JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Monitoring of Human Health Status

Yashi Srivastava[1], Deepali Gupta[2], Swarnita Shukla[3], Akriti Srivastava[4] Vijit Srivastava[5]

[1,2,3,4] B.Tech Student, Department of Electronics & Communication, UCER Prayagraj
[5] Assistant Professor, Dept. of Electronics & Communication, UCER Prayagaraj
yashisrivastava603603@gmail.com, deepali.gupta1531@gmail.com, swarnitashukla9935@gmail.com, as.akritisrivastava@gmail.com, vijit8@gmail.com

Abstract*— Looking at the scenario nowadays, dealing with pandemics in the past has made the world aware that they need to take certain steps in their way of living and habits. Health monitoring is one such vital thing that could make a difference in the world of health. If handled appropriately, any infectious disease or pandemic can be prevented from increasing and spreading. This kind of device could help in the monitoring and checkup of patients by maintaining proximity to the patient. This device would detect a patient's pulse, temperature, and oxygen level as well as ensure the room temperature and humidity for the patient's sake. Also, in hospitals or nursing homes, these devices could be a one-stop solution for patient monitoring during the pandemic. Regular checkups and proper steps are taken as per protocol may result in the prevention of diseases at risk. This device can also be used for self-monitoring at the same time during the time of home quarantine. The result is displayed on the web server, which is an IoT server used here, and after the detection and result can be accessed anywhere on phones or desktops through the services provided.

***Index Terms*— IoT, DS18B20 Temperature Sensor, MAX30100 Sensor, DHT11 Sensor, Node MCU.**

1 Introduction

Health surveillance is the biggest problem in today's world. The patient faces serious health problems due to a lack of proper health monitoring. There are a lot of IoT devices nowadays for monitoring patient health over the internet. Healthcare technology is very popular in this pandemic situation due to the corona virus. Indeed, with the help of the Internet of Things (IoT), healthcare technology is rapidly revolutionizing. Monitoring the health status of a COVID patient is a daunting task due to our hectic schedules and our daily activities. In general, elderly COVID patients should be monitored from time to time. So we thought of creating an innovative system to automate the tasks in this lockdown. This device uses an ESP8266 web server to track the patient's health using this monitoring system [1]. Therefore, patient health parameters such as body temperature, heart rate (BPM), blood oxygen level (SP02), as well as room temperature and humidity can be monitored from any device (such as a smart phone, PC, laptop, smart TV, etc.), with browsing capabilities. Similarly, to measure body temperature, we use a DS18B20 temperature sensor. Meanwhile, the patient is inside the room. So we also need to monitor the room temperature and humidity level as well. We should keep them in a room with a certain temperature and humidity level so as not to feel uncomfortable. Therefore, we use the DHT11 temperature and humidity sensor. In this project, we will create an IoT-based healthcare monitoring system that records the patient's heartbeat rate, body temperature, and room humidity temperature readings on the web-server IOT server and over the internet from anywhere in the world. Health and health care steps can be taken. Keeping track of the health status of our patients at home is a difficult task due to the busy schedule and work of our daily lives. Periodic monitoring should be done, especially in elderly patients [2-3]. That's why we propose an innovative system that can easily automate this task. Our device puts forward a smart patient health tracking system using web servers to monitor patient health parameters such as body temperature as well as heart rate and blood oxygen level.

We will be using the MAX30100/102 pulse oximeter sensor to measure heart rate and pulse (BPM) as well as blood oxygen level (SPO2). We will use the DS18B20 temperature sensor to measure body temperature. Similarly, the patient should be kept in a room with a certain temperature and humidity level so that he does not feel uncomfortable. To do this, we also need to monitor the temperature and humidity of the room. So we will be using the DHT11 humidity and temperature sensor. The world's population is increasing tremendously. Cities accommodating a large population face the astonishing pressures of urban life. Even though medical resources and facilities in cities are expanded every day, adequate levels are still not achieved. The massive pressure to manage health care in cities has accelerated advances in technologies with appropriate solutions to the growing problems. With the increasing number of people with medical disabilities, remote healthcare has become a part of our lives. In recent years, we have observed an increased interest in wearable sensors, and such devices are available on the market for personal health care and activity awareness at affordable rates. The researchers considered the implementation of such advanced tools for medical applications

for data recording, management, and continuous monitoring of patient health. The Internet of Things provides an emerging technology for achieving the next level of healthcare services [4-5].

It ensures affordable, low-cost, reliable, and easy-to-carry or embedded devices with patients to enable seamless networking between patients, medical devices, and physicians. The sensors will continuously record the signals, which are then correlated with the required physical parameters and communicated over the wireless network. The resulting data is stored, processed, and analyzed along with existing health records. Using available data records and decision support systems, the physician can make a better prognosis so that prompt treatment can be suggested. This analysis enables today's machines to predict health problems even when doctors are not available. Not only is this a prediction, but systematic study of medicinal databases may also enable machines to come up with drugs. Progressive technology will have a transformative impact on the life and health monitoring of every human being. This will significantly cut healthcare costs and go a step further in disease prediction accuracy. In this paper, we present the idea of a service model in technical and economic considerations for patient comfort and also the open challenges in implementing IoT in the real world medical field [6].

2 Methodology

With the proposed system, various sensory information will be recorded and presented to users through an easy-to-use interface. This data can be accessed through the app and shows that the reading is within the standard range. A sensor-based system is proposed that monitors a variety of health parameters, including heart rate, body temperature, humidity, surrounding temperature, and oxygen level (SpO2). Its sensors are connected to the nodeMCU. NodeMCU ESP32 is a microcontroller equipped with a built-in Wi-Fi module. Through a Wi-Fi network, the data are processed and sent by an IoT platform called ESP32 web server by a microcontroller. Using the web server, a caregiver can monitor and visualize data from their Smartphone or web browser [7]. Additionally, the caregiver receives an email alert if the pulse rate reading is abnormal.

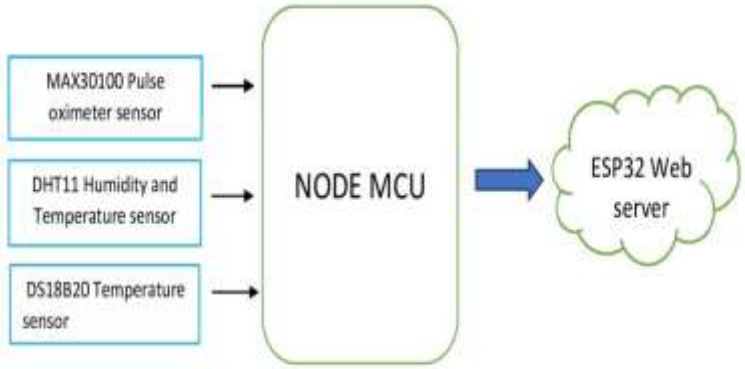

Fig. 2.1: Block Diagram of Health Monitoring System using IoT

As the brain of the entire circuit, the microcontroller acts as the heart of the proposed IOT monitoring system. The work uses a NodeMCU microcontroller to link several peripheral units. Sensors can be directly connected to the microcontroller without requiring any additional components. An external supply powers the device. There are nerves attached to the patient's body. Based on the values taken from the sensors, a control program is written on the microcontroller to determine the state of the connected circuit. As the adjustment between readings varies over time, the system records sensory data and shows it on the display. The used data is sent to the web server through cloud computing where individual data is stored and monitored. To run the program, you need to open the serial monitor after you have uploaded the code to your board. The NodeMCU ESP32 attempts to connect to your Wi-Fi network. The IP address of the ESP will be displayed once it is connected. ESP32 IP address should now be copied and pasted into a web browser[8]. In addition to the room temperature and room humidity, you can find information about your heart rate and blood oxygen level, as well as your body temperature as shown in Fig 2.3.

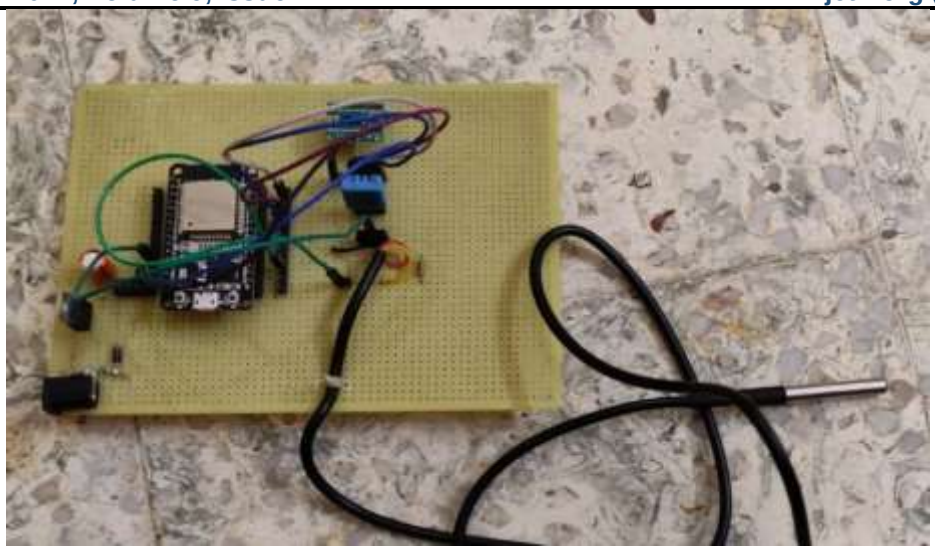

Fig. 2.2: System Prototype

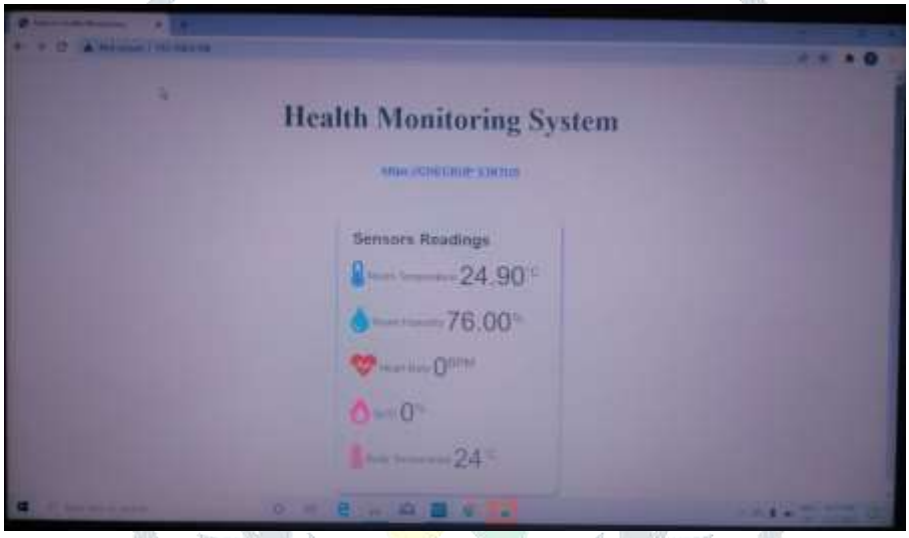

Fig. 2.3: The estimated physical parameters shown remotely

Pulse Oximeter Sensor: MAX30100 is a multipurpose sensor that is used for a variety of applications. Both heart rate and blood oxygen levels can be measured by it. Operating voltage ranges from 1.8V to 3.3V supply. It features two LEDs, one emitting red light and the other emitting infrared light. Infrared light is only required to determine pulse rate. However, both red light and infrared light are used to measure oxygen levels in the blood. When the heart pumps blood, there is more blood, and therefore more oxygen in the blood. During rest, the amount of oxygenated blood decreases as well. The time between the rise and fall of oxygenated blood determines the pulse rate.

Temperature Sensor: The sensor comes prewired and waterproof. Ideal for measurements in wet conditions, or when a distance measurement is needed. A PVC jacket protects the cable. One wire method is used for the communication of this sensor. As a result of its digital nature, the DS18B20 does not suffer from signal degradation over long distances. It can measure the temperature ranging from -55ºC to +125ºC. It can be operated from 3.0V to 5.5V supply. Using a single digital pin on a microcontroller, the sensor works well.

Humidity and temperature sensor: DHT11 Sensor is a low-priced digital humidity and temperature sensor. Capacitive humidity sensors measure humidity and temperature using thermistors. Due to its digital nature, it does not require analog input pins. It can measure the temperature ranging from 0ºC to 50 ºC and humidity from 20% to 90%. It can be operated from 3.0V to 5.5V supply.

3 Results

The system consists of two parts: the hardware and a mobile application. Both parts are essential for the system, and the mobile application allows the user to obtain results. The system was built using the block diagram shown in Figure 1. Figure 2 shows the prototype.

An MCU, MAX30100 pulse sensor, DS18B20 temperature sensor, and DHT11 humidity and temperature sensor are used to implement the system. The mobile application shows the measured pulse rate, SpO2, and body temperature. As a lightweight system

prototype, it is easy to move from one place to another. Additionally, as all components are precisely positioned, the overall result is satisfactory. One of the major components of this system is the mobile app; through this device, users can obtain the results they need. As a result, this system is convenient and user-friendly. The system functioned successfully.
Below is a table of the assume output. The output is shown in the table below. It shows the user's SpO2, heart rate, room temperature, room humidity and body temperature. It is an essential interface for mobile applications because it displays the main results of the system. The sensors worked as expected.

Table 3.1 Result Analysis

Parameters	Person A	Person B	Person C
Room Temperature	22.40(ºC)	23(ºC)	22(ºC)
Room Humidity	64%	64.5%	63%
Heart Rate(bpm)	75	72	74
SpO2	97%	97%	93%
Body Temperature	37(ºC)	36(ºC)	40(ºC)

4 Conclusion

In this proposed IoT-based health monitoring system, patients' heartbeat, blood pressure, and other vitals can be monitored using a mobile monitoring system. A monitoring and control mechanism is used in this project to monitor the heartbeat of the person. The future of the project is to make the design system even more advanced by acquiring remote health care data and implementing an intelligent storage system. This system would be improved by connecting more sensors. This project defines the internet as that can measure various other health parameters and be beneficial for patient monitoring. Setting up a Wi-Fi mesh network to increase the communication range and improve healthcare mechanisms by connecting all the objects to the internet. The functions that can be used in IoT Healthcare Monitoring System can be Body temperature, pulse rate, humidity in the room, and temperature are monitored using sensors, which are displayed on the screen. As soon as these data are received by the individual's smartphone with IoT platform, the values are sent to the doctor, and then the doctor diagnoses the disease and the state of health of the patient can better be assessed. IoT in the medical care industry has incalculable advantages. In any case, the most significant is that treatment results can be fundamentally improved or amplified, as the information assembled by IoT medical services gadgets is exceptionally precise, empowering informed choices. Well-being offices and specialists will be equipped for limiting mistakes since everything patient data can be estimated rapidly and shipped off a leading body of specialists or a medical services cloud. Artificial intelligence-driven calculations running on these IoT gadgets could likewise assist with settling on understandable choices or ideas in light of existing information.

5 References

.

[1] Viswanathan H, Lee EK, Pompili D (2012)
[2] Sun Q, Li H (2011) Research and application of a UDP-based reliable data transfer protocol in wireless data transmission
[3] Duggal R (2003) Urban healthcare-issues and challenges
[4] Andriopoulou F, Aguilas T, Orphanides's T (2017).
[5] https://ieeexplore.ieee.org/document/8441708/references#references
[6] https://advances.massgeneral.orgcardiovasclar/vieo.aspx?id=10 61
[7] Andriopoulou F, Dagiuklas T, Orphanoudakis T (2017) Integrating IoT and fog computing for healthcare service delivery. In: Keramidas G, Voros N, Hübner M (eds) Components and services for IoT platforms. Springer, ChamGoogle Scholar
[8] Kahn JG, Yang JS, Kahn JS (2010) 'Mobile' health needs and opportunities in developing countries. Health Aff (Millwood)