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IOT Based Health Monitoring System

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Abstract: ***According to the research most of life threatens caused due to cardiac arrest, or variation in heart pulse and body temperature. Hence safety of human beings has become major concern in the world. The patient deaths are caused due to doctoror patient negligence, lack of treatment, improper monitoring of health condition etc. This problem can brought up to an end by continuous health monitoring of patient condition with help of sensors and comparing sensor values with threshold value. Then triggers the alert message to the user or doctor through Wi-Fi and Node MCU when values exceed the preset value and respective precaution will be taken by doctor to safeguard the patient lives.***
Keywords: Patient Monitoring, Node MCU, Wi-Fi.

I. INTRODUCTION

In ongoing period there is a sudden improvement in the technology called as IOT this technology makes a human activity easier. IOT (Internet of Things) implies with the help of a network system different devices are associated these devices are played a key role in exchange of information about how well they are utilized in environment in which how they are worked here sensors and embedded systems are implemented in each physical gadgets. With the assistance of this innovation, objects will identified and estimated remotely all over current system set up. This structure chances for direct blend of physical word into PC based frame works. IOT makes more benefits to the user because it makes the entire process fully automated from this process the user's time and cost can be minimized then it is also will improves the quality of life.

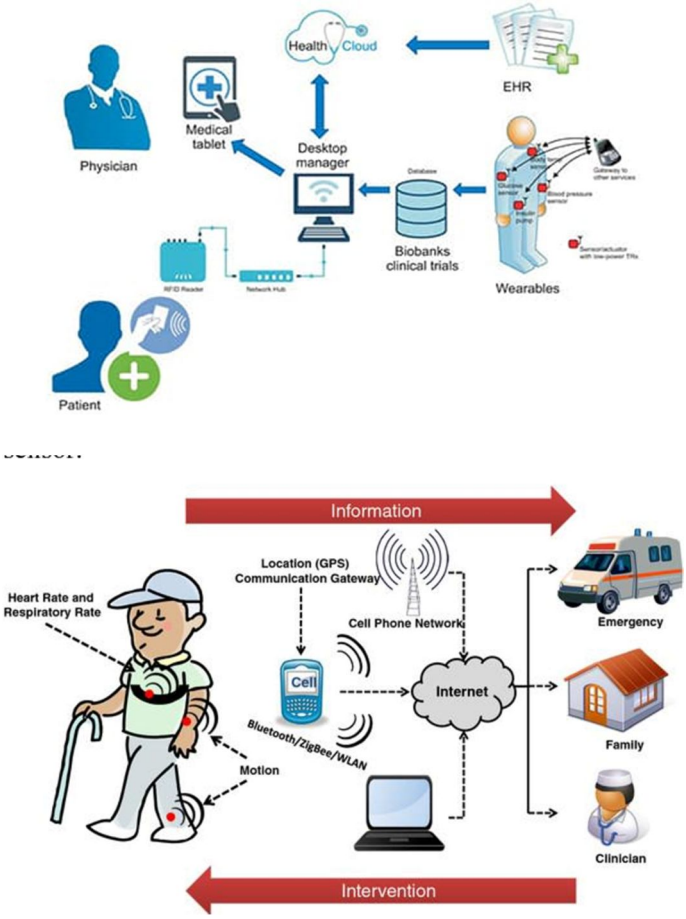


Figure 1: Smart Health Monitoring

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Table 1: Normal heart rate (In BPM)

Age	Women	Men
18-25	70-73	66-69
26-25	69-72	66-70
36-45	70-73	67-70
46-55	70-73	68-71
56-65	69-73	68-71
65+	69-72	66-69

This technology finds the application in the areas of Automotive, Agriculture, and Home automation.Similarly IOT also plays a vital role in the medical sector because it save the patient life during emergency and also continuous monitoring (24×7) is possible so from these criteria patient gets rapid treatment as quickly as possible. If a sick person arrival into a clinic or to the hospital the first and foremost thing to be done by physicians is to be analyze the patient pulse rate as well as body temperature. Heart beat is sometimes also called pulse rate. Pulse is a mechanical push of a blood flows through a capillaries caused by the contraction of heart. Hence this would expressed in terms of BPM (Beats per minute). And an active healthy person pulse rate would be about 60 to 100 BPM. This values will going to alter for every person or with different age group peoples. If this normal heart rate value goes below (Bradycardia) or above (Tachycardia) then it is conclude that patient status would be at critical stage. Heart rate must be regularly monitored otherwise it leads for cardiovascular failure.

The common symptoms for most of the diseases would be “Fewer” this would be checked up using thermometer the normal human body temperature ranges from 36-38°C. Thermometers can’t be used for over a long period time because it requires calibration to overcome this limitation temperature sensor are used different forms of temperature sensor are thermocouple, thermistor etc... To reduce the complexity and make human work so simple and easier an IOT based Cloud platform called Adafruit is implemented this makes human work completely automated. To control and coordinate the entire process Node MCU is installed. There are two input modules i.e. DHT11 (temperature and humidity sensor) and Pulse rate sensor. The patient details is analyzed by this sensor and then displayed on the LCD screen after that the message were passed on to the IOT platform (Adafruit) then information are send to the doctor’s or nurse mobile or to the personal computer.

II. LITERATURE REVIEW

This section discuss about existing system. The recommended system is firmly fixed on the soldier’s body which helps to trace the health status and also GPS is employed to indicate the precise current location during military operations and war. If soldiers get injured or connection gets lost, their health information is tracked by using GPS [1]. The system is designed in such a way that it is composed of load sensor which modifies the load of the glucose bottle to the equivalent voltage and it also include an AT-Mega microcontroller it controls and coordinate the overall performance of the system to give an output to the receiving end GSM module is used which would be low cost which sends notification to the registered phone number like glucose bottle is full, half and empty [2]. A large portion of ICU gadgets are equipped with different sensors to qualify wellbeing parameters and also to monitor each and every parameters still it is a challenging work.

This paper describes about how to overcome this problem. The system is designed with reliable energy cost-effective patients watching system at a particular interval of time it will going to send parameter (ECG, Heartbeat) information, to notify the data MQTT protocol is used [3]. To check the patient’s health status doctors have to physically move to the patient room every now and then which is a long-lasting process.

In this paper a health monitoring system based on GSM is prepared it makes doctors work more easily by adopting this digital and remote system with GSM. Body temperature, heartbeat, blood pressure of the patient can be calculated by this system. The regular updates can be obtained to the registered mobile number and also buzzer will give sound signal which helps to keeps the doctors awake design cost is less with ease of installation as well [4].

This devices works with advanced sensing by the detection of life alarming problem or diseases. Also communication technology has played an important role to save the patient’s health. This devices checks the heart rate with DS18b20, Body temperature and Pulse sensors. This is used for transmitting the wireless data with IOT technique along with the BLYNK app installed in the android device [5].

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III. PROPOSED SYSTEM

The Health monitoring system show in figure 2 which consists of three major component

A. Sensors, i.e. Pulse, Humidity and temperature
B. Node MCU
C. Android Application.

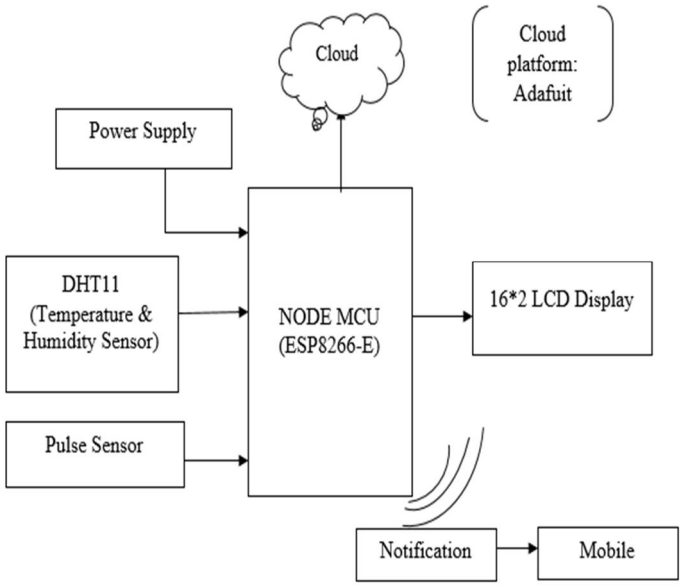


Figure 2: Block Diagram of Health Monitoring System

Initially a 5V DC power supply is used in this module. Initialization will take place when system gets ON. A Node MCU microcontroller-based device with appropriate bio-medical sensors will be attached to patient to provide constant cloud-based monitoring. The vital signs i.e. temperature and pulse rate of human body which are major signs to detect any health problem will be sensed by respective sensors supported by Node MCU in a Wi-Fi environment and the data will be sent to Ada fruit cloud where the data will be analyzed to look for any irregularity. In case of any irregularity a notification will be sent to doctors and nurses. By this system, patients can be kept under proper constant monitoring without being dependent on any human's responsibility at a very low cost. This will also reduce any possible errors and help the doctor to quickly respond to the situation.

IV. HARDWARE DESCRIPTION

This section gives brief description about hardware components

A. Power Supply

A Power supply is an electrical device that supplies electric power to an electrical load. The function of a power supply is to convert electric current from a source to the correct voltage, current and frequency to power the load.



Figure 3: Power Supply

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B. DTH11 Sensors

It is fundamentally made up of NTC and Humidity sensing component helps to detects both temperature and humidity content digitally. It is less expensive and provide excellent performance it is processed by an IC that is established on the rear side of the device it is an 8 bit microcontroller that makes the values ready to read.

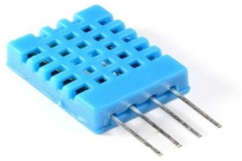


Figure 4: DTH11 Sensor

C. LCD Display

Liquid crystal display is a flat panel display which emits the information of incoming and outgoing signal with the preset value. The commonly used LCD is 16×2 LCD which display 16 character per line and has ability to display in two lines i.e. 16 columns and 2 rows, and also includes three control signals, one data bus, read and write pin, enable pin, register select pin.



Figure 5: LCD Display

D. Pulse Sensor

It helps to monitor the heart rate. The front portion of the sensor is designed like a heart shape. This is the aspect that makes touch with porous and skin. On the front portion there is a small spherical hole that is where in LED shines through. And there is an additional little rectangular just under the LED. It is an ambient light sensor, precisely like the one utilized in laptops, mobiles to modify the screen brightness in special light conditions. The LED shines light into fingertip and sensors will read the light and bounce back. The rear portion of the sensor is wherein the rest of the elements are set up.

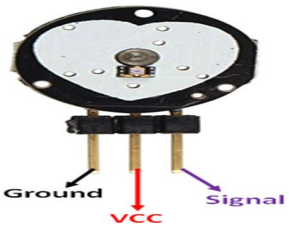


Figure 6: Pulse sensor

E. Node MCU ESP8266

It acts as a microcontroller and also it has inbuilt Wi-Fi connectivity. LUA based firm ware which runs on ESP8266 Wi-Fi SOC (System-on-Chip) recognized by Espressif system. It contains different number of pin-out group and also USB collection by make use of USB cable Node MCU can be connected to personal computer and work effectively. And another advantage is that it is more compatible with Arduino IDE.



Figure 7: Node MCU

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F. Wi-Fi Module

Wi-Fi module creates network connectivity by taking help of radio waves. It is wireless adapter to create a hotspot and also helps out to store data in cloud.



Figure 8: Wi-Fi Module

V. SOFTWARE DESCRIPTION

This section gives brief description about software requirements

A. Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. It is also called as sketches. The sketches are written in text editor and saved with file extension .ino. The software also includes libraries, third party hardware and serial monitor.

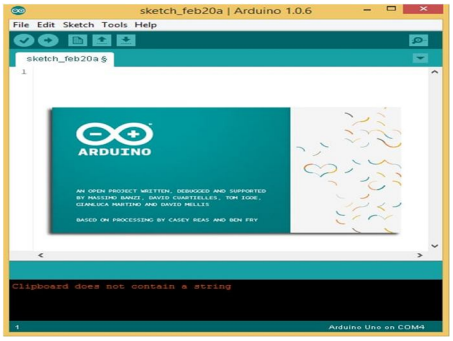


Figure 9: Arduino Software

B. Adafruit MOTT

Adafruit hosts a cloud service, where program data can be uploaded from devices and also subscribe to data from another services. The data is stored in “Feeds” and can be configure its own dashboard for viewing the data. There are two API: available one is REST- based and the other follows the subscribe pattern of MQTT it has faster response, lower battery and bandwidth usage then the privacy data can be secured this makes better choice to choose MQTTT compare to HTTP.

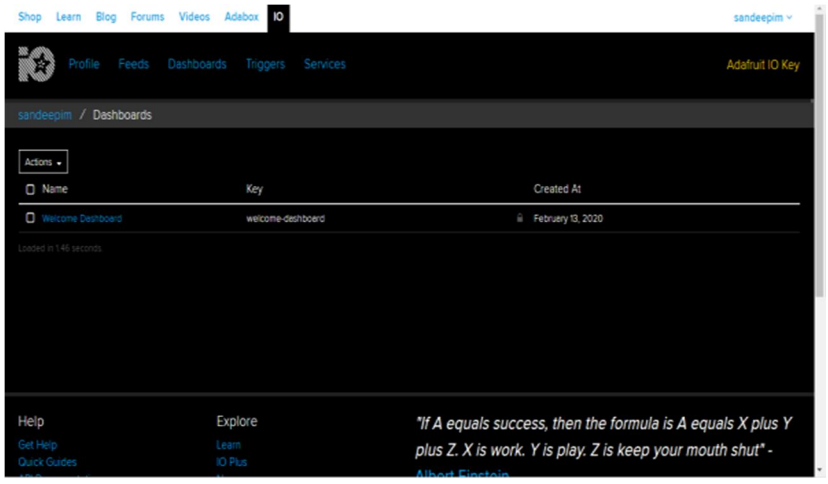


Figure 10: Adafruit MQTT Dashboard

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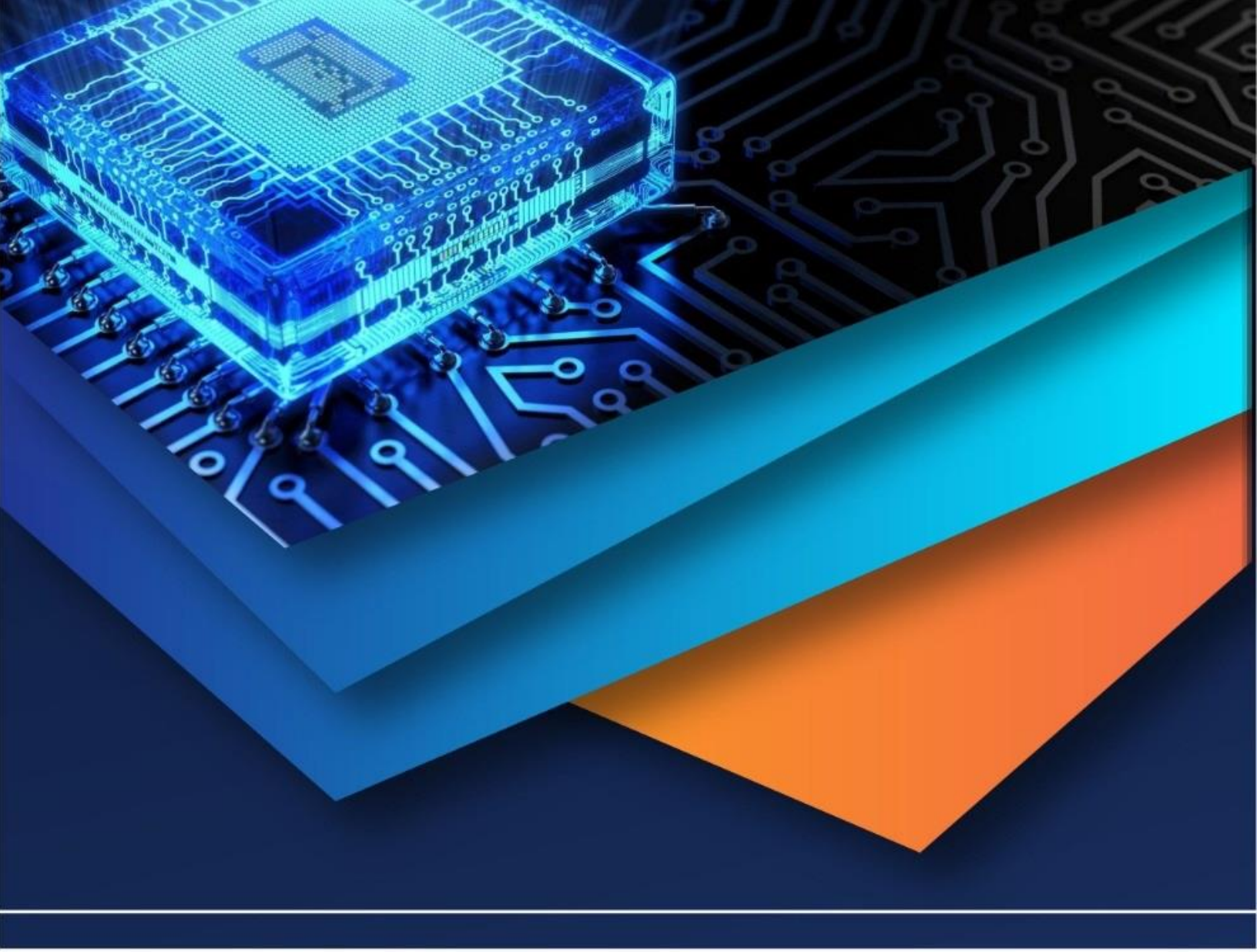
VI. CONCLUSION

In this paper, the cost optimized device used for continuous monitoring of health for detecting variation in human body was achieved. Where pulse rate, humidity and temperature were detected with help of sensors by comparing the sensor values with preset value and stores those data in cloud ,then triggers the alert message to the user or doctor with help of cloud and Node MCU to user android application about health variations when sensor value exceeds the preset value. From experimental result it can be concluded that health monitoring device is easier and highly reliable device to detect the variations in human body within short period.

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