

Cluster based Health Monitoring System using Internet of Things

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Abstract:

In this present context being healthy and conscious about health issues is one of the main important things in human life. These days to get basic health information about the patient has to wait for a while in the queue. To overcome this problem we proposed a wireless health monitoring system that can measure the basic health parameters of the patient and capture the data through the sensors and server-based system to monitor the data and visible to the doctor or patient through a webpage. This proposed system is a clustered architecture based device (having a one head node that maintains all the data of child nodes i.e. 2 or more child nodes) uses message queuing telemetry transport (MQTT) is a protocol which handles the larger number of nodes to for communication. Present systems are meant only for one doctor to one patient monitoring but in this proposed system this helps to monitor the two or number of patients at a single device.

I. INTRODUCTION

Cluster-based portable devised health monitoring is used to monitor multiple patients at a time Using message queuing telemetry transport (MQTT) protocol the data gathered from the patient(child node) is sent to the webserver(cluster head). Patients' basic health parameters like body temperature, heart rate, etc. To monitor the patients' health it is easy to monitor it in a wireless environment and that too we are creating a web server so the doctor will be monitoring the patients through a web link anywhere. A credit card-sized system can decrease the space, also very cheap to buy and also gives real time values by using sensors. In this project, we are using raspberry pi for creating a server and also for developing a portable device, whereas node MCU is used to interface the sensors and to send the data gathered to the server using an inbuilt Wi-Fi module called ESP8266. Right now we have described about the framework where a patient can get to know its heart rate and temperature level in intense estimation as well as they can see the chart which changes second to second as indicated by their breathing or

heart rate and the entire strategy is finished using NodeMCU which shows the graph and the entire procedure and this entire procedure will be conveyed to the doctor and the methodology is prepared remotely then it will become very simple for the doctor to monitor the whole process and give suggestions as per those details.

II. LITERATURE REVIEW

Parameters such as heart rate, temperature etc. which are considered as main measures of health status and have enormous diagnostic value. Until recently, continuous monitoring of these physiological parameters was only possible in the hospital environment, these parameters can now be reliably measured and continuously tracked in real time with the invent of various technologies. In the past days there are so many techniques that are used by the doctor to check the health conditions of a patient. upon all these the most common method that followed by a doctor is manual method, i.e. for example when a patient is having a fever then doctor will monitor the level of temperature by using a

mercury thermometer and another example is heart rate where it is monitored through a device where it consisting of three terminals and those are stacked to the patient's body parts where the pulse is accurately seen. After that Then an advance arrived by installing in wristwatches or wristbands the miniature of the medical set-up or sensors. This would sense the pulse rate immediately and intimate the patient.

III. Methodology:

IoT based health monitoring framework manages the estimation of human body parameters, for example, internal body heat level and heart beat and sends the continuous parameters to the specialist and the patient's family members via server. This module is helpful and it measures the parameters with great exactness. This module is typified with WI-FI module, which communicates something specific to a doctor in any crisis condition and this will be useful to make a vital move.

This framework mainly contains some sections: a pulse sensor module, DHT sensor a microcontroller outfitted with ESP8266 WIFI, MQTT broker on the Raspberry pi and also observing programming. shows the pulse module and its data that all around worked to attach over a patient's fingers and peruses, sum of infrared light reflection to the blood flowing within a patient's body and gathers the room temperature and humidity and also if we want any sensor to include like a sensor to measure blood sugar levels also include that. At the point when the heart beats, the pulse rises pointedly thus the measure of infrared light from the sensing object LED that gets expanded and reflected to the photodetector, collects the DHT sensor data and sends to pi server. The photodetector passes progressively it gets increasingly reflected light and afterward turns into voltage drop. And two continuous takes intensifiers are utilized to the build up a sign standard and stress through module. The separated sign are perused by a analog to digital pin to node MCU.

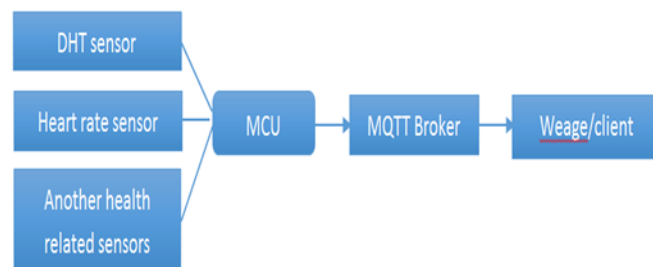


Figure 1: Proposed system block diagram

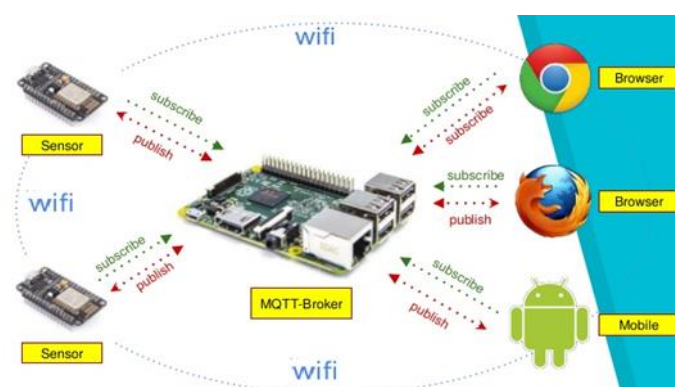


Figure 2: Proposed system connectivity diagram

In the Wi-Fi chip(ESP8266) is an integrated chip intended to necessities to a IOT gadgets. It gives a total independent Wi-Fi organizing functions, permitting it to go about as broadcasting applications organizing tasks. This hardware inbuilt on ESP8266 board. In consistently, the NODEMCU is perusing the heart module rate, temperature from sensor associated with Analog to Digital and compute the heart beats, temperature, humidity and afterward updated to server associated on a similar system. The regular HTTP protocols is extraordinary to send request and get a reaction, for example, when user need to retrieve's data from server afterward find solution, however it isn't better answer to data to drive a opportunity a number of users and there was no work help for the nature of administration. The ordinary HTTP transfer protocol requires transfer speed can be gives a approaching helps to serve, which takes a great in terms utilization. Along these lines, HTTP transfer protocol doesn't get our prerequisites to the backup power-worked gadgets. Along these lines, Message queuing telemetry transport (MQTT) taken a protocol works it requires

a little instructions impression and simple to modules hubs so it is appropriate to a condition where the system transfer data as throw capacity is consideration to MQTT clients to perfect world can be take until 10,000 users and basic for app designers in actualizing correspondence convention. MQTT programming right now the Mosquito broker which is free source for using MQTT protocol. The Mosquito broker is introduced on a charge measured PC, the raspberry pi. multiple-client or doctor can monitor patient's pulse information effectively utilizing MQTT programming created for our underlying assessment. The server can be arranged for a community that permits remote checking at anyplace through the Internet.

Flowchart:

The health monitoring device is written here in the Arduino Uno microcontroller, which fully operates on program execution. Below the flow chart is a description of program execution and its operating principle

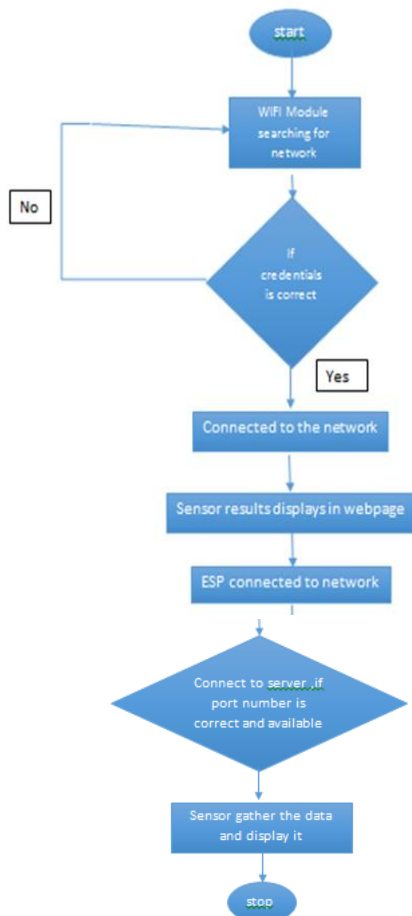


Figure 3: Flow Diagram

The flowchart above portrayed that, right off the bat if esp8266 is associated with arrange code scrap is flashed to the microchip and is scanned for accessible system after effective transfer. Presently the software engineer ought to be input SSID and secret phrase of the WI-FI organize when it finds the accessible system. Accordingly the sensors read information after fruitful association.

This framework has some limitation and preferences like

- 1) Reliability: This proposed framework is solid because of its little and minimal gadget for estimation of various human body wellbeing parameters. It is anything but difficult to available and with less framework disappointment. If there should be an occurrence of any crisis the specialist will effortlessly get a criticism about the patient's wellbeing status.
- 2) Flexibility: This system is made with NodeMCU and module-based sensors, which are effectively accessible in a showcase with a reasonable expense. Execution of the structure, change of any hardware and adjustment of the product according to a framework prerequisite is extremely simple.
- 3) Restrictions: The system is made up of all hardware segments so it ought to be deliberately taken care of and keep it at a sheltered spot. It constantly fuelled with a 9-volt battery and gets a message alert from the gadget it ought to be associated with web.

IV Results:

The health information about any patient can observe in mobile or computer. All information about patient is gathered by different sensors is stored in individual NodeMCU. The connection between different NodeMCU is wired or wireless, and connected cluster based network where Raspberrypi is cluster head which sends all patient information to the cloud. The cloud information we can access from any device (computer or mobile).

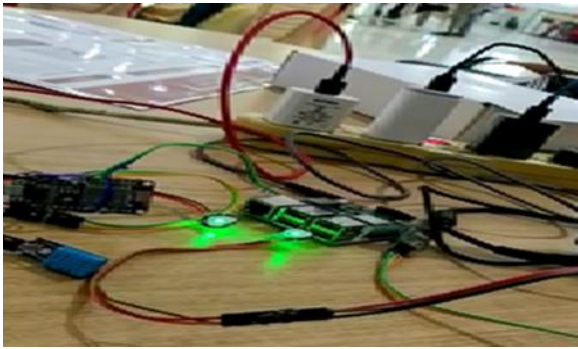


Figure 4: Working Model for Implementation for an IoT based Health Monitoring



Figure 5: Patient health Display on Monitor

V Conclusion:

This paper proposed an IOT based internal heat level and heartbeat checking framework which defeats the issues looked by specialists and medical clinic authority brought about by instruments that are utilized in emergency clinics, nursing homes, and other human services parts. This the framework is less massive, cost-effective, straightforward hardware, low support cost, and convenient in the examination as for those instruments which are accessible in the market. The fused Wi-Fi module has made the framework IoT, which implies if the patient is in genuine condition or not feeling great at that point take him/her to the wellbeing place. This IoT based convenient gadget serves to the brisk estimation of temperature and heart monitor module can send the deliberate information utilizing the web to the specialist in control over versatile and at that point, the specialist makes a reasonable move at the earliest opportunity. As per our perception and research, this gadget is favourable to wellbeing divisions just as patients. Basically, utilizing the specific IP address the specialist and patient's family

members could think about the patient's wellbeing status online by utilizing a Laptop or Smart versatile by utilizing Virtuino application and clearly this gadget ought to be associated with the Internet. As indicated by our exploration and examination, this gadget is of acceptable exactness, an exceptionally proficient, compact and practical item for our Health Sectors.

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