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IOT BASED PATIENT HEALTH MONITORING SYSTEM USING ESP8266 AND ARDUINO

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ABSTRACT

We are utilising the internet of things to monitor several characteristics of the patient in this project. The real-time parameters of a patient's health are transferred to the cloud via Internet connectivity in the patient monitoring system based on the Internet of things project. These parameters are transmitted to a distant Internet site where people can access them from any point on the planet. We demonstrate a multi-parameter wearable sensor system that works in tandem with the Internet of Things to provide real-time, unobtrusive monitoring of core body temperature and heart rate. Clinical study demonstrating the importance of sustaining precise measurements of core heartbeat and body temperature in the ambulatory environment and during activity to examine human thermoregulation. On the other hand, for initial diagnosis and survival analysis of cardiac disorders, the ECG remains the gold standard. We use a wireless multisensory system to monitor the tympanic temperature of the body as well as the pulse of the heart. The behind-the-neck gadget allows the patient to move about freely while measuring heartbeat without wearing a chest band. For data transmission and display, the suggested gadget is wirelessly linked to a computer. This device not only provides real-time access to the core temperature and beating of the heart, but it can also be managed by the patient, who may remove and reapply the device at any moment, therefore improving the performance of personal health apps.

Keywords: Wireless Body Area Networks (WBAN), Thinkspeak, Sensor Network, Temperature Sensor, Pulse Rate Sensor.

I. INTRODUCTION

With the fast advancement of wireless technology, new creative concepts are emerging that allow for continuous real-time remote patient monitoring of expanding healthcare services using small wireless body sensors. Critical bodily measures like heart rate and temperature are extremely important in assessing a patient's overall health. In especially for epilepsy, heart attack, fever, cold, sleep apnea, and heart failure, continuous remote monitoring of these vital indicators can play an essential role in identifying the patient's condition. ECG monitoring is a common diagnostic method used to determine whether or not a patient has a cardiac condition. The human body's core body temperature (CBT) is a well-known physiological indication. It is linked to a number of clinically diagnosed diseases, particularly in the characterization and diagnosis of human sleep disorders in order to estimate the circadian-system, which is a 24-hour cycle in biological processes, and CBT monitoring is a broad area of research for human thermoregulation applications. Another vital indicator used to diagnose illnesses such as sleep apnea is oximetry, which is monitored using a device. This research intends to enhance the system by offering wearable sensors that wirelessly send integrated biological data to a computer and monitor ECG and temperature data in real-time. Because most traditional methods collect data from multiple parts of the body, each data point is collected independently. We, on the other hand, created a smart sensor system that makes sensor fusion easier. Furthermore, motion artefacts are less noticeable in this design. This option will provide patients more options in the future, as well as physicians access to physiological data in real time. Two sensors are used in IoT patient monitoring. The temperature sensor is the first, and the heartbeat sensor is the second. This technology is extremely beneficial since it allows doctors to check patient health metrics simply by going to a website or URL. In addition, several IoT apps are being developed these days. As a result, the doctor or family members may now use their mobile phones or computers to monitor or track the patient's health.

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Fig.1. System architecture

This initiative is vital in several ways because, in today's society, many lives are impacted every day because patients are not treated promptly and effectively. In clinics and hospitals, as well as in real time, parameter values are not accurately monitored. It might be challenging for hospitals to keep track of their patients' status on a regular basis. It's also tough to keep track on ICU patients on a continuous basis. Our method is useful in dealing with these sorts of problems. Our system may be used to measure and monitor different parameters such as temperature, ECG, heart rate, and blood pressure in both hospitals and homes. Arduino may be used to record the findings. Doctors can also view the results on their mobile or desktop devices. In addition, the system will send an alarm signal to the doctor. Our technology may be used to track the health of any individual by simply plugging in a device and recording the data.

II. METHODOLOGY

The smart sensor platform was developed to experimentally combine 2 different body sensors and monitor vital parameters on the computer. The main characteristics of the proposed system are to integrate and monitor ECG and temperature and to communicate to doctor by using IOT connection. The ECG and tympanic sensors for displaying the physiological data are integrated in the form body. Max30100 sensor will be attached onto the finger and it will be connected to the Arduino. Within the system design prototypes, each of the biosensors will be tested independently. Our system is made up of both hardware and software components. The system's hardware consists of the following components: We utilize an Arduino and ESP8266 as the primary controller, a temperature sensor to detect core temperature, a pulse oximeter detection module MAX30100, and a wireless IOT device. The multi-parameter body monitoring system is depicted in Figure 2 as a block diagram. The following components make up the system's software: Arduino is used to control different sensor hardware components as well as link to IoT devices (computer). Python is a versatile programming language that may be utilized in a variety of situations. In this example, the Arduino IDE programme is utilized.

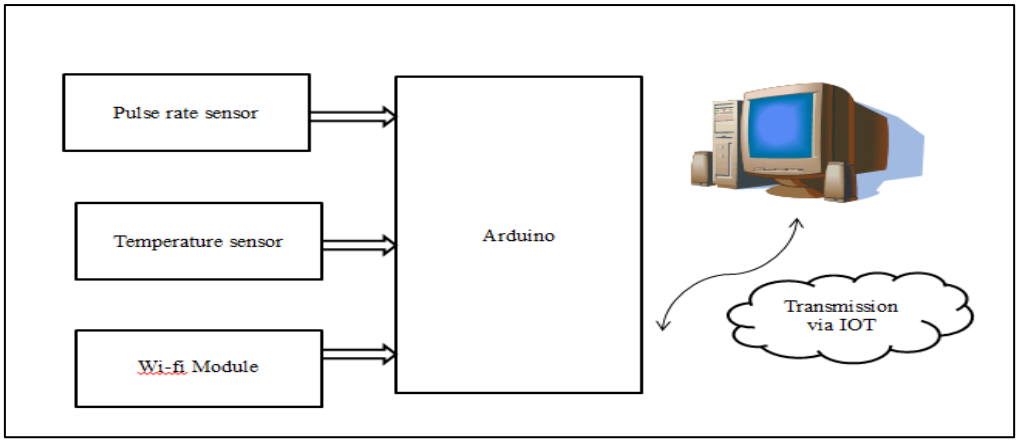

Fig.2 Block diagram of design System

III. DETAILS OF HARDWARE AND SOFTWARE REQUIREMENT

1. Hardware Requirement

A. Heart rate monitoring

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The MAX30100 is a sensor that combines pulse oximetry with a heart rate monitor. It detects pulse oximetry and heart rate signals using two LEDs, a photo detector, improved optics, and low-noise analogue signal processing. The MAX30100 uses 1.8V and 3.3V power supplies, and it may be shut down by software with very little standby current, allowing the power supply to be connected at all times.

B. Temperature sensor

The DS18B20 digital thermometer measures temperatures from 9 to 12 bits in Celsius and includes a nonvolatile alarm function with user-programmable higher and lower trigger points. The DS18B20 connects with a central CPU using a 1-Wire bus, which requires just one data line (and ground) by definition. Furthermore, the DS18B20 may draw power directly from the data line ("parasitic power"), obviating the requirement for an additional power supply. Each DS18B20 has its own 64-bit serial code, allowing many DS18B20s to share a single 1-Wire bus. As a result, controlling a large number of DS18B20s with a single CPU is straightforward.

2. Software Requirement

A. Python

Python is one of the few languages that can be both simple and powerful at the same time. You'll be pleasantly pleased at how simple it is to focus on the solution to the problem rather than the syntax and structure of the programming language you're using.

IV. RESULTS AND DISCUSSION

These devices, or things, connect to the network to provide information they gather from the environment through sensors, or to let other systems to reach out and act on the world through actuators. A gateway allows devices that are not directly connected to the Internet to access cloud services. Each device's information is transferred to Cloud Platform, where it is analysed and integrated with information from other devices. Sensor recording apps, location tracking apps, and a social network of items with status updates are all possible with Blynk. Blynk is an Internet of Things (IoT) platform that allows you to gather and store sensor data in the cloud while also allowing you to create IoT apps. The BlynkTM iot platform includes applications that allow you to study and display data in MATLAB before taking action. Sensor data may be transmitted to Blynk through Arduino, and the source of truth is maintained by the application code running on the device. Blynk was created with the Internet of Things in mind. It has the ability to manage hardware remotely, show sensor data, save data, visualise it, and perform a variety of other amazing things.

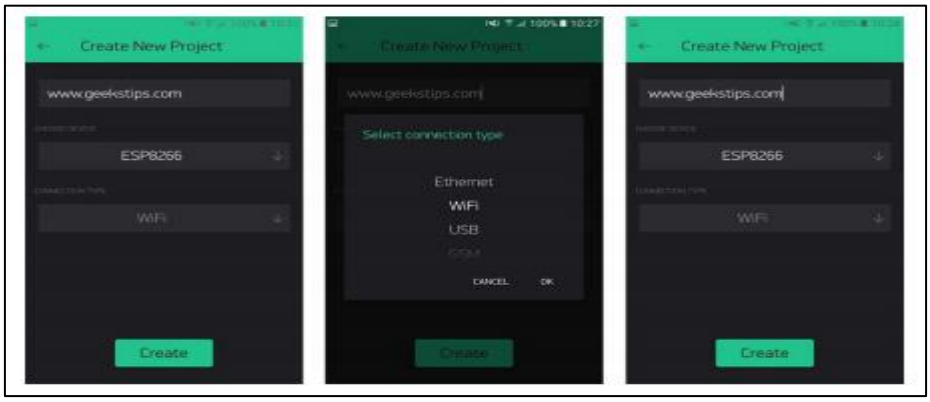

Fig.3. Screenshot of blynk

Analysis and discussion are carried out throughout the preparation of the final project to guarantee that the project outcomes are in the desired state without generating any difficulties. An ideal design in terms of material consumption, cost, and flawless production techniques is determined, selected, and produced through project analysis. The focus of the study is on the project's features, issues faced, and material costs, such as the price of raw materials utilised, tests done, and other items involved.

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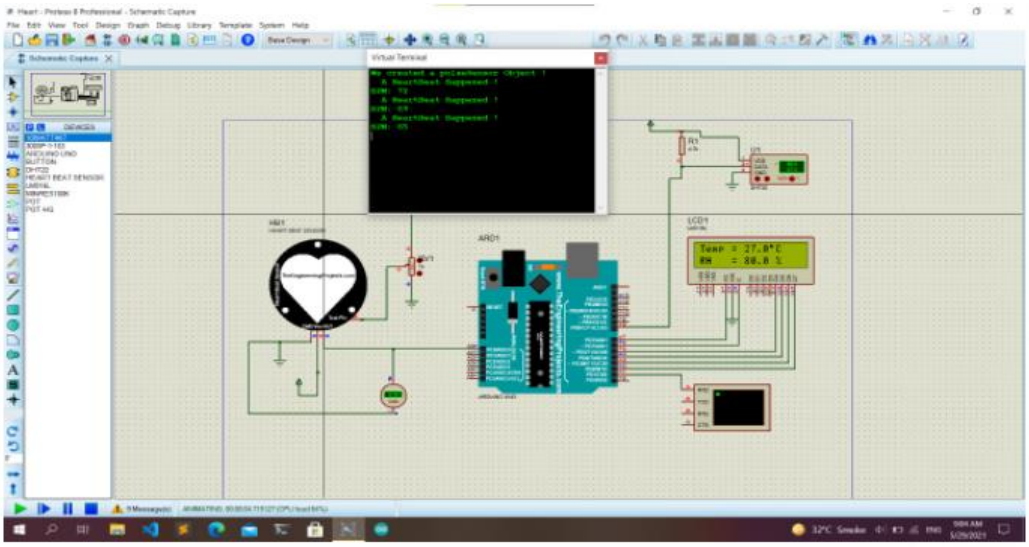

Fig.4. Simulation of designed system

V. CONCLUSION

We've presented a smart sensor system that collects various physiological data and constantly monitors IOT, allowing patients to have real-time data management. This gadget comprises nonintrusive sensors with excellent accuracy, such as an ECG and a temperature sensor. Furthermore, it simplifies the challenges of wearable technology by removing the need for invasive equipment or the use of a laptop to see biological data, allowing patients to have far less restrictions. In the future, this smart sensor system may be combined with a wide-area network system to allow physicians and healthcare professionals to access patient data for more accurate and faster diagnosis and treatment choices.

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