**Patient Health Monitoring System Using ESP32 & Webserver**

**Abstract**

This project presents a comprehensive patient health monitoring system utilizing an ESP32 microcontroller interfaced with various sensors and a webserver for real-time data visualization and alert management. The system monitors vital health parameters, including heart rate and SpO2 using the MAX30100 sensor, body temperature using the DS18B20 sensor, and room temperature and humidity using the DHT11 sensor. Additionally, it controls the room temperature through a relay system, which activates a heating mechanism when the body temperature falls below 37°C.

**System Components**

**ESP32**: Central controller for processing and communication.

**MAX30100**: The MAX30100 is an integrated pulse oximetry and heart-rate monitor sensor. It uses photodetectors, LEDs, and low-noise electronics with ambient light rejection to derive the heart rate and SpO2 levels.

**DS18B20:** The DS18B20 is a digital temperature sensor with high accuracy and a wide operating temperature range. It measures the body temperature of the patient and provides data via a 1-Wire interface.

**DHT11:** The DHT11 is a basic, low-cost digital sensor for measuring temperature and humidity.

**Relay Module:** A relay module is used to control external devices. In this system, it activates a heating mechanism when the body temperature drops below 37°C to ensure the patient remains in a comfortable and safe temperature range.

**Algorithm :**

1)Initialize ESP32, sensors, and webserver.

2)Continuously read data from MAX30100, DS18B20, and DHT11.

3)Display data on the webserver.

4)Check if body temperature (DS18B20) is below 37°C.

If true, activate the relay to turn on the heating mechanism.

If false, deactivate the relay.

5)Update the webserver with the latest data and system status.

**Results and Discussion :**

The system was tested in a controlled environment to monitor its performance. The ESP32 successfully read data from all sensors and displayed it on the webserver. The relay activation based on body temperature conditions was reliable, ensuring that the patient's environment was maintained within safe temperature limits.

**Bill of Material :**

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| --- | --- | --- | --- |
| **S. No.** | **Materials** | **No. of Items** | **Cost** |
| 1. | ESP 32 | 1 | 550 |
| 2. | MAX30100 Sensor | 1 | 250 |
| 3. | DS18B20 (body) Temperature Sensor | 1 | 150 |
| 4. | DHT 11 Sensor (room)  Temperature and Humidity | 1 | 150 |
| 5. | Relay | 1 | 120 |
| 6. | Filament bulb with holder | **1** | 230 |
| 7. | Jumper Wires | As required |  |
|  |  | **TOTAL** | 1500 |

**Circuit Diagram :**

