ROLE OF IOT IN HEALTHCARE

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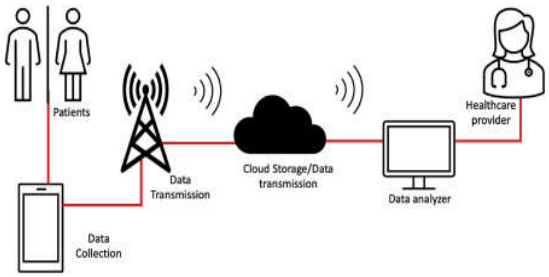
Abstract - We often come across the scenarios wherein it is found that the life of the patient might have been saved if some first aid or preliminary care would have been provide to the patient. The time of merely a few minutes becomes a deciding factor between the life and death of the person. Sometimes even though we have ample amount of time but we are denied of the expert opinion and forced to take decision on our prejudice. Taking a decision on our prejudice may often lead to worsening the condition rather than improving it. As we all know that today is the era of rapid changing world of technology, Internet of Things (IoT) is well verse subject in this era. IoT is playing a vital role in this technological world. IoT is assisting us in providing the connect between the objects and the internet. IoT has the capacity of timely collection of the vital data, processing the data and also forwarding of the information to the desired destination.In this paper we are trying to study how can IoT help in saving the life of the patient. This paper presents how we can be collect the vital parameters related to patient health condition, store the collected data and also send timely information for initiating necessary action by the expert doctors for the critical patient and thus save the valuable life of a person.

***Key Words*:** IoT, NodeMCU, Pulse sensor Oximeter sensor, Temperature sensor , Blynk App/, ThinkSpeak web server.

1.INTRODUCTION



It is most common that a patient who seems quite normal suddenly develops complications. Most often there will not be anyone to assist him and even if someone is present near him, that person may not have courage to assist the patient due to the fear that something more serious may happen. So if we make use of the technology that is available we can monitor the health condition of patient and alsowe can provide the correct advice either to the patient or the attendant who is near the patient to take immediate required care and thereby saving the precious life.

A brief survey is presented here. The authors in [1] describe how the IoT can be used in healthcare for monitoring the current situation of the patient by using sensors to acquire the real time data and help in reducing the human error. Further in [2], the authors tell how IoT can be used effectively in field of medical and healthcare. In paper [3] the authors describe that IOT is playing

vital role in healthcare industry in enhancing reliability, accuracy and also productivity. By virtue of digitalization it is possible to integrate the health care and internet technology. The authors describe regardingthe benefits and functionalities of utilizing Internet of Thing (IoT) devices to serve in the field of healthcare. The paper[4] presents few useful ideas of efficiently integrating and applying IoT devices in healthcare services.

The proposed system could be developed withNodeMCU acting as the heart and brain of the system. The NodeMCU is an Open Source firmware that can be used in IoT based applications. The NodeMCU operates on 3.3 V. It has 12 digital pins which be used as GPIO and 1 analog input pin. Furthermore the main advantage of using NodeMCU is that it has built in Wi-Fi, this makes it most suitable for IoT based applications.

The NodeMCU along with the relevant sensors can be used for monitoring the vital parameters like SPO_2, pulse rate, blood sugar and many more such life saving parameters depending upon the condition of the patients. As the parameters vary from person to person, the doctor incharge can set the specified limits for the particular person. The limits can be set statically or also can be made dynamic. The system monitors various parameters with the assist of the sensors. The real time status of the parameters obtained can be transmitted at a fixed time interval of time or can be programmed to be transmitted in case of critical circumstances. In either case the data transmitted from the patient could be stored in the Cloud server such as Blynk ,ThinkSpeak .A display can be provided at the patient side for viewing the current status of the parameters. Also there may be an alarm in form of beep codes in case of emergency.The doctor can have access to the patient data at any time and at any place by the virtue of IoT.In case of emergency the doctor can provide immediate instructions so that the patient attendant can provide the required emergency care ; which may thus become major factor in saving the life.

2. CONCEPTUAL FRAMEWORK

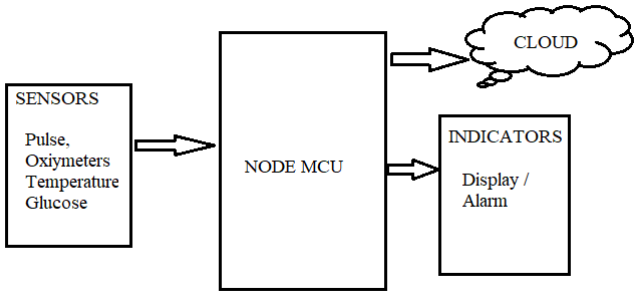


Fig 1: Block diagram of the system

NodeMCU

The entire system is build around the NodeMCU. The NodeMCU ;Open source firmware is used in IoT based applications . The NodeMCU operating voltage is 3.3V. It has 1 analog input pin and 12 digital pins which be used as GPIO. It also has built in Wi-Fi, making it ideal for IoT applications. More details regarding NodeMCU can be found at [5]. The system takes the input from different types of sensors (as required depending on the condition of the patient). The data can then be processes as per the embedded program and initiates corrective action. The values from sensors can be pushed onto the cloud such as ThinkSpeak or Blynk to monitor the data from around the world.

SENSORS

The number of sensors that can be connected vary from patient to patient. Different kind of sensors like pulse-oximeter, thermometer,

electrocardiogram,sphygmomanometer (blood pressure) fluid level sensor, which are capable of reading the current patient situation (data) can be interfaced to the NodeMCU. Thepulse-oximeter record the current Oxygen level, the thermometer records the current temperature, the electrocardiogram sensors can record the ECG pattern, the sphygmomanometer (blood pressure) can record the systolic and diastolic blood pressure.

INDICATORS

The data collected by different sensors is fed to the NodeMCU and processed according to the embedded program. Few parameters can be displayed on the display screen provided for casual monitoring purpose. In case of considerable variation in the parameters with reference to prescribed limit set by the doctor appropriate emergency beep code can be sound by the alarm. Beep code may be of the form such as single beep, two beeps, three beeps or continuous beep depending on the kind of action that needs to be taken and the time available to take the action.

CLOUD

In the proposed system the real time status of the parameters collected can be transmitted at a fixed time interval of time or can be programmed to be transmitted in case of critical circumstances . In either case the data transmitted from the patient could be stored in the Cloud server such as Blynk ,ThinkSpeak . This data can serve as historical data for providing accurate diagnosis

SAMPLE OUTPUT DATA

The Fig 2 shows a snapshot of data that can be made available in the cloud

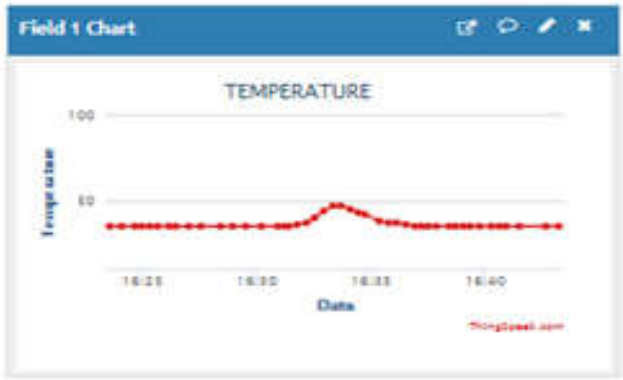


Fig 2. Sample Output on ThingSpeak Webserver

Fig 3. Sample Output on Blynk App

4. CONCLUSION

In this proposed system explains how the IoT can be used effectively is collecting of the patient current data , processing it for monitoring and also taking immediate action for the patient. The system also highlights how the IoT can play a vital role in making the difference between death and life of a patient by providing accurate, reliable and timely information of patient health.

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