IOT Based Smart Health Monitoring System COVID-19 Using NodeMCU

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Abstract— This paper presents the design and implementation of a health monitoring system using the Internet of Things (IoT). In present days, with the expansion of innovations, specialists are always looking for innovative electronic devices for easier identification of irregularities within the body. In particular, COVID-19 patients, high blood pressure patients, diabetic patients, etc., in a rural area in a developing country, such as Bangladesh, do not have instant access to health or emergency clinics for testing. The technical revolution in the region of Internet of Things makes all object interconnected. The concept of IoT has been used in so many fields from Smart Home to Smart City. But the main assistance of IoT in healthcare is just out-of-the-way. Patients are facing a problematic situation of unforeseen demise due to the specific reason of heart problems and attack which is because of nonexistence of good medical maintenance to patients at the needed time. This is for specially monitoring the old age patients and informing doctors and loved ones. This paper proposes an idea of Patient Monitoring System which monitors the real time health parameters of the patient which includes Temperature, Heartbeat, blood Pressure, Sugar Level with the use of different sensors are connected to the NodeMCU. To track the patient health micro-controller is in turn interfaced to a LCD display and wi-fi connection to send the data to the web-server .In case of any abrupt changes in patient heart-rate or body temperature alert is sent about the patient using IoT. To design an efficient Remote Monitoring System, Security is of imperial importance. Therefore the system presents quality healthcare to all patients.

Keywords-Internet of Things(IOT),Temperature & Humidity Sensor(DHT22),Pulse Rate Sensor(Max30100), Body Temperature Sensor(DS18B20)

I. INTRODUCTION

Today Internet has become one of the important parts of our daily life. It has changed how people live, work, play and learn. Internet serves for many purpose educations, finance, Business, Industries, Entertainment, Social Networking, etc. The IoT is connected objects to the Internet and using that connection for control of those objects or remote monitoring. A health care monitoring system is necessary to constantly monitor the patient's physiological parameters. The main advantage of this system is the result can be viewed at any time and place. The doctors can be notified using mobile phones messages if patient health is abnormal. The system was using both the sensors like heartbeat sensor, temperature sensor and blood pressure sensor. The system can analyze the signal to detect normal or abnormal conditions. The blood pressure sensor used to ensure systolic pressure and diastolic pressure and pulse rate for a few seconds. The DHT22 temperature sensor is used to measure the surface temperature of the skin. Heartbeat sensor is used to measure heartbeat which normally lies between 60-100bpm. Usually, patients with heart diseases live at home and ask for healthcare service when they feel sick. In addition, most of the patients die before they get any treatment. Therefore, the key to improve heart diseases healthcare performance and reduce the death rate is turning the passive healthcare mode into a pervasive way. Therefore, the doctor will decide when to deliver healthcare service based on patients' real-time status. The essential part of this pervasive healthcare mode is the real-time monitoring system. In this paper, an IoT based monitoring system is proposed for pervasive

diseases healthcare. Satisfactory work is done in health monitoring by using IoT and NodeMCU . IoT is the interconnecting of devices and services that reduce human intervention to live a better life. In the recent years wireless technology has increasing for the need of upholding various sectors .In these recent years IoT graped the most of industrial area specially automation and control. Biomedical is one of recent trend to provide better health care. Not only in hospitals but also the personal health caring facilities are opened by the IoT technology. So having a smart system various parameters are observed that consumes power, cost and increase efficiency .In according to this smart system , this paper is reviewed.In traditional method, doctors play an important role in health check up. For this process requires a lot of time for registration, appointment and then check up. Also reports are generated later. Due to this lengthy process working people tend to ignore the checkups or postpone it. This modern approach reduces time consumption in the process. In the recent years use of wireless technology is increasing for the need of upholding various sectors .In these recent years IoT groped the most of industrial area specially automation and control. Biomedical is one of recent trends to provide better health care. Not only in hospitals but also the personal health care facilities are opened by the IoT technology. So having a smart system, various parameters are observed that consume power, cost and increase efficiency .In accordance with this smart system, this paper is reviewed. Medical scientists are trying in the field of innovation and research since many decades to get better health services and happiness in human lives. Their contribution in medical area is very important to us and cannot be neglected. The Internet of things is defined as the integration of all devices that connect to the network, which can be managed from the web and in turn provide information in real time, to allow interaction with people they use it. On the other hand, the Internet of things can be seen from three paradigms, which are Internet-oriented middleware, things sensors oriented and knowledge-oriented semantics.

II. PROPOSED SYSTEM

The main purpose of proposed system is to remote various health parameters of patient such as Temperature, Blood Pressure, Heart beat, and sugar remotely. The proposed method of Internet Of Thing based patient monitoring system monitors patients health parameter using NodeMCU. After connecting internet to the NodeMCU, it is connected to Domain Or Host which is pass the data in SQLServer, then data will be printed on our device.
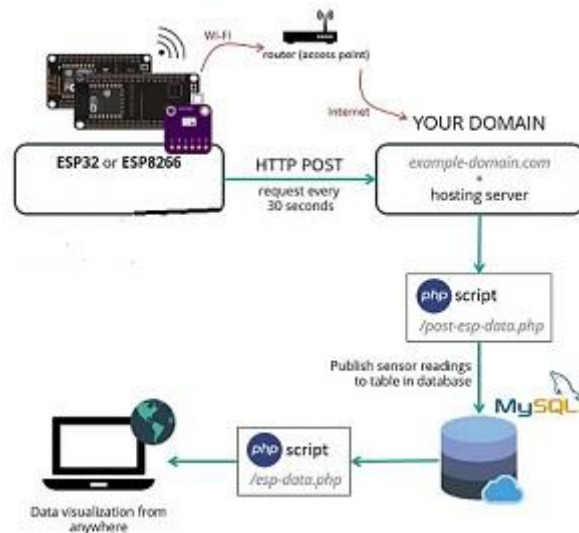

Figure1. Proposed System Architecture

Hardware Used

The sensors are used by proposed system

1 Temperature and Humidity Sensor

The DHT22 is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use but

requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2 seconds old. Simply connect the first pin on the left to 3-5V power, the second pin to your data input pin, and the rightmost pin to ground. Although it uses a single wire to send data it is not Dallas One Wire compatible! If you want multiple sensors, each one must have its own data pin.

Fig 2. Temperature Sensor

2 Pulse Oximeter Sensor

The MAX30100 sensor is used as both a heart rate monitor and a pulse oximeter. These features are enabled by the construction of this sensor which consists of two LEDs, a photodetector, optimized optics, and low noise signal processing components. It is easily used with microcontrollers such as Arduino, ESP32, ESP8266 NodeMCU, etc. to build an efficient heartbeat and oxygen saturation device.
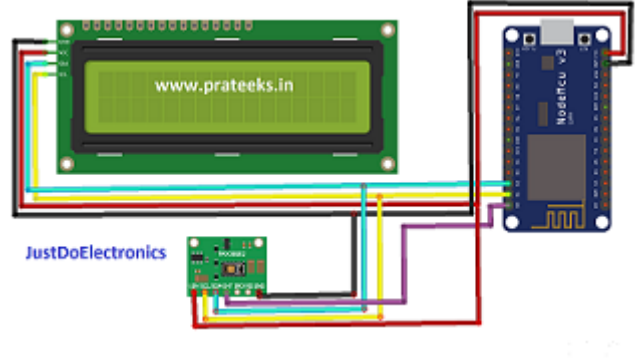
Fig 3. Pulse and Oximeter Sensor

Body Temperature Sensor

It is a temperature sensor that is single wire programmable in nature. It is widely used to measure the temperature of chemical solutions and substances which are present in a hard environment. One of the advantages of using this sensor is that we only require a single pin of our ESP boards to transfer data. Thus, it is extremely convenient to use with the micro-controller as we can measure multiple temperatures by using the least number of pins on our development board.
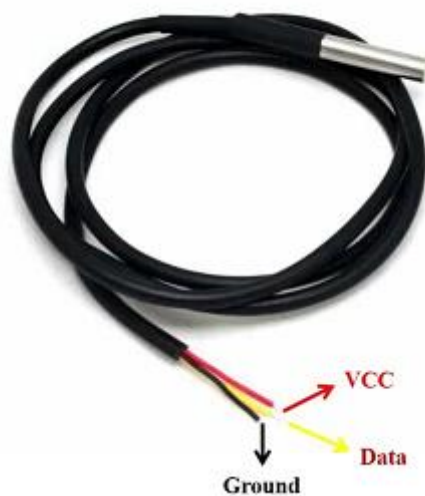
Fig 4. Pin out Cable DS18B20

Room Temperature and Humidity

The BME280 sensor is used to measure readings regarding ambient temperature, barometric pressure, and relative humidity. It is mostly used in web and mobile applications where low power consumption is key. Although there are several different versions of BME280 available in the market, the one we will be studying uses the I2C communication protocol and SPI. I2C means Inter-Integrated Circuit and works on the principle of the synchronous, multi-master multi-slave system. With BME280 and the ESP boards, the ESP8266 NodeMCU acts as a master, and the BME280 sensor as a slave because it is an external device, acts as a slave. The ESP development boards communicate with the BME280 sensor through the I2C protocol to get temperature, barometric pressure, and relative humidity. The connection of BME280 with the ESP boards is very easy.

Fig 5. Pinout Cable BME280 Sensor

MicroController

The NodeMCU is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Express if Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds. However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analog voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the "computer" on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware. This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics.

Fig 6. NodeMCU with ESP8266 Controller

LCD Display

A Liquid Crystal Display or LCD draws its definition from its name itself. It is combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology.

Fig 7. LCD Display

3. Experiment and Result

The experiment was tested using all hardware and software. Following all images showing the result. Results of experiment have been divided into two important sections which are results displaying on LCD display and results stored on database.
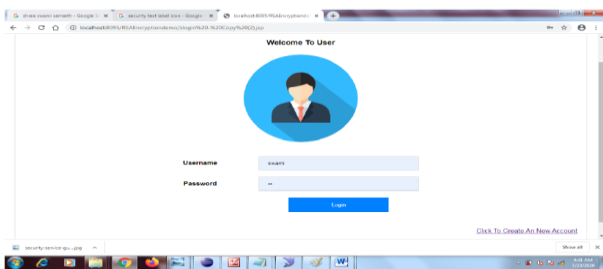

8. Front Page

9. Patient Registration Form

Figure.6.2.2.Login Page

10. User Login Page

11. Patient Login Page

Result

LCD used in this project for display temperature, humidity, oxygen, heartbeat. Database receive data from serial monitor for stored the data in date wise for patient and doctor use.

12. Dashboard

13. After click on dashbord

Conclusion

The proposed system of patient health monitoring keeps track of your patient's health status. With the wide use of internet, this work is concentrated to execute the internet technology to establish a system which would communicate through internet for better health. Specially our system very for people who wants to keep track of their patient health status while at work. And our system is also useful in big hospitals. Hence the present work is done to design an Internet of Things based smart patient health tracking system using an NodeMCU microcontroller. so our system puts forward a smart patient health tracking system that uses internet to inform their loved ones in case of any issues. Our system monitor health parameters of patient such as temperature, blood pressure, heartbeat, Huminity. During critical situations to alert the doctor, the warning message is sent to the doctor using Emergyncy Button.

References
1. Rai S., Patil A., Vardhan V., Marwah V., Pethe M., Pandey I. Best treatment guidelines for bronchial asthma. *Medical Journal Armed Forces India .* 2007;63(3):264–268. doi: 10.1016/s0377-1237(07)80151-1. [PM C free article] [PubMed] [CrossRef] [Google Scholar]
 2. Shalini R., Cholaraju S., Asha M. R., Devi J., Suguna M. K. Easy respire device-dmart asthma management using IoT. *International Journal of Engineering Research and Technology .* 2020;09(5):1186–1188. [Googl e Scholar]
3.https://www.mdtmag.com/article/2011/08/brief-l ook-ecg-sensor-technology.
4. S. J. Jung and W. Y. Chung, "Flexible and scalable patient's health monitoring system in 6LoWPAN," Sensor Lett., vol. 9, no. 2, pp. 778–785, Apr. 2011.