IoT BASED MODERN HEALTHCARE SYSTEM

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Abstract. Healthcare is given extreme priority nowadays by every country because of COVID-19. Because of the huge cost of medical care, every country today prioritizes it. The IoT has emerged as a result of developments in world and communication technologies. IoT technologies, which are used in a variety of medical domains such as real-time monitoring and patient information management, provide ease to doctors and patients in today's healthcare environment. Body sensor networks are one of the newest IoT technologies in the healthcare sector, where a patient is constantly monitored and diagnosed using a collection of lightweight wireless sensor nodes. Diverse distributed device will aggregate, analyze and it will communicate instantaneously medical information's to the cloud, allowing for the collection, storage, and analysis of large amounts of knowledge in numerous different forms and activating contexts. The proposed system in this paper is more efficient and secured way. The doctor can review the data easily and can monitor the patient.

Keywords: Sensors, Internet of Things, Blynk Application,Body Sensor Network.

1 Introduction

A platform where various dispersed devices has to accumulate, analyse and communicate to the cloud environment instantaneously which is known as implementation of IoT in Healthcare environment. Vehicle/Asset monitoring, vehicle parking management, water leakage, oil leakage, monitoring of energy in the grid are the some of the examples of remote monitoring systems. Health is a complicated system that must be constantly monitored. The health system has been dealing with a range of hospital admission concerns as a result of a higher incidence

of patient access to hospitals. To attain this purpose, a program for human health services is being developed. The technology allows routine monitoring of a patient's metabolic parameters, as well as disease diagnosis based on the various data's collected from the various sensor networks connected in the body. A continuous health monitoring program is required due to sudden deaths because of chronic heart disease/high blood pressure or due to covid. However, because the system connects gadgets to the internet, it creates a seamless network, which exposes users or patients to cyber-related risks. The advancement in IoT health monitoring system is the patient management devices. Various sensors have been used in our system to measure patient parameters such as SPO2(Oxidation level), temperature of the patient, heart rate of the person, pulse rate, and fall detection among others. The section of this paper is organized as below: Section I continues with the introduction and the existing system which are available in the present situation. Section II explains the proposed system along with its merits and demerits. Section III discusses the block diagram of the project. Section IV says about the hardware implementation of the entire setup. Section V describes the hardware components. Section VI and VII conclude with the experimental setup and output.

2 Existing Methodology

The world's population is rapidly increasing. Cities that are undergoing rapid population growth are facing significant urban living pressures. Despite constant expansions of medical resources and facilities in cities, sufficiency has yet to be attained. The tremendous demand on city healthcare administration has led technology innovation to find appropriate solutions to the rising problems in the current plan, where direct hospital visits for all illnesses cause some pain for both patients and doctors. Patients can have to wait longer to see the doctor. In this pandemic case, it often takes longer to see a doctor for advice and medications. As a result, it is painful for patients to wait for extended periods in hospitals. That is a significant disadvantage for patients. To escape these issues, we suggested an IOT-based modern healthcare system.

2.1 Drawbacks of the Existing System

As a result, people are forced to wait in hospitals for long periods. For patients, this is a huge disadvantage. Because doctors work with their patients' sensitive information, privacy is a primary issue. Humans should have confidence that this information will remain private. Viruses are abundant on the internet nowadays, and they can infect any operating system, as well as IoT apps in the healthcare area.

3 Proposed Solution

In the proposed method, we have to design and build an IoT based latest health care system that collects and stores data from the various numerous sensor connected to the human body and stores it in the cloud environment. The sensors are embed in the patient's body to measure the patient temperature, heartbeat, and oxidation level. The fall detection sensor is fixed it will send the message to the caretaker's mobile number that alerts the person when the patient gets to fall outside. These sensors are linked to a control unit that adds up the values of all four sensors. These calculated values are subsequently sent to the cloud via NodeMCU. NodeMCU consists of a light weight low power various wireless sensor nodes that is used to track the human physiological functions.The information is shown on a web server as well as the Blynk application. The doctor can determine the status of the patient based on the temperature, heartbeat values, and oxidation level of the patient. The display shows the oxidation level of the patient as well as the temperature of the patient in Fahrenheit. The doctor can easily diagnose the patient with the help of the records obtained from the server.

3.1 Advantages of the Proposed System

With IoT, patient monitoring can be done in real-time, reducing the need for doctors to go out and make visits. IoT devices involve physical objects that have sensors attached to them such that the data about the current activities of the person to whom it is attached can be monitored through the use of a sensor and transferred to a remote server for further analysis. Professionals may keep an eye on people who are either in the hospital or going on their everyday lives Connected home care facilities will also aid in the reduction of hospital stays and re-admissions. It enables patients to be monitored in the privacy and comfort of their own homes. Sensors are attached to the patient body so real-time data will be generated all the time. IoT devices can collect and analyze massive amounts of data in a short time, they have a high potential for use in medical research.

The Block diagram for the implementation of the hardware is shown in figure 1. A sensor like MAX30100 which is the combination of pulse oximetry and heartbeatmonitor it senses the oxidation level of blood and heartbeat rate and the temperature sensor measures the temperature of the patient sends the recorded data to the Node MCU and it gets processed the data are uploaded to cloud and we can access the data by using Blynk application and thing speak and the data will also be displayed

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in the OLED display. The fall detection sensor senses the position parameters of the body if the person gets falls**.**

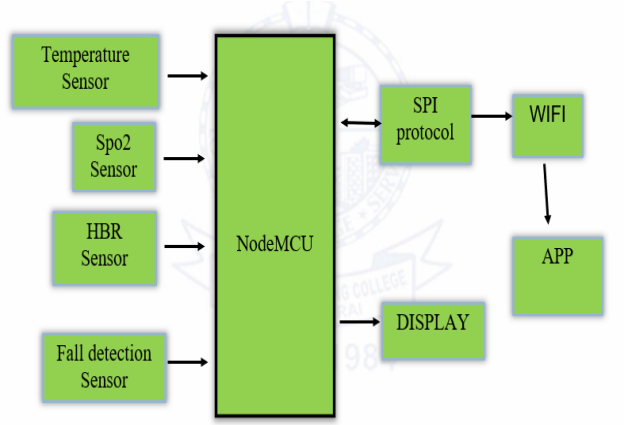

Fig.1 BlockDiagram

4 Hardware Implementation

The hardware components used in this project is NodeMCU, temperature sensor, MAX30100, Fall detection sensor. Blynk application is used to store data in the cloud. The various sensor is located in the fingerprint it calculates the information of the patient and the data are transmitted to the webserver and is shown in the Blynk application and the Thingspeak website where information is shown we have a secure password to access

4.1 Max30100 Sensor

MAX30100 sensor has a integrated pulse oximeter and a heart - rate monitor. MAX30100 sensor is an optical sensor which will measures the absorbance of pulsating blood through a photodetector after emitting two wavelengths of light from different LED's: a red one and an infrared. This LED color combination is ideal for reading information with the tip of human finger. The output data which is in digital form is stored in a 16 deep FIFO within the same device and it will be fully customizable through the software registers in the device. It includes an I2C digital interface that allows the communication with many microcontrollers. Ambient light cancellation (ALC), a 16-bit sigma-delta ADC, and a proprietary discrete-time filter make up the pulse oximetry subsystem of the MAX30100. It operates at ultra-low power, making it perfect for battery-powered devices. The MAX30100 requires a power supply that is between 1.8 and 3.3 volts.

4.2 NodeMcu

The NodeMCU (Node Microcontroller Unit) is an open software and hardware project based on the ESP8266, a low-cost System-on-a-Chip (SoC). The ESP8266 was developed by Espressif Systems and features major computer components like a CPU, RAM, networking (Wi-Fi), and even current operating systems. On the NodeMCU, the data and program are stored in 128 KB RAM and 4MB of ROM. ESP8266 is a high processing power, built-in Wi-Fi, and Deep Sleep Operating features, the ESP8266 is ideal for a wide range of IoT projects. The ESP8266 is mainly used in IoT device development area, applications which require battery operation with low power applications, and various I/O interfaces such as Wi-Fi, Bluetooth, etc The hardware setup of the entire project is shown in figure 2.

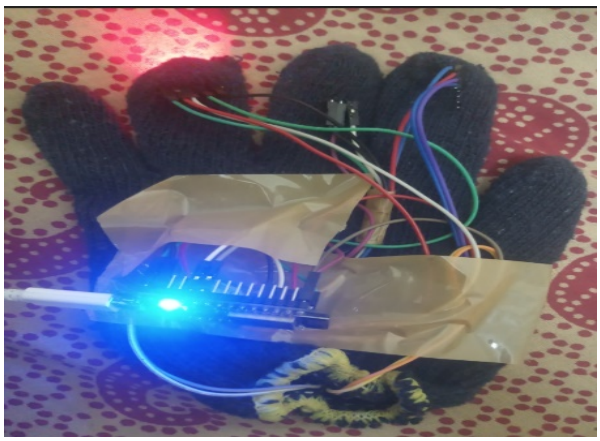

Fig.2 Hardware setup

The figure 2 shows the hardware setup of the project in which the various components are fixed at the backside of the gloves.

5 Result and Discussion

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The sensors are placed in their respective position in the gloves. Sensors of the glove are connected to the Node MCU microcontroller and the data is transmitted through Wi-Fi and is received by the web page and app servers, where the results will be displayed.

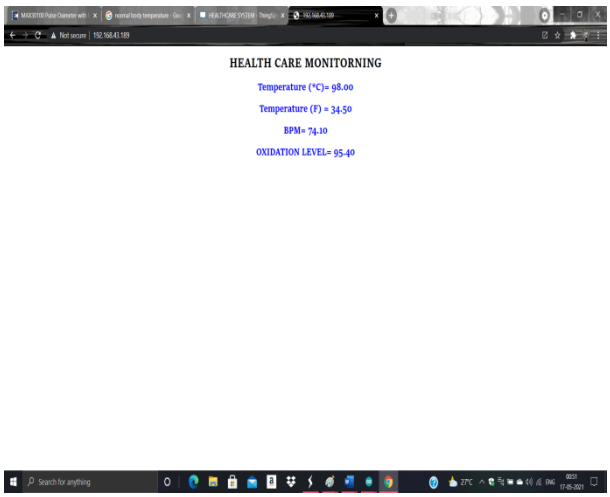

Fig 3. Output From IP Address

The figure 3 shows the output response of the webserver.

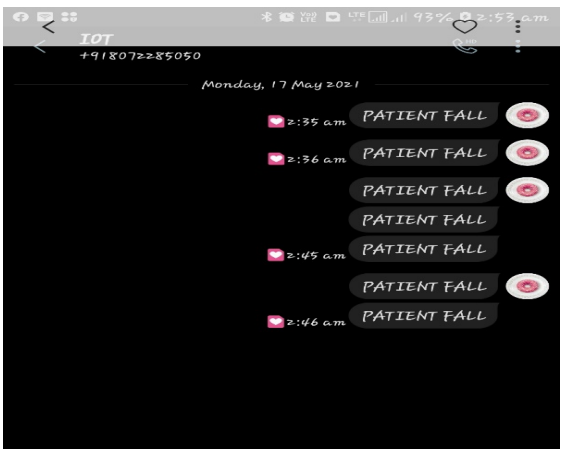

Fig.4 Message received when the person falls

The figure 4 shows the output message received by the caretaker when the person falls.

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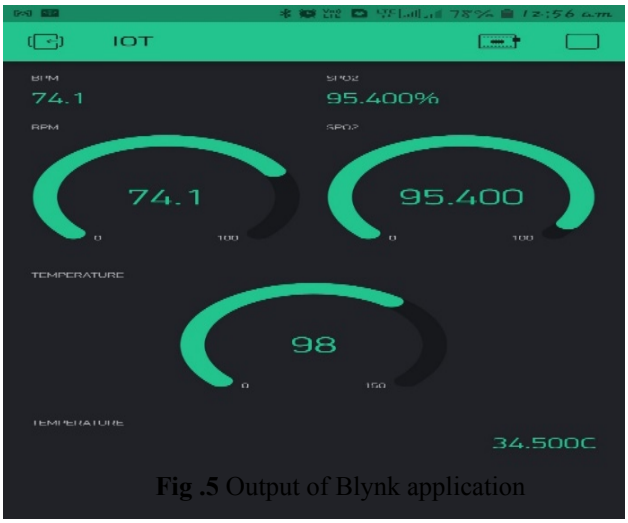

Fig .5 Output of Blynk application

The figure 5 shows the output response in the thing application

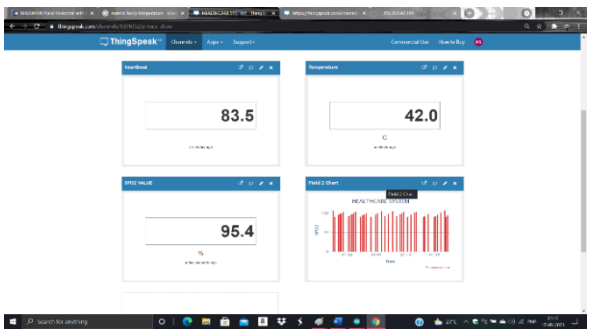

Fig .6 Output of Think speak web

The figure 6 shows the output response in the webpage.

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6 Conclusion

The importance and benefits of incorporating IoT into remote health management systems is important to monitor the patient health. The IoT-enabled lightweight sensors would have a significant impact on any patient's life, assisting them in reducing their fear of danger while they are away from home and their physician. The sensory information might be gathered at home or work. The Internet of Things (IoT) was created to detect and mitigate data breaches, as well as to enable secure storage for personal health information. As a result, IoT-based healthcare, whether in the form of wearable devices, services, or databases, has become increasingly popular.

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