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Iot Based Health Monitoring System

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Abstract: *The Internet of Things is an emerging technology developed nowadays. IoT can connects our all physical electronics devices to internet. Application domain of IoT technology is very diversified from Home/Industry Automation to Health Care sector.*
In this paper we use IoT in health care such for the monitoring patients health. What we done here simply connects the medical sensors to internet. By using ESP8266 NODEMCU microcontroller unit. We transmit the patient data to doctor throughout internet. And the transmission of data accessible in real time.
Keywords: *Internet of Thing, Automation, Health care, Medical sensor ESP8266 NODEMCU .*

I. Introduction

Internet of Things (IOT) can be defined as the wireless network of devices which are connected to each other to share information and data in order to communicate and produce new information so as to record and analyze it for future use.[1] Internet of Things (IoT) is the network of physical, devices accessed through the Internet.
For the monitoring of patients health a particular patient need to visit doctors clinic/hospital. It is convenient for one or twice time but not convenient often checkup. To reduce that cost and sometime for emergency services it will help both the doctor and patient. There are some medical sensors we use here to collect the patients data. There are total four basic parameter we took to monitor the health. The health parameter are Human body Temperature, Hearth Rate(Systolic and Diastolic) Hearth Pulse and Respiratory Rate.

II. Ease of Use

A. Ease of use for patient end

The reason behind this project is to reduce the effort of doctor as well as patient. As our device is portable. It s a compact design can fit on wrist. The patient can use this device like watch. The blood pressure and Pulse rate on liquid crystal display.

The device has two switches, One is reset and another is memory. Reset button is use to delete the previous data And memory button is store the data.
A LM35 temperature sensor is have attached to Patients body. So we use sticky tape so that sensor will collect reading more easily.

The ESP8266 NODEMCU Microcontroller unit also attached to the wrist band.

So overall the Patient can use this device easily.

B. Ease of use for doctors end

For the doctors end it is very simple procedure just doctor has to login at the web portal we created . There are many protocols like HTTP(Hyper Text Transfer Protocol) , MQTT(Massage queuing Telemetry Transport) , CoAP(Constrained Application Protocol) and XMPP(Extensible and Presence Protocol). For the monitoring purpose we can use computer/Laptop/Tablet/Mobile etc.

III. Existing System

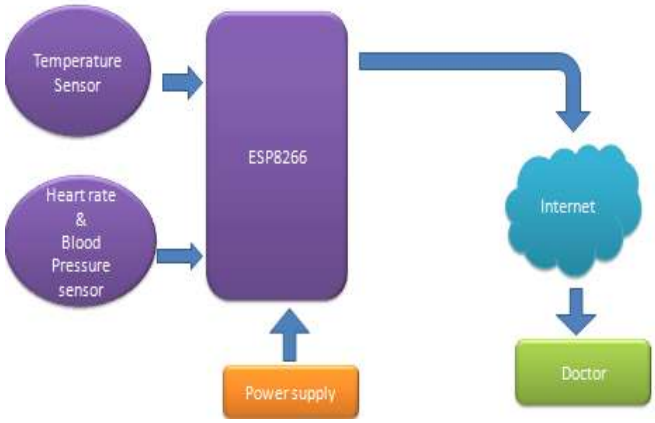
Conventionally for any problem related to health we go throw the clinic. Doctors consult us about our health. Do treatment as per regarding to diagnosis. Sometimes for emergency there are so many problem facing by both

Patient and doctor. If some case like large surgery or Patient under supervision . So that patient have to visit doctors regularly.

Sometime for example like Diabetes patient have to check blood sugar level regularly. So the patient have to go hospital every time. That's why we design this device . By using IoT for healthcare there is no need to go throw doctor for the checkup. All the health parameters like body temperature , heart rate, blood sugar level is monitoring throw over the internet. There is need to visit doctor every time.

IV. Proposed System

Block Diagram



As shown in figure above there are two medical sensors, ESP8266 Development board

[A] Temperature Sensor-Lm35

The LM35 is an integrated circuit sensor that used to measure temperature with an electrical output directly proportional to the temperature (in ºC) .You can measure temperature accurately than a using a thermistor. . The LM35 produced a higher output voltage than thermocouples and may not require that the output voltage be amplified.

Figure 4.3: Temperature Sensor - LM35

The LM35 series are more precision integrated-circuit temperature device with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear

output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy). The LM35-series devices are available packaged in hermetic to transistor packages, while the LM35C, LM35CA, and LM35D devices are available in the plastic TO-92 transistor package. The LM35D device is available in an 8-lead surface-mount small-outline package and a plastic
TO-220 package.

[B] Heart Beat and Blood Pressure sensor

Blood Pressure & Pulse reading are shown on display with serial out for external projects of embedded circuit processing and display. Shows Systolic, Diastolic and Pulse Readings. Compact design fits over your wrist like a watch. Easy to use wrist style eliminates pumping.

Figure 4.5. Heart Beat and Blood Pressure sensor

Features

- Intelligent automatic compression and decompression
- Easy to operate, switching button to start measuring
- 60 store groups memory measurements
- Can read single or all measures
- 3 minutes automatic power saving device
- Intelligent device debugging, automatic power to detect
- Local tests for : wrist circumference as 135195mm
- Large scale digital liquid crystal display screen, Easy to Read Display
- Fully Automatic, Clinical Accuracy, High accuracy
- Power by External +5V DC
- Serial output data for external circuit processing or display

[C] ESP8266 Node MCU

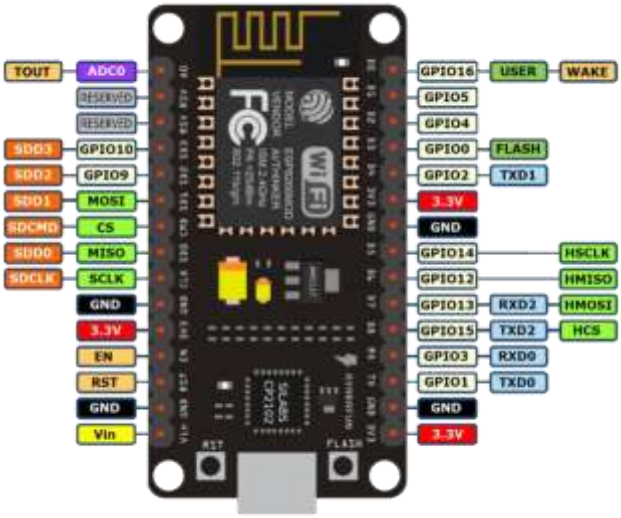
ESP8266 is a less-cost, WiFi Module that use to connect the Internet for Internet of Things(IoT) and same Technology Projects. Basically, our normal Electrical or Mechanical devices cannot connect to the Internet on their own. They don't have the built in system to do same.

We can setup ESP8266 with these devices and do various interesting projects. Controlling, Monitoring, Analysis and much more. Node MCU is a Firmware on ESP8266**.** Its basically an SoC (System on Chip) .A

System on a Chip or System on Chip(SoC) is an integrated circuit that integrates all components of a computer or other electronic systems.

Features

- Node Mcu Lua ESP-12E WIFI Development Board
- Wireless 802.11 b/g/n standard
- Support STA / AP / STA + AP three operating modes
- Built-in TCP / IP protocol stack to support multiple TCP Client connections (5 MAX)
- D0 ~ D8, SD1 ~ SD3: used as GPIO, PWM, IIC, etc., port driver capability 15mA
- AD0: 1 channel ADC
- Input: 4.5V ~ 9V (10VMAX), USB-powered
- Current: continuous transmission: ≈70mA (200mA MAX), Standby: <200uA
- Transfer rate:110-460800bps
- Support UART / GPIO data communication interface
- Remote firmware upgrade (OTA)
- Support Smart Link Smart Networking
- Working temperature: -40 ℃ ~ + 125 ℃
- Drive Type: Dual high-power H-bridge driver



[D] Software used

The software part include an IoT which is needed to program our ESP8266 Board which is Arduino IDE used to upload our final code of maintain our database. All the patients data connected to the sensors is transmit to an MySQL based data base server to observe the patient and timely captured and sensed data, which will help to the doctor as well as patients for better consultation and prescription for the patient. Also these datasets saved in database are used to plot graph for each of the sensors are shown. The server has an option for uploading the database of the patients with their details and their medical history. The data server can be accessed any time by the doctor and the doctor can also see the current live feed of the patient's medical condition. A track of patient's health record is also maintained for future reference on the web portal. The portal also has the option to maintain and track the 24-Hour records of multiple patients. The patient can also see patients medical detail on the web portal of there own. Thus this system proves to be an efficient and robust way to maintain and analyse one's medical record and live track .

Fig 1:- System web portal Login Page

Fig. 2:- System web portal Admin Page

Fig. 3:- System web portal uploading data

V. Conclusion

IOT based health monitoring system can be introduced in a globally with the help of the ESP8266 NODEMCU. The project present here shows better healthcare system nowadays. One of the advantage of it is that it can interface USB.

The ESP8266 NodeMCU is a single computer board with credit card size that can be used for many tasks that your computer does. With comparison with other board ESP8266 Nodemcu is more advanced in terms of cost, speed, features etc. In the highly developing era, where directly or indirectly, everything is dependent on computation and information technology, ESP8266 NodeMCU proves to be a smart, economic and efficient platform .

As the healthcare service is very important part of our society, automating thise service lesser the burden on doctors as well as patient and easy to measuring process. Also the transparency of this system helps patients to trust it. The main purpose of developing monitoring systems is to reduce health care costs by reducing doctors linical visits, hospitalizations, and diagnostic testing procedure. The IoT technology helps the server to update the patient data on website in real time. Many further improvements can be made in our system to make it better and easily adaptable such as adding more advanced sensors. The biometric information of the patient which is stored and published online can be given to scientists and researchers of medical fields to analyze the value and find patterns or for other research work. To simplify the hardware and reduce wiring we can use wireless sensors.

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