

IOT Based Heart Beat and Glucose Level Monitoring System

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Abstract : In this Project, we are going to introduce a system in order to monitor the Heartbeat rate and Glucose drips level using Node MCU. This System helps to monitor the patients in hospitals for emergence purpose. When Heart beat varies above or below normal level and when glucose drips bottle reaches below certain level, a notification is sent to nurses or doctors mobile. It also helps to monitor the patient in real time in anywhere in mobile by using Blink App. Here we are using four important components i.e. Node MCU to control the system, Heartbeat sensor to measure Patient Heartbeat rate, Ultrasonic sensor to measure level of glucose bottle and Widget Virtual LCD to display Heartbeat rate.

Keywords: Glucose, Node MCU, Virtual LCD, Heartbeat sensor and Ultra sonic Sensor

I. INTRODUCTION

Heartbeat is one of the most important factors that are regularly measured by doctors once patient comes for check-up. Heartbeats define how many times contraction and relaxes take place per minute, it changes among different age groups for example for adults it is 69-72 beats per minute, and for kids, when sleep it is 60 beats per minute and during physical activities it is up to 220 beats per minute. For Heart patients, continuous monitoring of heart beat is necessary because if there is any changes occur it leads to heart attack.

Once the drips bottle attaches to the patient it has to be continuously monitor to check whether it is nearer to empty or not because if nurses or doctors forgotten to check drips bottle when it is empty it will leads to bad consequence like backflow of blood to IV tube from their vein or blood loss.

The system is designed in order to eliminate the manual efforts by using cloud platform (Blink).Node MCU is used in order to control the whole system; heartbeat sensor and Ultrasonic sensor are used as an Input Module. The system will display Heartbeat rate and level of the glucose drips bottle in blink app, doctors or nurses can check in mobile by using blink app as every person is using mobile in modern world. If the heartbeat changes above or below normal level and also if glucose drips bottle comes to 1/2nd and 3/4th level, notification message is sent to mobile.

II. PROPOSED WORK

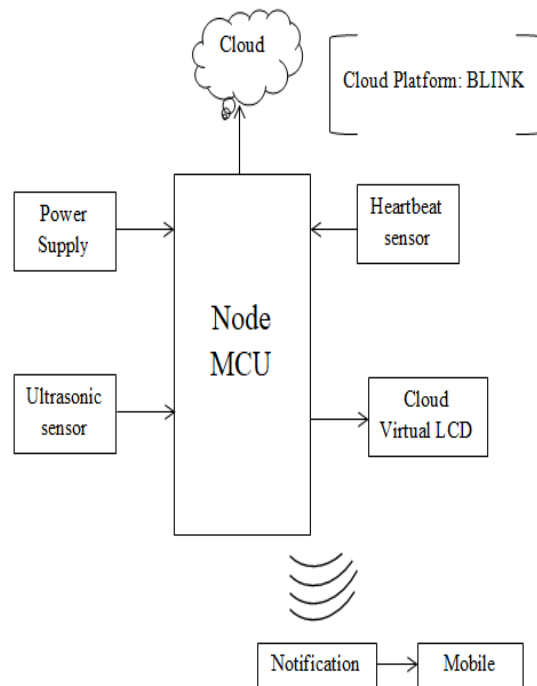


Fig2.1: Block Diagram of Heart beat and Glucose level Monitoring System

Fig 2.1 shows the block diagram of heartbeat and glucose level monitoring system. 5V DC power supply is used for this module. Node MCU is used in order to control the whole module. When System starts, all devices will be initialized. Next Heartbeat sensor and ultrasonic sensor measures Heartbeat rate and level of the glucose and both the output is given to Node MCU. From Node MCU the results are send to cloud platform i.e. Blynk through IOT. Heartbeat rate is display in widget virtual LCD and Virtual level of Glucose drips bottle can be seen in Blynk app. If there is any changes in the normal Heartbeat rate and when the level of the glucose bottle reaches 1/2nd and 3/4th then notification is send to doctors or nurse mobile.

III. HARDWARE DETAILS

3.1 Node MCU



Fig 3.1 Node MCU

Espressif Systems design a microcontroller named as ESP8266 i.e. Node MCU. It is an open-source firmware and expansion kit that aids you to Prototype your IOT product within a small number of Lua script lines. ESP8266 has Inbuilt WiFi network connection offering as an extension from existing microcontroller to WiFi and it is also useful to run application oriented.

Node MCU have inbuilt USB connection and also has many pin-outs of different collection. By connecting Node MCU kit to laptop using USB cable we can run it without any problem same as Arduino.

3.2 Ultrasonic Sensor



Fig 3.2: Ultrasonic sensor

Ultrasonic sensors work by emanating sound waves at a recurrence unreasonably high for people to hear. They at that point trust that the sound will be reflected back, ascertaining separation dependent on the time required. This is like how radar estimates the time it takes a radio wave to return in the wake of hitting an article.

While radar and ultrasonic sensors can be utilized for a portion of similar purposes, while radar, or even light-based sensors, have a troublesome time accurately handling clear plastic, ultrasonic sensors have no issue with this. Truth be told, they're unaffected by the shade of the material they are detecting.

Then again, if an article is made out of a material that ingests sound or is molded so that it mirrors the sound waves from the beneficiary, readings will be untrustworthy.

In order to measure the distance by using ultrasonic sensor the equation 1 is used

$$\text{Distance} = \frac{1}{2}(T * C) \quad (1)$$

Where T=Time

C=Speed of the sound

If Speed of the sound is 340meter/sec

Therefore equation 1 becomes

$$\text{Distance} = \frac{1}{2}(0.034 * C) \text{ in cm}$$

3.3 Heart beat Sensor

Heartbeat Sensors are accessible in chest latches, Smart Phones, Wrist Watches (Smart Watches), and so on. The heartbeat is estimated in pulsates every moment or bpm, which demonstrates the occasions the heart is contracting or growing in a moment.

Photoplethysmography is the working principle of the heartbeat sensor. The principle states that, the variation in the amount of blood flow through the organ is evaluated by the variation in the amount of light transient over that organ.

Generally, IR LED is used as the light source in heartbeat sensor and Photo Detector for example Photo diode, LDR (Light Dependent Resistor) or a Phototransistor is used as a gauge.



Fig 3.3: Heartbeat Sensor

By using Source off light and detector, we can assemble them in two methods:

- a. Trans missive Sensor
- b. Reflective Sensor

In case of Trans missive Sensor; the source of light and detector are positioned opposite to one another and the person finger need to be positioned in the middle of transmitter and receiver

In case of Reflective Sensor; the source of light and detector are positioned next to one another and the person finger need to be positioned before the sensor. .

IV. SOFTWARE USED

4.1 Blynk App

Blynk is a modern platform, which is used to rapidly construct user interface for controlling and monitoring the hardware project by using IOS and Android device. First step is to download the Blynk app and then we can create a new project platform and then position switches, sliders, charts and additional widget on top of the display. With the help of widgets, we can change pins to on and off or sensor display data.

At present, Blynk app supports like Raspberry Pi, Arduino board devices, particular core, the ESP8266 and a few of similar microcontroller and a single board PCs and we can add many devices over time. Blynk app supports Arduino Wi-Fi and Ethernet, using this we can operate devices which is connected to PCs USB port also.

IV. RESULT

4.1. Heart beat measurement

The system is designed where Heartbeat sensor is attached to the patient hand in order to read the heartbeat and it is given to Node MCU, through cloud platform (IOT), it is displayed in virtual LCD i.e. in Blynk app. If there is any variation in the Heartbeat rate then a notification is send to the nurses or doctors.

4.2 Glucose drips bottle Monitoring:

In order to monitor the glucose drips bottle, ultrasonic sensor is used. Ultrasonic sensor is attached to the glucose drips bottle when the level of glucose reaches 1/2nd and 3/4th then a notification is send to the doctor mobile stating that glucose drips bottle reaches nearer to empty. If in case doctors want to check the level of glucose drips bottle of the particular patient they can check in Blynk app by using patient user name and password.

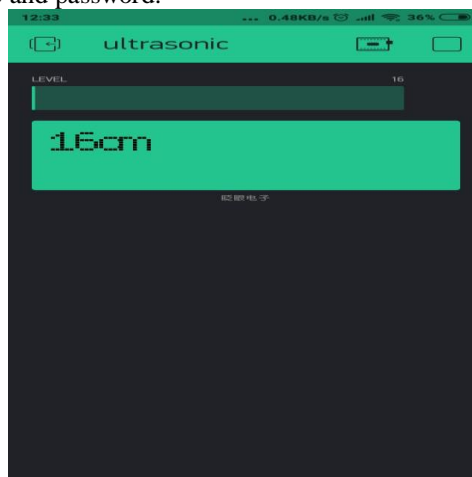


Fig 4.2: When Glucose drips bottle reaches 16cm

V. CONCLUSION

The “Heartbeat and glucose drips bottle monitoring system” using Node MCU will be useful for Hospital application, new born baby monitoring. By using this system we can lessen human efforts, time will be reduced as we need not to be checked patient regularly. This system will be useful when the patient is in critical condition and also during night time where patient has to be continuously monitored.

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