Raspberry Pi based E – Health System over Internet of Things

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Abstract. Health is very important in our daily life style. It’s monitory to check up health every for patients, and old age people. Electronic technology also helped to enhance the health monitor and auto alerts regarding their health, it’s very easy and time reduction for doctors. We introduce the Internet of things based latest techno health system for easy flexible health monitoring anywhere in the world. In the proposed system having heart rate, temperature, vibration sensors all integrated to the parallel processing microprocessor. Health parameters re measured by sensors and give the raspberry pi module. This module analyse the data and monitor in LCD, post the same in internet of things based server. We continuously monitor, if any changes found like low heart rate, high heart rate, high temperature, patient movement iot alerts the authorized person regarding health. This proposed system enhances the present health system to next level with easy to operate.

Keyword: heartbeat sensor, Temperature sensor, Humidity sensor, Raspberry Pi, IOT - module.

1. Introduction

Specialists throughout the healthcare sector are increasingly leveraging the areas of concern that these developments carry in and can allow considerable improvement in and beyond the medical administrations. Similarly, the capabilities of Electronic Health apps and Health (therapeutic organizations managed by ICT) are utilized by countless regular consumers to develop, support and strengthen their healthcare network. The SMS is submitted to the specialist or to any family member in some fundamental situation. Health analysts slowly misuse the points of value these developments add to the social security market in the healthcare setting, thus creating a crucial change. Likewise, endless standard customers are helping and helping their health experts by using the M-Health (Mobile Health) applicants and EHealth. Health analysts slowly misuse the points of value these developments add to the social security market in the healthcare setting, thus creating a crucial change. Likewise, endless standard customers are helping and helping their health experts by using the M-Health (Mobile Health) programs and EHealth. A dependable and rapidly persistent portion of this corresponding technique. Structure like look (PMS). One of the biggest issues for society is the lack of social security. As the World Health Organization (WHO) parliaments demonstrate, the most elevated feature of the Medical system is a great best thing for a person. In order to persuade and render people look, it is important to have a flash similar to the new mending machine. The system for social insurance will include stronger remedial connections for people wherever they are, in a sustainable and careful manner. Provided that such contraptions support the Internet, they boost the environment and insure that organizations and social security become continually safe and logically drawn. The whole idea of IOT remains on sensors, portion as well as remote systems that allow customers to grant and access the application / information. No place, however, is the IOT across all zones more apparent than it was in the areas of prosperity treatment. As a cliché states, ’Prosperity is money,’ the movement towards greater results is phenomenally important. Therefore, it is necessary to connect to an IOT framework that provides secure and prosperous analysis. At present, the contraction of human institutions, the conventional way of coping with a technologically advanced personally driven oriented system, is being traded.
2. Literature Survey

We have investigated the different examinations performed utilizing existing strategies that have been applied in the field of patient wellbeing checking. This study remembers current patterns for persistent checking frameworks and related work on the far off patient observing framework. In [2], a structure of IoT based wellbeing checking framework utilizing Rasberry Pi is proposed. In this paper, they have used Internet of Things (IoT) and distributed computing advancements. The proposed model screens the Heart Rate, Oxygen level and Blood Temperature of a patient. Distributed computing empowers tenacious capacity of information. Thus the information assembled by the wearable sensors put on a patient's body is spared in the cloud with the goal that it very well may be gotten to from anyplace over the g projection. The specialist can login to the site to get to the patient's information and produce a wellbeing report. Patients can get to the wellbeing report by signing into the site. A visit alternative is given in the site to specialist and patient correspondence. The framework goes about as an extension among specialist and patient staying away from the separation obstruction. In country regions where satisfactory clinical offices are not accessible, it is useful and financially savvy arrangement. In [3], a wellbeing Monitoring framework utilizing Arduino is proposed thinking about the necessities of old individuals. In the maturing populace world, there is an expanded requirement for a specific wellbeing checking framework. In this unique situation, the proposed framework screens internal heat level, circulatory strain, and pulse and sends the information to specialists. These boundaries are commonly estimated during fundamental wellbeing exams as its qualities are significant indications of a patient's wellbeing condition. In the event of crisis, an alarm button is provisioned so the specialist will get a SMS when an alarm button is squeezed. Information is pushed to the web worker with the goal that the specialist and patient can see the qualities. The fundamental test watched was the delay of the older to utilize this new innovation. They should be taught to utilize new mechanical gadgets like cell phones and PCs. In [4], Wireless Bluetooth innovation with Android is investigated for the far off evaluation of wellbeing and fall identification. The framework screens the wellbeing boundaries like ECG, temperature, 'body pose', 'fall recognition' and present GPS area. Numerous synchronous Bluetooth associations are set up with an android telephone to move the gathered information. An android application investigations and procedures the information which is likewise sent to the worker utilizing the web. Information is sent to a crisis contact individual in the event of a crisis. Being a versatile, vitality productive, lightweight and adaptable plan, it is generally appropriate for people that are at high hazard like officers guarding at high elevations, travelers, unskilled workers, and so forth.

3. Proposed System

In the proposed system of health monitoring system we used temperature sensor, heart beat sensor and humidity sensor for monitoring the human body health parameters and display in LCD and IOT server. If the heart rate fluctuations mean if we got low BP or HIGH BP then buzzer module automatically alerts and same thing will update in server.

![Fig.1.Block diagram](image-url)
This methodology is intended to build a structured remote observation system for well being. The goal is to track the patient’s body’s temperature and heart rate that the NRF innovation specialist will be faced with. The care services in medical centers are consistent with the assessment of the well being of the patients. The body of the patient is continuously monitored for temperature and pulse and registered. This interface is simple, illustrating the usage of ESP8266 and Raspberry pi IoT Patient Safety Monitoring Program. Temperature sensors Pulse and LM35 monitor separately BPM and Ambient Temperature. The Raspberry pi designs the application and shows an LCD panel with 16 * 2. Starts sending the data to the IoT application server via WLAN ESP8266 unit partners with both the WiFi. Thing speaks is the IoT server used in this. Finally, data from anywhere in the world can only be verified by identifying the channel Thing speak. Hardware modules used in this proposed system is explained in below.

A. Regulated Power Supply

In this section of RPS we need 5v dc to work RPI processor. This RPS module is getting the required voltages from higher voltages with the help of filters and voltage regulators. 12v alternating current received by 230 v alternating current step-down by transformer, Bridge rectifier used to converts AC voltage to DC voltage. 1000 micro farad Capacitor for filtering the noise and voltage regulator 7805 used to provide 5v DC for operating the RPI processor.

![Fig.2. Regulated Power Supply](image)

B. Raspberry Pi

Raspberry pi processor used to integrate the all input and output peripherals, process the input data and control the output modules. This processor having 4 USB ports for integrating output modules. 1GB RAM which is high speed process the data. 3.5mm audio socket for output voice, CSI camera port for interface camera, micro SD card for operating system storage, 1.2GHz speed 64 bit Broadcom processor. This processor having 40 GPIO pins. All input sensors and output modules are interfaced to processor. Python programming used to implement RPI based applications.

![Fig. 3. Raspberry Pi model](image)
The Linux operating system can run on the Raspberry Pi platform. This means a large range of libraries and open source software programs can be used with it directly. Using open source software, the raspberry pi communicates using things like the mouse, the monitor with the HdmI, and the Wi-Fi transmitter, without including proprietary alternatives.

C. Heart Beat Sensor

The beat is the notable parameter in the evaluation of prosperity. The actual human tone has a heartbeat of 60 to 100 thumps almost any second. The beat calculation is, commonly speaking, an irregular strategy. This prototype has a beat sensor with sharp Q beat. This consists of a fundamental sensory structure. The heart rate may be genuinely measured for two regions of the wrist and back, the revolving rhythm (carotid rhythm), by monitoring the beats of each other. With a Heart Beat detector the light is a customed through the blood, when the heart rate varies, based on the optical force range. The beat sensor relies on the photography norm. The adjustments in blood pressure that pass from each organ in the body induce a light strength shift across this organ (a territory of the vascular)

![Fig. 4(a) ECG Sensor](image)

![Fig. 4(b) Heart-rate Monitor](image)

D. Temperature Sensor

LM35 is a concentrated circuit that provides a particular value to a temperature (in °C). It doesn’t need to think about the external synchronization in order to preserve a specific alignment at room temperature as it is balanced internally. No output voltage is required for LM-35 to be stepped up. LM-35 produces small produces, simple yields. To assess appreciations used in the process daily. The voltage levels are between 4 and 30v. The voltage commonly used here is 5V or 12v. LM-35 scale is 0.01 V / °C. Figure 3: LM-35
E. LCD Monitor

A liquid Crystal Display commonly abbreviated as LCD is essentially a display unit built Using liquid technology. LCD module is 32 character displays, which is 16x2 models. Having 16 characters in row. LCD module interfaced to microprocessor with 16 pin configuration. LCD has 16 pins in series. Each pin is programmed to do here: Pins 1 and 16: Power and ground are these. Pin 3: This is used to change the LCD's brightness. Pins 4–6: Used for LCD service. Pins 7–14: Used as line of info. Pins 15–16: Used to control backlight to the LCD.

F. Buzzer

Peizo electric buzzer is used for intimating the changes in this system. Buzzer is the output module used to generate alarm. This module which converts the voltage to sound signal. We directly connected to RPI processor for

G. IOT- Module

ESP 8266 Module used for Internet of things operations. Internet of things is the latest technology for controlling and monitoring operations through the world fast and secure. Wireless fidelity based
operating module which works with 5GHz frequency. It supports 802.11b, 802.11n wireless transmission of data protocols. Normally we use 4 pins in this 3.3v voltage, ground comes under power supply for operating device, TX,RX are transmit and receive the data from micro processor bidirectional.

![ESP 8266](image)

**Fig. 8. ESP 8266**

**H. Software**

In embedded system software module plays important role for any electronic automation. This proposed article we use Python IDE for programming development, debugging and compilation process. Python is effective scripting language for real time applications. Rasberian Operating System is used in Raspberry pi modules.

**I. Results**

We designed the electronic health monitoring system hardware using raspberry pi as shown in the below figure 10. We integrate the input modules heartbeat sensor, temperature sensor, humidity, vibration sensor. The output data of the all the sensors will displayed in LCD and internet of things. The buzzer module here will alerts the low heart beat, high heart beat and high temperature alerts in internet of things using thing speak database.

![Output Hardware setup](image)

**Fig. 9. Output Hardware setup**

All sensors heartbeat sensor, temperature and humidity are integrated to raspberry pi. All the sensors data firstly displayed in lcd module as showed in the below figure 11. Below figure 11 shows the heart rate 95 in case1 and case 2 shows the heart rate 125. This is the case of high heart rate. This time buzzer automatically alerts and sends the high heart rate data to the IoT. Heart rate and body temperature is displays in LCD module with high hart rate alerts.
All sensors heart beat sensor, temperature and humidity are integrated to raspberry pi. All the sensors data firstly displayed in LCD module as showed in the below figure 12. Below figure 12 shows the heart rate 25. This is the case of high heart rate. This time buzzer automatically alerts and sends the high heart rate data to the IoT. Heart rate and body temperature is displays in LCD module with low heart rate alerts.

The health parameters temperature humidity and heart rate data displayed in internet of things using server. And it alerts us through high heart rate and low heart rate of data when the patient in emergency situation. Figure 13 shows the all sensor data posted into iot server and continuous monitoring the data.
4. Conclusion

We designed and implemented Raspberry Pi Based E – Health System over Internet of Things with integrating of all input modules like temperature, humidity, position motions, heart rate monitoring sensors, output modules LCD, buzzer and wireless communication system called internet of things through Raspberry pi processor. In this proposed system, the various health parameters such as pulse rate, temperature, angle movement of fingers and eye blink were monitored and recorded in the ThingSpeak platform. The values of these parameters were analyzed and alerted in this the proposed system. In future we will add some other sensors which enhance the health monitoring system like glucometer and body fat device measurement we an add.

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