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IOT BASED HEALTH MONITORING SYSTEM

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ABSTRACT

This project focuses on developing a smart health monitoring system using IoT technology. The system is designed to measure important health parameters such as heart rate, temperature, and oxygen levels using sensors. The collected data is sent to the cloud, which allows doctors to monitor the patient's condition from anywhere. If any abnormal value is detected, alerts are sent immediately. This system helps reduce hospital visits and improves patient safety by enabling continuous monitoring.

KEYWORDS: Internet of Things (IoT), Health Monitoring System, Remote Patient Monitoring, Sensors, SpO_2, Cloud Computing, Real-Time Monitoring, Smart Healthcare.

1. INTRODUCTION

The Internet of Things (IoT) has brought major improvements in the healthcare field by enabling smart and continuous patient monitoring. In traditional healthcare systems, patients need to visit hospitals regularly for checkups, which may not always be convenient or efficient. To overcome this issue, IoT-based health monitoring systems are used to track important health parameters such as heart rate, body temperature, oxygen saturation (SpO_2), and ECG in real time using sensors and microcontrollers. The collected data is transmitted to cloud platforms through Wi-Fi, allowing doctors and caregivers to monitor patient health remotely. In emergency situations, the system can send instant alerts, helping in faster medical response and better patient care. This project provides a cost-effective, reliable, and efficient solution for modern healthcare monitoring.

2. PROBLEM STATEMENT

In the current healthcare system, continuous monitoring of patients is challenging, especially for elderly people and patients with chronic illnesses. Traditional healthcare methods require frequent hospital visits, which can be time-consuming, costly, and inconvenient. Sudden changes in health conditions such as abnormal heart rate, low oxygen level, or increased body temperature may not be identified quickly due to the lack of real-time monitoring. This can delay medical assistance during emergencies. Therefore, there is a need for an IoT-based health monitoring system that can continuously track patient health parameters, store data online, and provide instant alerts to doctors or caregivers for better and faster healthcare support.

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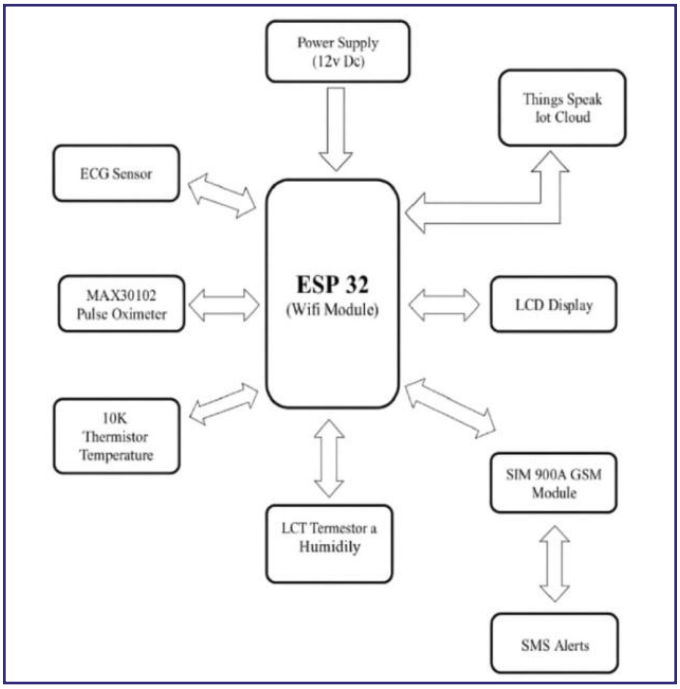
3. BLOCK DIAGRAM

Fig. 1: IOT BASED HEALTH MONITORING SYSTEMBLOCK DIAGRAM DESCRIPTION



The proposed IoT-based Health Monitoring System is designed to continuously monitor the patient's vital signs using advanced sensors and wireless communication technology. The system mainly consists of an ESP32 microcontroller, biomedical sensors, cloud storage, display unit, and alert modules.

The sensors such as the ECG sensor, MAX30102 pulse sensor, temperature sensor, and humidity sensor collect real-time health data including heart rate, SpO_2 level, body temperature, and environmental conditions. These sensors are connected to the ESP32 microcontroller, which acts as the central processing unit of the system.

The ESP32 processes the collected data and sends it to the ThingSpeak cloud platform through Wi-Fi communication. The cloud platform stores the patient's data and displays it graphically for remote monitoring and analysis by doctors or caregivers.

An LCD display is integrated into the system to show the live values of health parameters directly to the user. For emergency situations, the SIM900A GSM module is used to send instant SMS alerts whenever any parameter crosses the predefined threshold values.

The complete system is powered using a regulated DC power supply, ensuring stable operation of all hardware components. Thus, the proposed system provides an efficient, low-cost, and reliable solution for continuous patient health monitoring and remote healthcare support.

4. RESULTS & DISCUSSION

The developed IoT-based Health Monitoring System effectively monitors and records important physiological parameters such as heart rate, body temperature, and oxygen saturation (SpO_2) in real time. The integration of biomedical sensors with the ESP32 controller enables accurate acquisition and fast processing of patient data.

The LCD display provides instant visualization of the measured parameters, making the system user-friendly and easy to operate. In addition, the GSM module efficiently sends SMS notifications whenever abnormal health conditions are detected, ensuring quick medical response during emergencies.

Fig. 2: Output Of IOT Based Health Monitoring System

5. CONCLUSION

The IoT-based Health Monitoring System developed using ESP32 and biomedical sensors provides an efficient and reliable method for real-time monitoring of patient health parameters such as heart rate, ECG, body temperature, and SpO_2 levels. The system successfully collects sensor data, displays it on an

LCD, and transmits it to the ThingSpeak cloud platform for remote monitoring and analysis. The integration of the GSM module enables instant SMS alerts during abnormal health conditions, improving patient safety and timely medical response. The proposed system reduces manual monitoring efforts, supports early diagnosis, minimizes hospital visits, and offers a cost-effective and scalable solution for smart healthcare applications.

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