Tele-Health Monitoring System

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Abstract

Aim of this project is to inform doctor about a patient's condition, who is bedridden at home, on his portable computer or tablet. It is really expensive to admit the bedridden patient in hospital for a very long duration of time. This project gives a gadget which will persistently screen the indispensable parameters, for example heartbeat blood pressure, temperature of patient and do information logging ceaselessly. If any parameter crosses a safe minimal level, then an alert will be sent to the doctor by means of wifi and emergency actions would take place accordingly. In the event that any parameter crosses safe minimal level, this unit additionally raises an alert, furthermore speaks with the concerned specialist by the method of sending SMS through IOT based system. A patient observing programming application is actualized to store information that can be later downloaded to a doctor's workstation for investigation and finding.

Keyword- IOT, Temperature Sensor, Heartbeat Sensor, Oscillator, USART

I. INTRODUCTION

Health is one of the global challenges for humanity. In the last decade the healthcare has drawn considerable amount of attention. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor the patients, who are either hospitalized or executing their normal daily life activities.

Recently, the patient monitoring systems is one of the major advancements because of its improved technology. Currently, there is need for a modernized approach. In the traditional approach they need to visit the patient's ward for necessary diagnosis and prescription [2]. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, connected with bedside biomedical instruments, for a period of time. In order to solve these two problems, a reliable and readily available patient monitoring system (PMS) is required.

In order to improve the above condition, we can make use of technology in a smarter way. In recent years, health care sensors along with microcontroller play a vital role. Wearable sensors are in contact with the human body and they monitor his or her physiological parameters. We can buy variety of sensors in the market today such as ECG sensors, temperature sensors, pulse monitors etc. The cost of the sensors varies according to their size, flexibility and accuracy.

In our proposed system we are measuring patient's parameters (ECG, temperature, heart rate) using different available sensors. This sensor collected data i.e. biometric information is given to microcontroller and then it is transferred to server. Biometric information gathered can be wirelessly sent using the WIFI rooter based on the IOT based system. The data stored in a database and can be displayed in a website that can be accessed only by authorized personnel. The doctors, patient or his family members can be given authorization. The system even facilitates the doctor to view the patient's previous history from the data in memory [3].

II. LITERATURE REVIEW

The need for a health monitoring system is crucial in the present scenario. The traditional method of visiting the patient is not very convenient. Therefore a modernized approach was invented to diagnose the health of the bedridden patients.

The previous systems used raspberry pi[4] wherein the instructions are executed at a slower duty cycle. This would create a time lab which can be very crucial at emergency conditions. Patient monitoring system and control using feedback and GSM technology was used to monitor the different parameters of an ICU patient remotely and also control dosage medicine according to patient's condition. This system enables expert doctors to monitor vital parameters viz body temperature, blood pressure and heart rate of patients in remote areas of hospital as well as he can monitor the patient when he is out of the premises.

A module that provides mobility to the doctor and the patient, by adopting a simple and popular technique, detecting the abnormalities in the bio signal of the patient in advance and sending an alert SMS to the doctor through Global system for Mobile(GSM) thereby taking suitable precautionary measures thus reducing the critical level of the patient[5].

III. METHODOLOGY

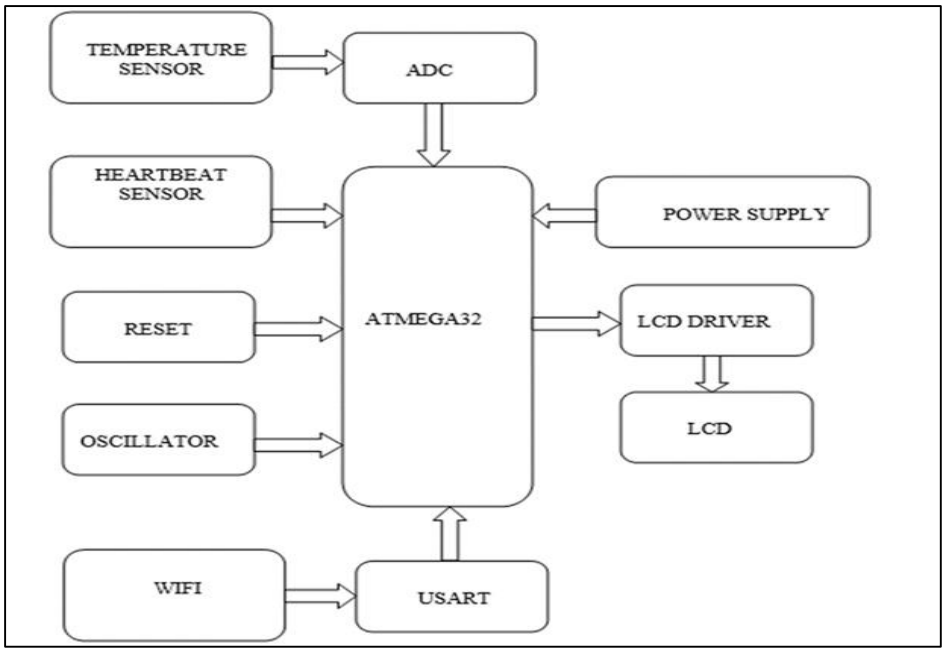

Fig. 1: Block diagram

The proposed project uses the methodology of a sensor that senses the physiology parameters of the human body and does actions accordingly.

The project has a temperature sensor, IC LM 35 senses the temperature of the body and converts the analog signal to digital using an ADC. This data is then fed to the AVR microcontroller. Pulse rate is measured using an IR sensor. The pulse is counted for 20 seconds. Then the value is calculated for about 1 minute by multiplying the value from IR sensor three times. It is then sent to the ADC to convert the analog signal to digital signal and is fed to the processor. The ECG signal obtained is in the range of 1 to 5mV. Blood pressure is calculated using an equation where in the peak and low values are taken from pulse rate value. Both diastolic and systolic pressures are displayed in an LCD along with temperature and pulse rate. All the data's are uploaded to IOT using USART and this information is sent to family doctor's Android mobile which has a Team viewer operation [1]. If there is an abnormal variation in the parameters an alert will be given to the doctor. A buzzer would operate at home in order to indicate the patient's bystander. The doctor will attend the patient physically in case of an emergency.

IV. SIMULATION

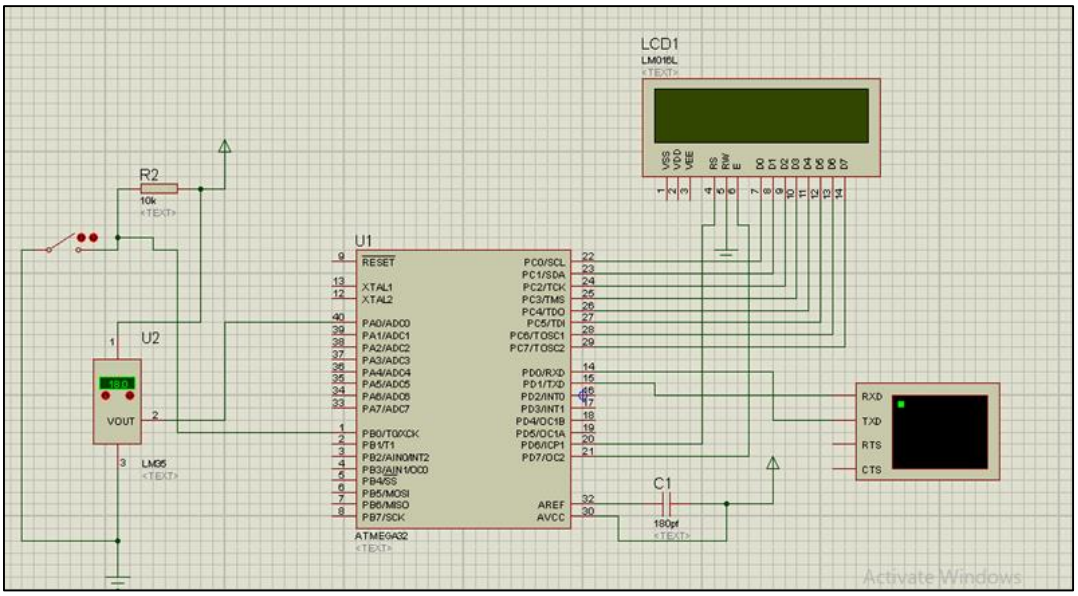

Fig. 2: Simulation Diagram

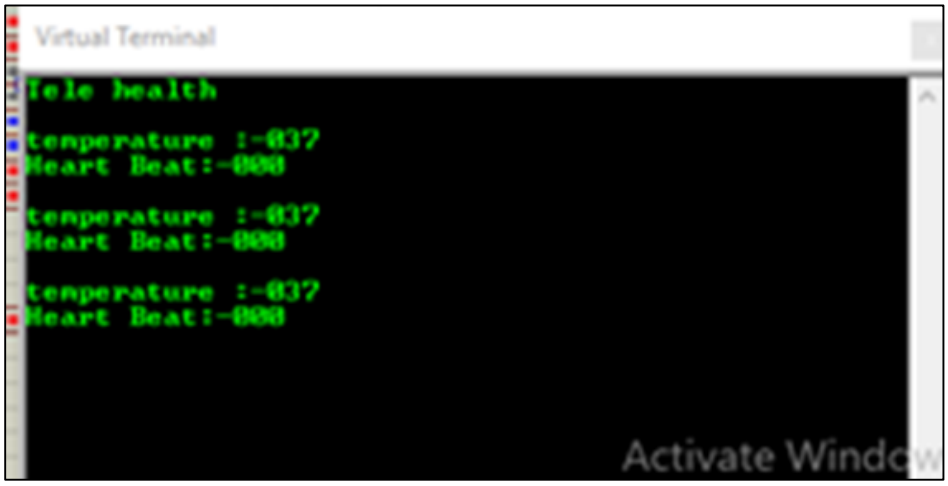

Fig. 3: Virtual Terminal

A virtual window appears on the screen as we play the simulation. On the screen body temperature and heart beat rate will be shown. The IR sensor is depicted in the form of a switch in this simulation. When we vary the temperature by increasing the IC LM 35 value, accordingly a change would be visible in the display. A change in heart beat rate can be verified by closing and opening of the switch many a times. Both temperature and heart beat value will be visible simultaneously.

V. HARDWARE

1) Atemega32 Microcontroller: It is a 40 pin IC and 256 bytes of EEPROM memory, 32K bytes of flash program memory. Its speed of program execution is about to 1 microsecond or 10 MIPS (10 Million instructions per second).
2) LCD Module: A liquid-crystal display is a flat-panel display that uses the light-modulating properties of liquid crystals. It display various physical parameters like heartbeat, blood pressure, temperature.
3) Sensors: In this system two types of sensors are used. They are temperature and heartbeat sensors. IC LM 35 senses the temperature and IR senses pulse rate and sent to ADC to convert the analog signal to digital signal and is fed to the processor.
4) IOT: An IOT module is a small electronic device embedded in objects, machines and things that connect to wireless networks and sends and receives data.
5) USART: (Universal Asynchronous Receiver/Transmitter) it is a piece of computer hardware that translates data between parallel and serial port.

VI. CONCLUSION

It can be conclude that the microcontroller based system can be effectively used as communication medium in conjunction with GPS. Sensors designed in the developed system gives accurate readings so it is found that the developed system is very cost effective and accurate. In the developed system only three parameters temperature, Heart rate and Blood pressure are monitored. The developed system can be used in the hospitals; in ICU ward, general wards as well as in accident wards, at home and while traveling. The "Tele-Health Monitoring System" using micro controller will be extremely useful for hospital application, soldier monitoring in military, new born baby monitoring. This system is useful when the patient is in critical condition.

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