PATIENT HEALTH MONITORING SYSTEM USING IoT

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ABSTRACT:

Health is the one of the global challenges for humanity. Now a day's population growth increased exponentially and health care diseases also increase parallel because of person do not give importance about the body condition due to time allocation and highly expensive medical treatment. Hence patient health monitoring system is gaining importance these days. This project is based on monitoring of patients. It enables the doctors to monitor patient health parameters (Body temperature, Heartbeat, Blood pressure) in real time. In the current proposed system, the patient health is continuously monitor using heartbeat, temperature and blood pressure sensors which will connect to Raspberry pi board and acquires data is send to the server using IOT shield attach to Raspberry pi board. The IOT send the patient current information through internet to the data base system. If any of the parameter value goes beyond the threshold value can alert is given to the doctor and concerned user.

KEY WORDS: Internet of things (IoT), Raspberry pi board, Sensors, Health Parameters.

1. INTRODUCTION

In recent years, the growth of internet is tremendous and has been further extended to connecting things through internet. All devices are connected to one another with various smart technologies to create worldwide ubiquitous network called Internet of Things (IoT).

In the field of health monitoring the current most important user groups are those aged 40 and more. The group of 40+ users shows more diversity in their health conditions than younger people.

There are ring-type pulses monitoring sensor available in the market in which the measured data are displayed in the LCD and cannot be transmitted out of the ring. Thus, it is not possible to continuously monitor the vital parameters such as temperature, pressure and pulse from a distant location. In a hospital either the nurse or the doctor has to move physically from one person to another for health check, which may not be possible to monitor their conditions continuously. Thus any critical situations cannot be found easily unless the nurse or doctor checks the person's health at that moment. This may be a strain for the doctors who have to take care of a lot number of people in the hospital. In order to keep in track of critical health conditions, a real time health monitoring system of patient based on IoT and developed in this project. This finds vast application in the remote places where the people are out of reach from the experienced doctors; keeping this factor in mind best effort is done to implement some of the basic test of pathological data on the system.

Hence the entire work can be broadly divided into four sections firstly, the parameters measured from the patient and transmitted, secondly the signal processing and conversion to digital form; thirdly decision making with the help of an algorithm where they obtained signal values are compared with the standard values and finally the transmission of the condition of the patient to the doctor. A real-time health monitoring system of remote patient developed is a wearable device.

This device will be wearied by the patient and parameters such as ECG, Temperature and Heart Beat will be continuously transmitted and monitor through wireless technology. At the receiver side (doctor side) the data will be wirelessly received using Internet. The doctor will monitor the measured parameter on the GUI designed using Visual Basic on PC. The data from the patient is collected continuously and stored in the database designed using SQL (Structured Query Language) if the doctor is not present at that instant of time, he will be intimated through Buzzer also the hospital authorities will receive a message in case of abnormalities. On detecting the type of abnormality the doctor can call the patient and let him know the further course of action.

Raspberry Pi module used in many IoT applications. Raspberry Pi is works on Linux platform. The cost is also very low. The GPIO pins are used for connecting between sensors and Raspberry Pi.
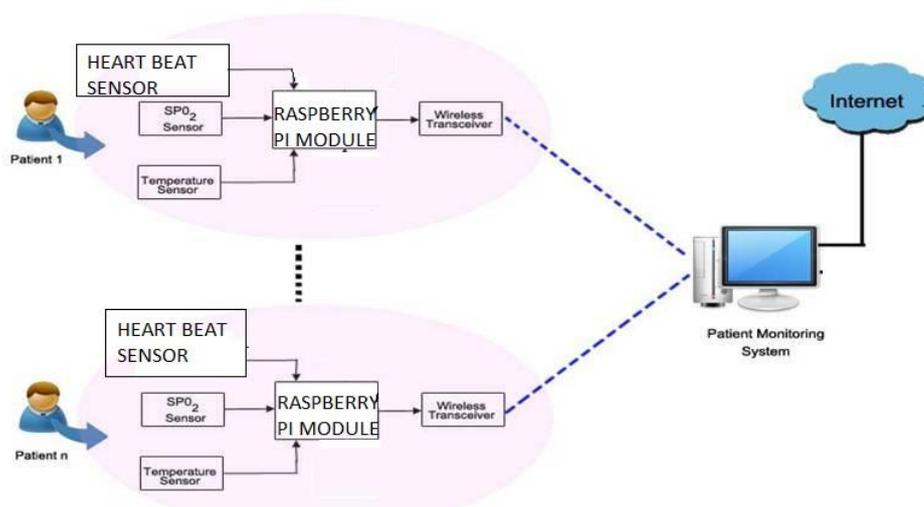
Figure1: patient health monitoring using sensors

Raspberry Pi and internet connection is a new innovative technology in healthcare systems. After connecting Internet to the Raspberry Pi it acts as a server. Then the server is automatically sends data to the webpage. Then these parameters (Heart rate, Body temperature, spo2 level and body movements are monitored. If these parameters are goes to abnormal it will automatically sends alert message to the doctors and relatives.

2. PROPOSED SYSTEM AND OVERVIEW:

The main idea of the designed system is to continuous monitoring of the patients over internet. The proposed system architecture for IoT healthcare. The model consists of raspberry pi board, Temperature sensor, spo2 sensor, heartbeat, Buzzer, Wi-Fi Module, and Regulated Power Supply. In this system, raspberry board collects the data from the sensors and sends the data through Wi-Fi Protocol. The Protected data sent can be accessed anytime by the doctors by typing the corresponding unique IP address in any of the Internet Browser at the database system.(ex: Laptop, Desktop, Tablet, Mobile phone).
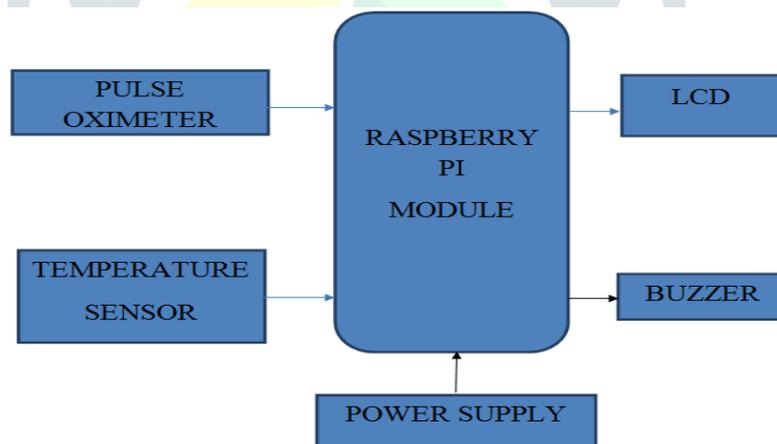

Figure 2. Block diagram of proposed system

2.1 RASPBERRY PI3:

The Raspberry Pi board contains a processor and graphics chip, program memory (RAM) and various interfaces and connectors for external devices. Some of these devices are essential, others are optional but all Raspberry Pi models have the same CPU named BCM2837 which is cheap, powerful, and it does not consume a lot of power. Raspberry Pi operates in the same way as a standard PC, requiring a keyboard for command entry, a display unit and a power supply.

2.2 TEMPERATURE SENSOR:

Normal human body temperature, also known as normothermia or euthermia, is a narrow temperature band indicating optimal health and thermoregulation. Individual body temperature depends upon the age, sex, health, and reproductive status of the

subject, the place in the body at which the measurement is made, the time of day, the subject's state of consciousness (waking or sleeping), activity level, and emotional state. LM35 series are precision integration-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 does not require any external calibration or trimming to provide typical accuracies.

2.3 PULSE OXIMETER:

SpO2 sensor:

It is a device which measures the percentage of molecules of haemoglobin in the arterial blood saturated with the oxygen. The sensor is put over the thin part of the body. Within the SpO2 sensor, there is a light sensor containing two LEDs as light sources, which emit red and infrared light, on one side and a light sensitive photo-detector on the other one. The lights shine through the body tissues in particular sequences. First the SpO2 activates the red light and it passes through the body tissues and gets to the detector on the other side. Then, the red LED light goes off, whilst infrared LED goes on. The detector records the amount of LED lights plus room lights which fall on it. A pulse oximeter is a medical device that indirectly monitors the oxygen saturation of a patient's blood (as opposed to measuring oxygen saturation directly through a blood sample) and changes in blood volume in the skin, producing a photoplethysmogram. The pulse oximeter may be incorporated into a multiparameter patient monitor. Most monitors also display the pulse rate. Portable, battery-operated pulse oximeters are also available for transport or home blood-oxygen monitoring. A pulse dosimeter consists of the monitor containing the batteries and display, and the probe that senses the pulse and it gives Sp02 and the pulse rate.

2.4 BUZZER:

A **buzzer** or **beeper** is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

2.5 LIQUID CRYSTAL DISPLAY:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.
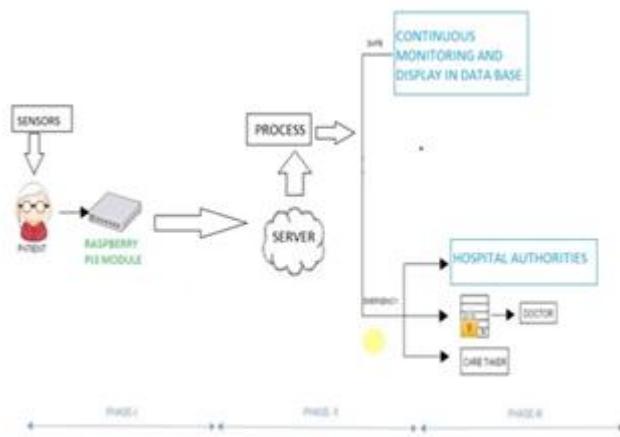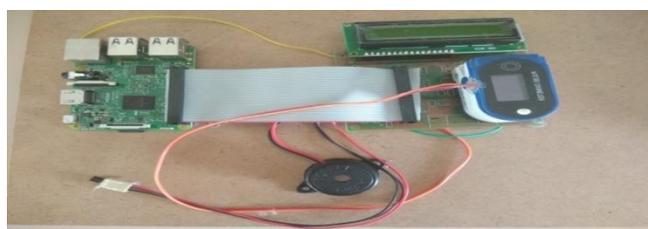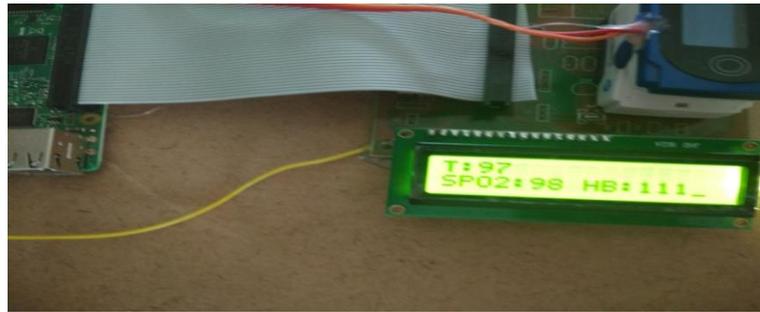

Figure3:System Architecture
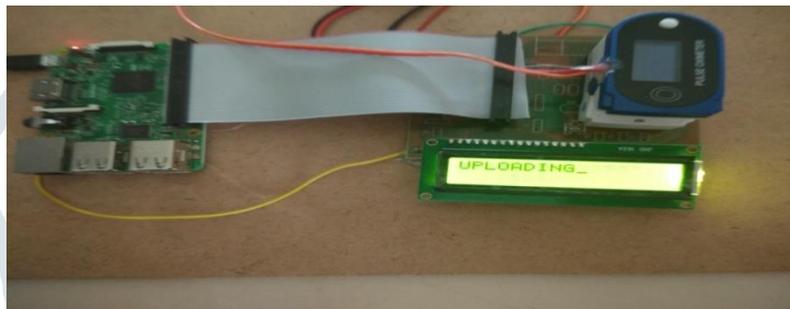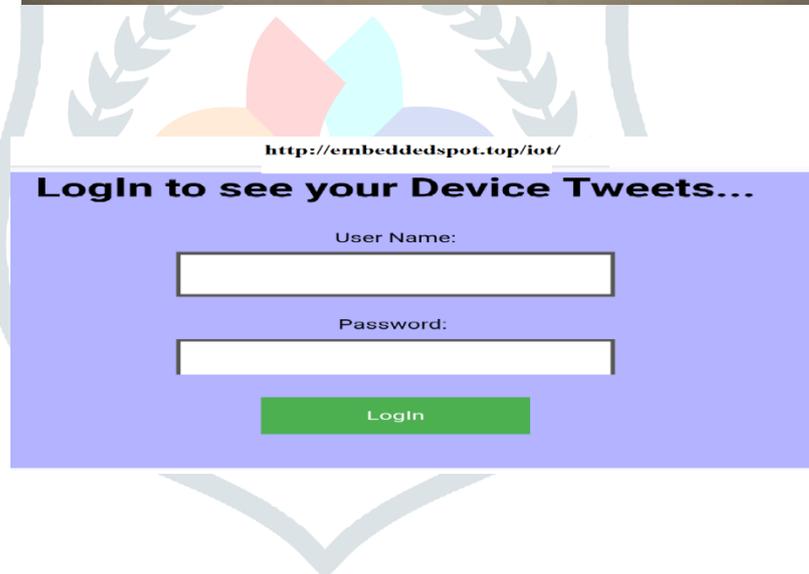
3. RESULT

Step1: Project kit
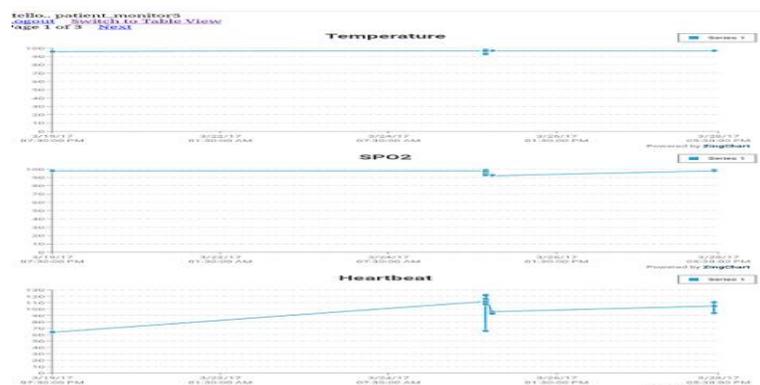
Step2: Showing patient health parameters

Step3: Uploading to Web page

Step4: Log in to web page

Step6: Graphical representations of patient status

4. CONCLUSION AND FUTURE SCOPE:

The whole health monitoring system, which we have proposed can be integrated into a small compact unit as small as a cell phone or a wrist watch. This will help the patients to easily carry this device with them wherever they go. As health care services are important part of our society, automating these services lessen the burden on humans and eases the measuring process. Also the transparency of this system helps patients to trust it. When threshold value is reached, the alarm system that consists of buzzer and LED alerts the doctors and he can act more quickly. The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure. The IOT technology helps the server to update the patient data on website.

The information of the patient which is stored and published online can be given to scientists and researchers of medical fields to analyze the value and find patterns or for other research work. To simplify the hardware and reduce wiring we can have used wireless sensors.

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