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Real-Time Health Monitoring System for Remote Places.

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Abstract: The project focuses to inform the condition of the patient to doctor in remote area .Often, in remote area, the responsibility of healthcare is handed over to a single doctor. It becomes difficult for a single doctor to monitor large number of patients. Also the patients face the challenge to inform their current heath condition to the doctor in the remote area where doctors are not easily made available. We are developing a web-based application to continuously monitor the patient and look after some of vital health parameters like Blood pressure , Heart rate and ECG of the patient .We use sensors such as ECG sensor, heart rate(pulse rate) sensor and blood pressure sensor to take their values respectively .The microcontroller calculates and performs operation on the values obtained from the sensor after sensing the patient with those sensors. The sensor sends the data over the internet to the sever .The processed data is then sent to the doctor side so that the doctor can draw a conclusion accordingly .The work can help to improve the medical health facility which is out of reach of the people living in remote area.

Keywords:-Mobile Multi patient monitoring system, ATMEGA16, ECG

I. INTRODUCTION

Often, the health care facility is out of reach for people in remote area. The main reason for this negligence is the remote location of the place along with lack of infrastructure and communication system in the remote areas . To address this problem we are building a web-based application for monitoring the ECG, Blood pressure, Heart rate and temperature of a remotely located patient using an emerging technology known as internet of things(IOT).

IOT as a concept can be described as connecting not only the tablets, personal computers and mobile phones to internet but the things or simply the devices in our case the sensor which previously were unable to connect to internet and could simply give away their generated data to computers and micro-controllers to operate and communicate and within themselves can now send and communicate and be connected to internet. Simultaneously these devices or things does not require any human interaction or human to computer interaction and evolving and becoming smarter themselves .

II. ARCHITECTURE OVERVIEW

The architecture is shown in Figure 1. This shows the integration of the patient side devices with the internet. The patient side contains the ECG sensor, Blood pressure sensor and Heart rate(pulse rate) sensor. The AVR microcontroller UART ports are been interfaced to computer using RS232 connector and the input to the microcontroller is taken from the Blood pressure sensor, pulse sensor and ECG sensor .The computer then sends data over server using internet and the website fetches the data and displays the values of the patient health parameters .

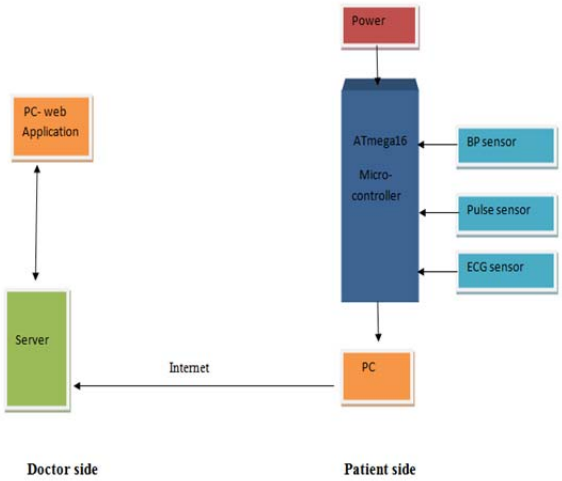

Fig 1 Architecture Diagram

III.PROPOSED RPM SYSTEM

In remote patient monitoring system of the general assumption is that a patient is at home and hence remote monitoring. The architecture setup shown in Fig. 1 is divided into three parts: Part I as embedded system Part II as the Web server with database Part III as web application.

Embedded system

Part I consist of embedded system for measurement of health parameters of patient. Regardless of patient's location, the hardware used for monitoring the health of the patient is attached to his/her body. A personal computer is placed at his bedside to which the microcontroller is interfaced that capture vital parameters received from the embedded system. These parameters are processed and are converted into digital form using microcontroller unit. The result (output) of this system is connected to computer using wired (RS 232).

Web Server

A web server processes requests via HTTP, the basic network protocol used to distribute information on the World Wide Web. The web server accepts the HTTP requests and responds accordingly. This data is provided by

rendering the values into dynamic web pages, and serving those pages to the requesting clients. The local machine reads the data every few seconds from part 1 and sends it remote web server having MySQL database for real time or later retrieval. Once the data is stored in a database of remote server, it is accessible over the Internet. Now a doctor at some remote location can view this data on his/her computer. 'www ' service to the client machines (doctor's machine at the remote location). Details of patient's current health parameters including patient's medical history can be viewed by the doctor. The database tables needs to be created before any data storage is done. Also, the patient profile account needs to be created and stored into the database before any values are captured by the Embedded system that are attached to patients body. Once the patient's profile and the doctor's credentials are created, the system is ready to accept the patient's vital signs and store them into the database.

Web application

The last entity of the proposed system i.e. web- application that provides access to remote patient's health related details which acts as an interface for doctor. With web GUI fetches the vital information from the server that displays patients health parameter on web page in real time. The doctor can also view all the medical history of the patient including the prescription he recommended the last time and to keep record of the prescriptions in order to prescribe a new one depending upon the current values and past history data. The remote doctor will log in to system using the credentials already given to him. An administrator can log in to the system .After the administrator logs in a dashboard it will contain menu of options to add a new doctor, add a new patient, change the administrator password and log out. The navigation window consists of links for doctor's page, patient's page and back to the dashboard. The doctor can add, update and delete new patients. The proposed system is simple and user friendly to use. It is also economically affordable and provides many features tailored according to needs of remote rural area.

IV. TECHNOLOGY AND CONCEPT

ATMega 16 - The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 16KB of programmable flash memory, 1KB SRAM, 512B EEPROM, an 8-channel 10-bit A/D converter, and a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts. By executing instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Blood pressure sensor-

It is usually measured at a person's upper arm. Blood pressure is usually expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimeters of mercury (mm Hg). It is one of the vital signs along with respiratory rate, heart rate, oxygen saturation, and body temperature. Normal resting blood pressure in an adult is approximately 120/80 mm Hg.

ECG sensor –

The ECG sensor is attached to the patient using disposable electrodes on the left and right side of the chest. The signal obtained from the body is filtered and amplified. The sensor outputs an analog signal which is then converted by the analog-to-digital converter (ADC).

V. CONCLUSION:

The proposed Remote patient monitoring system is integration of embedded and web application , provides a platform in cost efficient manner ,solution for patient and doctor located at a remote location. The doctor can come up to a conclusion by examining and monitoring the health parameters of the patients at remote locations .The abnormal change in values of patients health parameters can alert the doctor and help in taking the necessary actions that are possible . A Remote health care provides real-time reading of vital parameters of patients along with its demographics, which will help in patient health diagnosis and in critical health conditions.

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