To Measure Heart Rate and Blood Oxygen using ESP8266

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ABSTRACT

Pulse oximetry data such as peripheral oxygen saturation (SpO2) and heart rate are important indicators for the early detection of heart disease. Due to poor care, late detection, slow diagnosis and expensive equipment, continuous monitoring of the patient's health status is limited. Patients die from various causes. In this research, we present an improved pulse oximetry system for remote monitoring and management. As a solution, we devised a patient health monitoring system that will keep track of many patient health components. The system is light and its construction is cheap. This system can also control oxygen levels in the body. Pulse oximeters can tell the difference between oxygenated and deoxygenated hemoglobin and can only detect oxygen saturation in the arterial compartment of the blood. A NODE MCU board is used to build this device. And the gadget will be connected to WiFi, through which data will be delivered to the Blynk cloud platform via the Internet. With which the data can be viewed at any time and from any place..

KEYWORDS: BloodOxygen,BPM,ESP8266,Internet of things, NODE MCU, Blynk.

1.INTRODUCTION

In order to realize the need for medical technology at home, new personal medical devices (PHD) are regularly released these days. A PHD is a device that collects information about the wearer's health, such as a pulse oximeter, activity monitor, or medication reminder. The pulse oximeter, which measures pulse oximetry data (eg, peripheral oxygen saturation (SpO2) and heart rate) and is one of the most important PHDs for the early identification of heart disease, has become one of the most important PHDs among numerous PHDs. .

For many years, pulse oximeters have been used in medical facilities. A person's oxygen level can be unstable in many situations, including surgery, intensive care, the emergency room, and even in a depressurized airplane. This project is an attempt to build a functional pulse oximeter from an inexpensive collection of components, including a microprocessor. This gadget requires an infrared emitter and a red light emitter. Between these wavelengths, the absorption of oxyhemoglobin and the deoxygenated form varies dramatically. Consequently, the percentage of arterial hemoglobin can be calculated using the ratio of the two absorbance values.

With the help of modern technologies such as IoT, we have been able to develop a patient health monitoring system that is capable of monitoring heart rate and oxygen levels, and with the help of IoT technology, we have been able to facilitate the monitoring of patient health parameters through the Internet anytime, anywhere .

Below are some of the applications of the project: 1) Athletes can use this device to monitor heart rate and blood oxygen levels during exercise. 2) Monitor health indicators. 3) Monitor the patient's health status via the Internet. 4) To prevent and limit risks for patients. 5) Monitor a person's health regularly if they have a condition such as a heart attack. Lung cancer, anemia and asthma can be treated at home.

2. Literature Survey

1. The research is based on heart problems in which he used IOT technique and raspberry pi which is very useful for cardiovascular disease. In this research he used an IOT device which works on GSM technology, if there is a problem in the heart, then the specific person will be informed using the GSM module or through the internet, because nowadays the internet is available everywhere in the world. It is a type of system that is divided into two parts, one is hardware and the other is
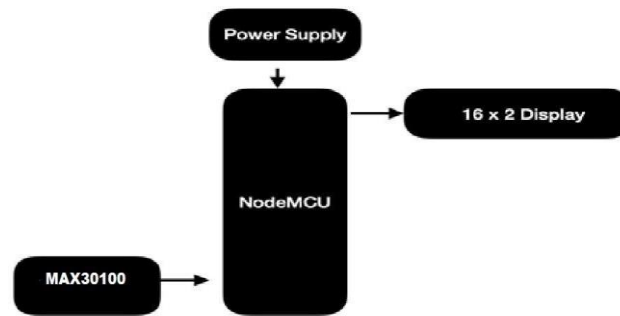
software.[1]

2.Research on a real-time monitoring system for cardiac patients, in which they used smartphone technology and an oscillating sensor that will measure the reading of the human heart. The sensor will measure the measured temperature of the heart rate and will be controlled by a mobile remote control, the information through the wireless system and the location will also be traced by the doctor and then the ambulance will send for treatment.[2]

3. Research on IOT based system which is very useful for elderly people because the daily heart problem of elderly people is a common disease. In our research, he introduced a wearable monitoring system. It used ESP8266 Node MCU and LM35 temperature sensor and SEN-11574 heart rate sensor. In this research, I found that the response of the sensor is not fast and the cost of the whole system is so high.[3]

4. In this research paper, a basic IOT system that measures heart rate by connecting an Android smartphone. They added an Arduino Uno board, an IR sensor and an ESP8266 Node MCU to our model design, then after connecting with a smartphone and reading the heart rate on the LCD screen and using a WiFi module, they sent the data to a specific doctor. But in this research, I found that the size of the Arduino Uno board is not small and the price is high, and it only measures the human heart rate, not the oxygen level.[4]

Oxygen saturation is an essential element of patient treatment. Oxygen is tightly regulated inside the body, as hypoxemia can cause many premature effects on one's own organ systems. These include our brain, heart and kidneys. Pulse oximetry is universally used to monitor critical care oxygenation in people who have serious health problems. By alerting physicians to the presence of hypoxemia in advance, pulse oximeters can lead to faster treatment of severe hypoxemia and usually avoid serious complications. Pulse oximeter technology has also expanded from SPO2 and PR-BPM measurement to measure other hemoglobin species using multi-wavelength analysis and suggests the use of a reflex type oxygen saturation measurement system. IoT plays a vital role in the healthcare industry in improving the accuracy, reliability, capacity and efficiency of electronic devices.

3. Block Diagram

• Our project has two LEDs, one of which emits red light and the other emits infrared light. Only infrared light is needed for heart rate. Both red and infrared light are used to measure oxygen levels in our body.

• When the heart pumps blood, there is an increase in oxygen-rich blood, resulting in more blood. Once the heart releases a volume of oxygen-rich blood, the heart rate is calculated.

• Oxygenated blood absorbs more infrared light and transmits more red light and infrared light. This is the main function of the MAX30100; monitors the absorption levels for both light sources and stores them in a buffer that can be read by the IC.

4. METHODOLOGY

We came across the problem of the drop in oxygen levels during the COVID-19 outbreak and started looking for a solution. We started by looking at the requirements. We discovered the kinds of sensors needed to meet the criteria, as well as their alternatives. The MAX30100 was chosen because its characteristics matched the system requirements. Finally, the output is displayed on LCD16x2. In addition, the blynk app is used to display data on mobile phones.

5. RESULTS

The physical circuitry of an IoT-enabled pulse oximeter includes components such as a power regulator, a transformer, a node microcontroller, and an ESP8266 module.
The proposed design displays real-time statistics such as the patient's heart rate and oxygen saturation.

This will be linked to the Blynk smartphone app to help doctors and patients' families understand the situation.

6. CONCLUSION

A large number of patients die during this time. Keeping records of up-to-date patient data has become vital for medical staff and patients' families.

With the support of the Blynk IoT platform, it can be easier to keep track of live data, store patient history and display at the same time. This device will also be less bulky and can be manufactured and sold at a low cost, meeting the criteria of being an easy-to-use, reliable and portable device that can be produced in large quantities at a low cost.

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