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Iot Based Health Monitoring System.

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Abstract

In todays world , as the population is increasing at rapid rate and number of health care issues are also increasing rapidly. Todays busy life style, expensive private medical services, and stressful goverment medical facilities dont allow people for health checkup on regulr basis. This condition increases the importants of "IoT Based health Monitoring System" which is not only elelctronic system but also useful in remote and real time patient data monitoring and storing system. This system measures three body parameters body temperature,blood pressure and pulse rate or heart beat. as one of these three or all body parameters may affected mainly due to any health problems. Accelerometer sensor working on principal of fall detection is used to detect dizziness. The current proposed systems allow only to measure 1 or 2 parameters and also the real time result can't be monitored at remote distance. With introduction of IoT in the system, patient's data can be accessed or monitored by doctors , patient himself, and authorised person by using android app or web page. The proposed system is based on Raspberry pi 3B which is having inbuilt wifi. The sytem uploads the readings of sensors on cloud first using internet access provided by users mobile hotspot or any other nearest wi fi access point. The proposed system is also usefull for monitoring patients recovered from serious diorders until he gets used with his daily routine.

Index Terms: *Internets of thing, Raspberry pi, Android application*

1. Introduction

The current patient monitoring systems which are implemented in the hospitals or on field for remote monitoring have certain limitations such as range of maximum distance covered by wireless device, cost of carrier to transmit data over large distance,data security, some time continious paramedic assistance etc.

The current proposed system uses the RF transmitters or zigbee modules at node for short range transmission and for remaote distance tranmisssion GSM modules or handsets are used which results in additonal carrier charges from service providers.

This limitations can overcome by proposed system "Iot based health monitoring system" this system can be mounted on patients arm. The system consist of raspberry pi 3B, pulse rate measurement unit, body temperature measurement unit, blood pressure measurement unit, and accelerometer sensor. this parameters are specifically selected because any health disorder affects atleast 1,2 or all of this parameter.

The proposed system "Iot based health monitoring system" uses lm35 temprature sensor for body temperature measurement, IR sensor is used for pulsed rate measurement accelometer sensor used for detection of diziness and traditional Sphygmomanometer is used with small modification for blood pressure measurement. This all modules reading are can be accesed by multiple authorized persons at same time which increases the response time

2. Need of project

This project is develope due to certain reasons which alltogether results in to the well being of humans

The main reasons are to increase the response time of treatment, to detect the disorders or illness at early stages, to study the affeccts of various climate changes on society to plan preventive measures, to collect data for research purpose, to reduce the cost of medical facilities and mainly for monitoring patients recovered from serious diorders until he gets used with his daily routine

3. Overview of the system

The complete system is divided in to two parts namely patients unit and doctors unit other than this there is one more part, cloud server.

Patient unit consisit of sensors which measures the body parameter. all sensors are connected to the Raspberry pi 3b which is processing unit. The output of sensors is fed to raspberry pi 3b for processing. All the results generated by processing unit are uploaded to cloud server. Cloud server is web storage which is provided by third party on chargable or unchargable basis. For example we can consider Thinkview server which provided free storage space on cloud with read and write keys to read and write data from server only after successfull log in

Figure 1 shows the overview of proposed system

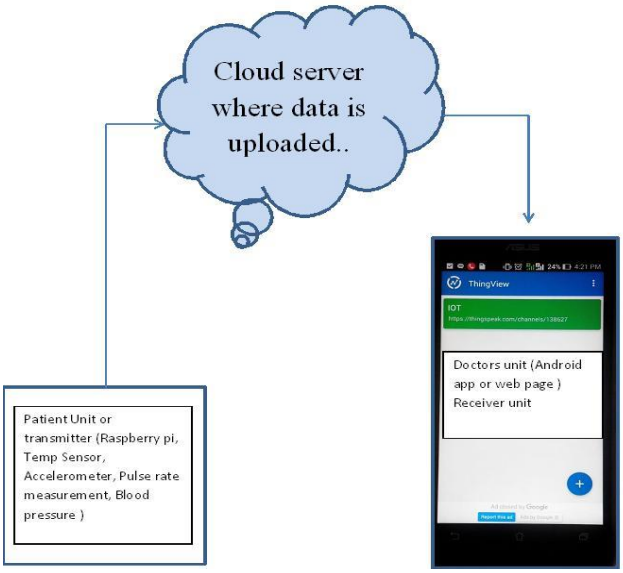

Figure 1: Overview of system

Doctor unit consisit of an android app or web page where authorised paramedical assistant can monitor patients health this data can be accessed by multiple authorised persons to increase the response time.

4. Block diagram and explanation

Figure 2 shows the block diagram of proposed system

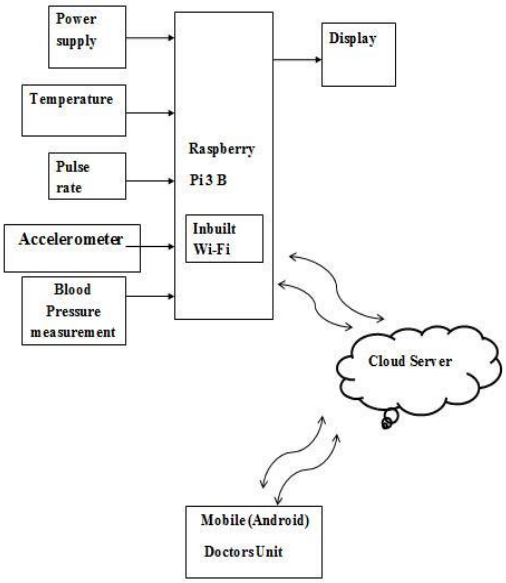

Figure 2: Block diagram of proposed system

4.1 Power supply:

It provides the supply voltage to drive the overall circuitry via Micro USB socket its output is 5.1V, 2.5A.

4.2 Raspberry pi 3 B:

In this project Raspberry pi 3 is heart of the system.It is nothing but mini computer which is designed in a single board with all the essential components required for running an operating system. The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications.The only reason for using the raspberry pi version 3 is on board Wi-Fi module for internet access. We are using the NOOBS operating system with this raspberry pi 3b module

4.3 Temperature:

LM35 temperature sensor is used to measure body temperature as its output is directly calibrated in ° Celsius (Centigrade).The LM35 series are precision integrated-circuit temperature sensors.It does not require any external calibration to provide typical accuracies. Its ranges from −55°C to +150°C and operates on 4 to 30v.

4.4 Accelerometer:

Accelerometer module is used for fall detection due to dizziness.ADXL335 sensor is being used which is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. It can also measure the static

acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

4.5 Blood Pressure:

This unit is similar to traditional blood pressure measurement system. Sphygmomanometer is used with small modifications. As shown in figure 3 to create pressure in cuff and depressurise. its manometer is replaced with SPD015G sensor and pumping unit with motor and relay switches.This SPD015G sensor converts the applied pressure into electrical signals which are again fed to amplifier circuit for signal conditioning then this signals are given to raspberry pi 3B. SPD015G sensor is commercial grade sensor designed for medical applications

Figure 3 shows modifications in Sphygmomanometer

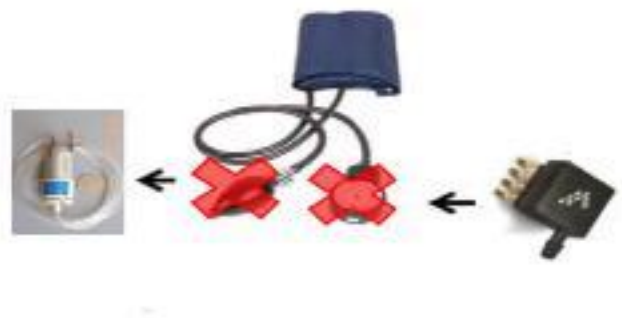

Figure 3: modifications in traditional Sphygmomanometer

4.6. Pulse Rate measurement

This unit is the combination of IR sensor and photodiode or LDR followed by high pass filter instrumentation amplifier and notch filter and power amplifier. High pass filter is the combination of resistor and capacitor. For instrumentation amplifier AD620 IC is used and for notch filter and power amplifier op-07 IC is used

Figure 4 shows Working of Pulse rate measurement unit

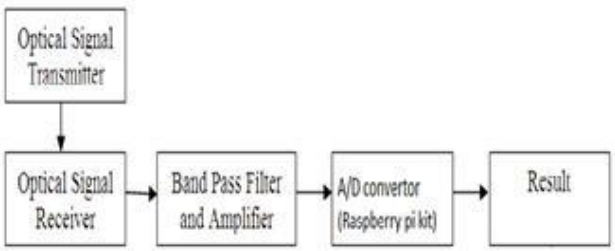

Figure 4:Working of Pulse rate measurement unit

This unit is mounted on the fingertip with clamp or spring loaded mechanism as shown in figure 5 the IR led and photodiode are on opposite side of each other light transmitted from led travels through skin tissues and blood at that time 80% power get attenuated it is well absorbed by blood and weakly by tissues The power transmitted by the LEDs is matched with the photo sensor in such a way that the resistance will vary within the range of the photo sensor after attenuations through the index finger

Figure 5 shows the unit is mounted on the fingertip

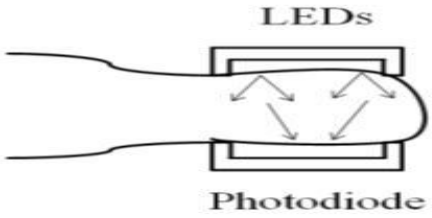

Figure 5: The unit mounted on the fingertip

4.7 Display:

The display part is optional not required while using the module for monitoring of patient body once the system is configured no need to carry display everywhere.

4.8 Cloud server:

It is the part where all the patient's data is saved and can be accessed any time by the doctor or authorized person using the android app on mobile or on web page.Thinkview cloud server is being used here as this server is free.There are various other cloud servers also which can be used they can be chargable

5. Methods:

Here we first need to connect the patient's unit to a nearby wi-fi/ hotspot having internet access and the attach the module on patient's arm and the unit will do the rest for us. The patient's unit laced with various sensors that will monitor patient's body and provide the readings which will be stored on cloud and displayed on webpage and android app

Table 1 shows the Standardized range for body parameters for normal and abnormal health condition

Parameter	Normal range	Abnormal range
Blood pressure	<120/80,>140/90	>120/80,<140/90
Temperature	(94.2to98.6)degree F.	Less than or more than(94.2to98.6)degree F.

Pulse rate	60 to 100 bpm	Less than 50 or more than 100 bpm

Table 1: Standardized range for body parameters for normal and abnormal health condition

6. Results:

Here results generated by system can be accessed by Doctors unit which is android app or web paged . the results can be accessed remotely

Figure 6 shows the result generated on android app

Figure 6: Result generated on android app

7. Conclusion:

An efficient IoT based health monitoring system is developed to monitor the up to date status of the patient irrespective of the presence of the doctor. The system collects information like temperature, blood pressure, and pulse rate of the patient and updates the same to the doctor.The system also uses an accelerometer sensor for fall detection. The doctor can monitor the progress of patient's health remotely.By using the system the healthcare professionals can monitor , diagnose and advice their patients all time. The health parameters data are stored and can can be accessed anytime online.

8. Future scope:

The device can be used for the monitoring of Sportsmen health parameter during training Similarly,
The device can be used for the monitoring of Soldiers health during training, peace time as well as war time
Drug reminder feature can be implement

9. References:

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