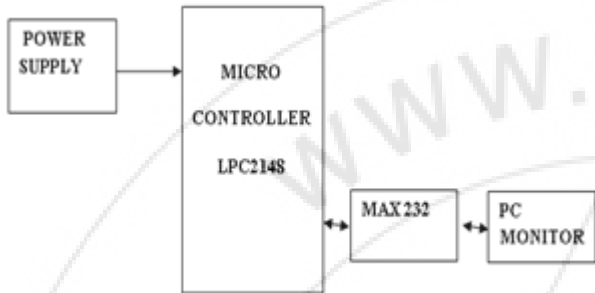


Figure 2: Block Diagram of System monitoring section

This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal. The output signal is also indicated on top by a LED which blinks on each heart beat. Electrodes are placed on human body as shown in fig.2. to capture small electrical voltage produced by contracting muscle due to each heartbeat.

3. Experimental Results

This paper discusses the aspects of acquisition of physiological Parameters like ECG Temperature, Pulse rate, pre-processing them and displaying them in a graphical user interface for being viewed by the doctor and also observes the clinically useful data in the hospital database monitoring unit. This system mainly contains 3 units as 1. Patient data transmitting unit. 2. Database monitoring unit. 3. Doctor's mobile. Patient data transmitting unit holds all the sensors needed to get the information from the patient in this project we have a temperature sensor to monitor body temperature and a pulse rate sensor to know whether the patient blood pressure is normal, low or high.

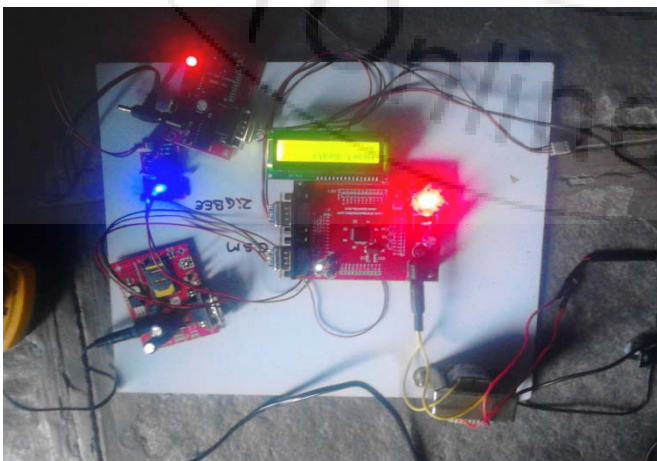


Figure 3: patient health monitoring by GSM communication

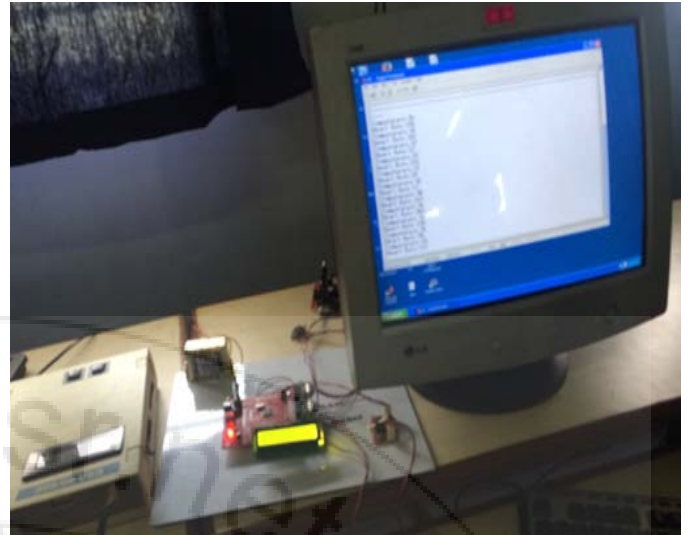


Figure 4: Patient Health Monitoring By ZIGBEE Communication

These two sensors are interfaced to the micro controller LPC2148. By means of this controller the data will be processed and transmitted to the local monitoring unit by ZIGBEE wireless communication. In case of emergency the patient information is directly sent to the doctor's mobile by GSM module.

4. Conclusion

This system reduces costs by enabling in-home monitoring of patients, eliminating the need for utilization of expensive facilities, and reducing the need for transportation of patients to physicians and medical centers. In future work the telemonitoring application is presented which allows doctor to view his patient's vital parameter remotely and dynamically in a Web page in real time and does not need to have any special requirement on his PC; all he needs is an internet access.

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