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Patient Health Monitoring by GSM & ZIGBEE Communications

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Abstract: ***In the recent trends, the healthcare industry is to providebetter healthcare to people anytime and anywhere in the worldin 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 thepresent paper the physiological parameters such as ECG, Pulserate and Temperature are obtained, processed using ARM7LPC 2138 processor and displayed PC. IR any vital parameter goes out of normal rangethen alert SMS will be sent to Doctor Mobile. This system isutilizing Teamviewer software and low cost component totransmit ECG data to physicians for monitoring, diagnosis andpatients 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 allaspects of day-to-day life, and the medical field is notexception for that. The need for well-equipped hospitals anddiagnostic centers is increasing day by day as the people arebecoming more conscious about their health problems. Inbiomedical fields special units are used, such as intensivecare unit or coronary care unit. All of these units aredesigned to offer the advantage of the low Nurse – Patientratio and concentration of the equipment and the resourcesneeded; to take care of critically ill or seriously injuredunits. The medical world today faces two basic problemswhen it comes to patient monitoring, firstly the need ofhealthcare provider's present bedside the patient andsecondly the patient is restricted to bed and wired to largemachines.

In order to achieve better quality patient care, theabove cited problems have to be solved. As the technologiesare advancing it has become feasible to design to hornebased vital sign monitoring system to display, record andtransmit signals from human body to any other location.Firstly on Doctors computer and secondly on AndroidMobile which contains a Teamviewer application. Thissystem is expected to monitor patient under critical caremore conveniently and accurately for diagnosing which canbe interfaced with computer to bring it under a networksystem widely for the doctor to monitor the patient'scondition sitting in his own office without being physicallypresent near to the patient's bed. In second section describessystem representation, third section describes Hardwaredescription of system, fourth section describesimplementation of system algorithm using arm7LPC2138, fifth section describes simulation of ECGwaveform, sixth section describes result and last sectiondescribes future scope and conclusion.

2. System Design Model

The block diagram of system shown in fig.1. Thesystem contains hardware and software components. Thebody parameters are processed by ARM processor, it willdisplay to the patient on LCD and Waveforms on Patientside Personal Computer. The same data oncomputer it can be viewed by physician in two ways. Firstly on Personal Computer using Remote Desktop sharing andsecondly on Android mobile having application of Remotedesktop sharing. If any parameter goes abnormal then thesystem will sent an alert SMS to the doctor through GSMmodem. Reports indicating that system have been a greatconcern for physicians with a passion for technology, andbarriers still remain for a low cost, comprehensive andintegrated use in the daily operations. This system reduces costs by enabling in-horne monitoring of patients, eliminating the need for utilization of expensive facilities, and reducing the need for transportation of patients to physicians and medical centers.

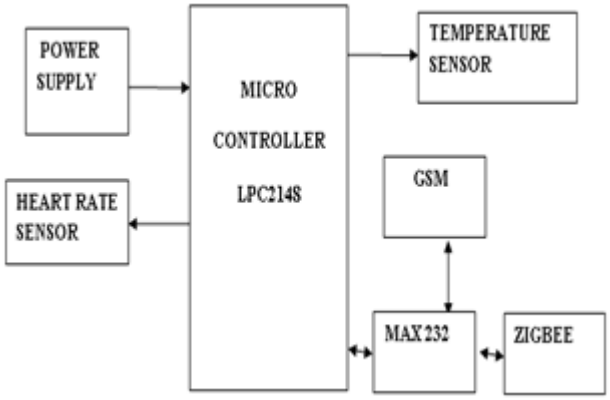

Figure 1: Block Diagram of System transmission section

The hardware design includes designing of, Temperature, Pulse rate and ECG measurement.The temperature sensing is performed by using a ICLM35. The LM35 se ries are precision integrated-circuit temperature sensors, whose output voltage is linearlyproportional to the Celsius (Centigrade) temperature.The LED needs to be super right as the light must pass through fmger and detected at other end.Now, when the heart pumps a pulse of blood through theblood vessels, the finger becomes slightly more opaque andso less light reached the detector. With each heart pulse thedetector signal varies.

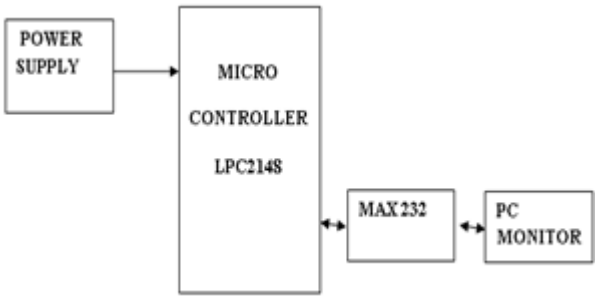

Figure 2: Block Diagram of System monitoring section

This variation is converted toelectrical pulse. This signal is amplified and triggeredthrough 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 contractingmuscle 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 as1. Patient data transmitting unit.2. Database monitoring unit3. Doctor's mobile. Patient data transmitting unit holds all the sensors needed to get the information from the patientin 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.

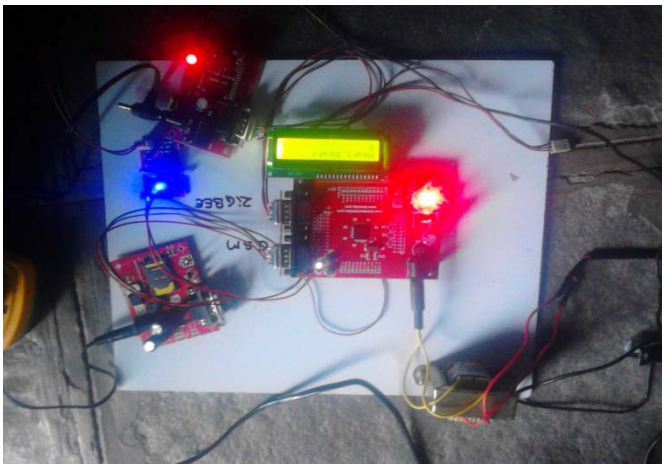

Figure 3: patient health monitoring by GSM communicaton

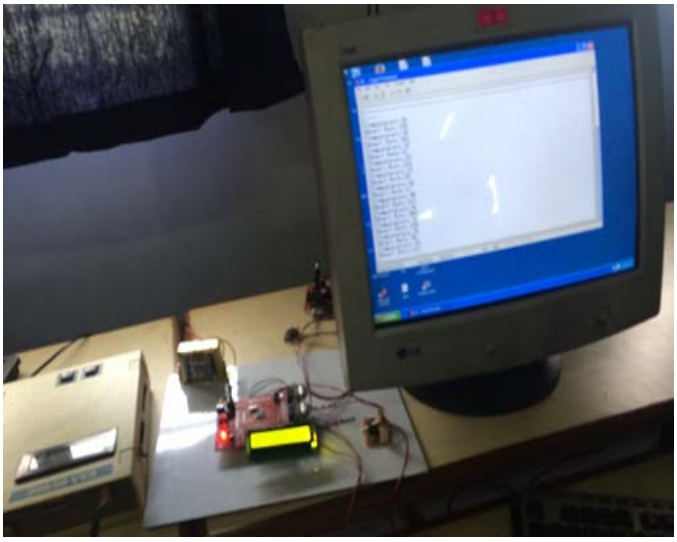

Figure 4: Patient Health Monitoring By ZIGBEE Communication

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 send to the doctor's mobile by GSM module.

4. Conclusion

This system reduce costs by enabling in-Hornemonitoring of patients, eliminating the need for utilizationof expensive facilities, and reducing the need fortransportation of patients to physicians and medical centers.In future work the telemonitoring application ispresented which allows doctor to view his patient's vitalparameter remotely and dynamically in a Web page in realtime and does not need to have any special requirement onhis PC; all he needs is an internet access.

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