IOT BASED PATIENT HEALTH CARE MONITORING SYSTEM

[1]Nagtilak Vedant Tanaji, [2]Ingale Pranjali Dattatray, [3]Telang Shruti Dhanraj, [4]Dr. S. M. Lambe

[123]B.Tech Student, [4]Project Guide
[1234]Department of Electronics and Telecommunication Engineering,
[1234]Karmayogi Institute of Technology, Shelve, Pandharpur, India.

Abstract : The rapid growth of Internet of Things (IoT) technology has significantly improved healthcare monitoring systems. This paper presents an IoT-based patient health care monitoring system designed to continuously monitor vital parameters such as heart rate, body temperature, blood oxygen level (SpO_2), and fluid level. The system uses an ESP32 microcontroller integrated with biomedical sensors to collect real-time data. The collected data is transmitted to a cloud platform via Wi-Fi, enabling remote monitoring through mobile or web applications. The system also includes an alert mechanism using buzzer and LED indicators to notify abnormal conditions. This solution reduces manual monitoring, improves accuracy, and ensures timely medical intervention. The proposed system is cost-effective, reliable, and suitable for modern healthcare applications.

IndexTerms **- IoT, ESP32, Patient Monitoring, SpO_2 Sensor, Heart Rate Sensor, Smart Healthcare**

INTRODUCTION

Healthcare systems require continuous monitoring of patient vital parameters, especially in critical care situations. Traditional monitoring methods involve manual observation, which can be inefficient and prone to human error.The proposed IoT-based patient health monitoring system provides a smart solution for real-time monitoring using sensors and wireless communication. The system uses sensors to measure heart rate, body temperature, and fluid levels, and sends the data to a cloud platform via ESP32.Doctors and caregivers can access this data remotely, improving response time and patient care. Additionally, the system provides alerts when abnormal conditions are detected, ensuring patient safety.

NEED OF THE STUDY.

The need for this system arises due to limitations of traditional healthcare monitoring:

- Continuous monitoring is difficult manually
- Increased workload on medical staff
- Delay in detecting critical conditions
- Lack of remote monitoring facilities
- Risk of human error

The proposed system addresses these issues by enabling automated, real-time, and remote patient monitoring.

THEORETICAL FRAMEWORK.

IoT-based healthcare systems combine sensors, microcontrollers, and cloud platforms to enable real-time monitoring. Sensors collect physiological data such as heart rate and temperature, which is processed by the ESP32 and transmitted to cloud servers. Algorithms and IoT platforms allow real-time data visualization and alert generation. Technologies like wireless communication, cloud storage, and embedded systems play a crucial role in developing such systems. Recent studies highlight the importance of IoT in remote healthcare, reducing hospital visits and improving patient outcomes. However, challenges like data security, reliability, and power efficiency remain important considerations.

SYSTEM DESIGN.

4.1 Block Diagram.

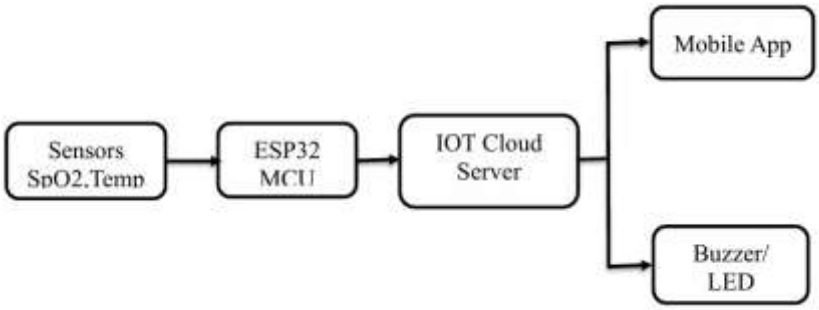

Figure 1: Block Diagram of IoT Patient Monitoring System

4.2 Hardware Design.

The system includes:

- **ESP32 Microcontroller** – Main processing unit
- **Heart Rate Sensor** – Measures pulse rate
- **SpO_2 Sensor** – Measures oxygen level
- **Temperature Sensor (DHT22/LM35)** – Measures body temperature
- **Float Sensor** – Detects fluid level
- **Buzzer & LED** – Alert system
- **OLED Display** – Displays real-time data

These components work together to collect and process patient data efficiently.

4.3 Circuit Diagram and Working.

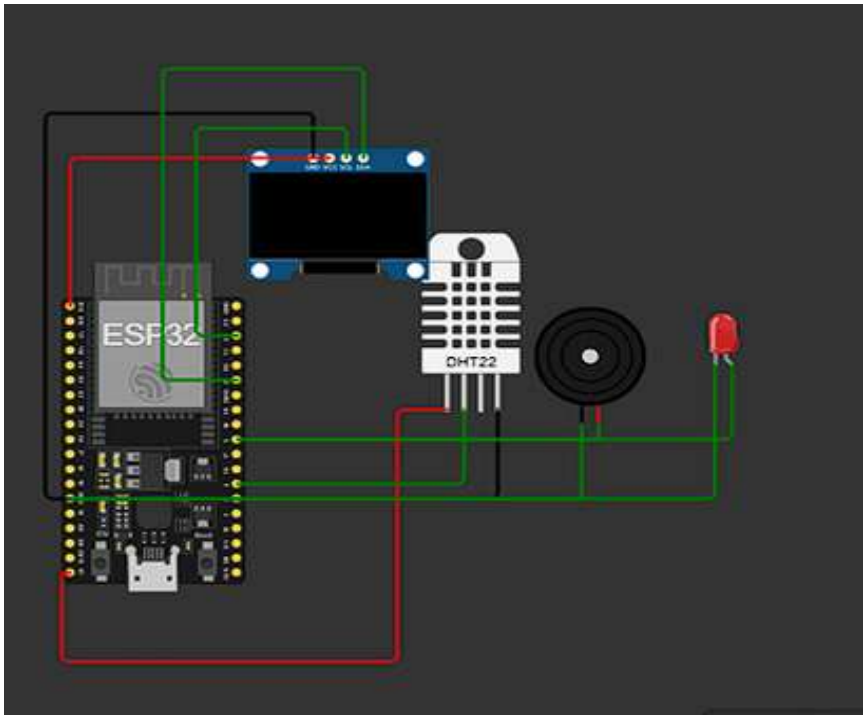

Figure 2: Circuit Diagram of the System

Working:

1. Sensors collect patient data
2. ESP32 processes the data

3. Data is sent to cloud via Wi-Fi
4. If abnormal values detected → alert triggered
5. Data displayed on mobile app/dashboard

RESULTS AND DISCUSSION.

The system was tested under real-world conditions like environmental monitoring.

5.1 Hardware Implementation.

The system was successfully implemented and tested. The hardware setup includes ESP32 with sensors and display module.

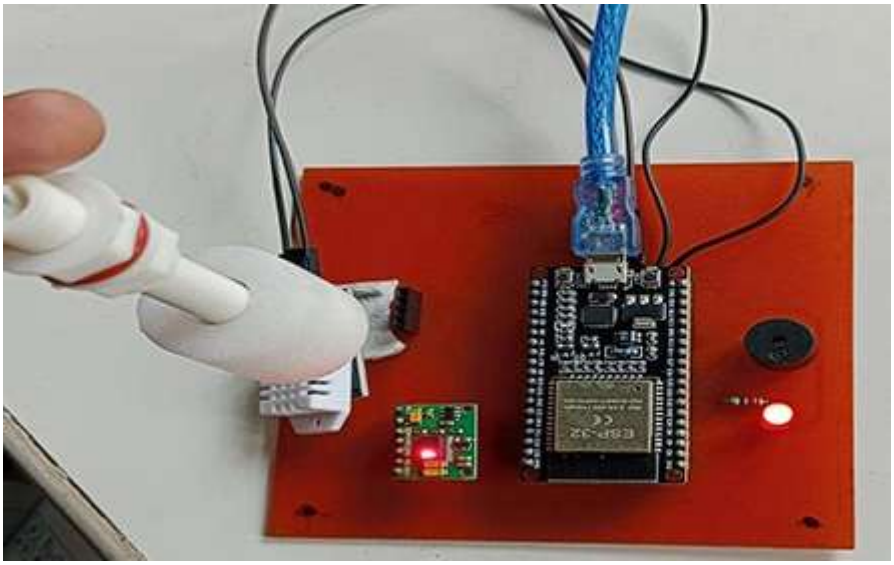

Figure 3: Hardware Project Prototype

5.2 System Performance.

- Accurate real-time monitoring
- Reliable data transmission via Wi-Fi
- Immediate alert system for abnormal conditions
- Remote monitoring via IoT dashboard
- Reduced manual effort

Figure 4: Dashboard output and real-time readings

CONCLUSION.

The IoT-based patient health care monitoring system provides an efficient and reliable solution for monitoring patient health in real time. By integrating sensors with ESP32 and cloud technology, the system enables continuous monitoring and remote access to

patient data. The alert system ensures timely medical intervention, improving patient safety. The system is cost-effective, scalable, and suitable for both hospital and home-care environments.

FUTURE SCOPE.

- Integration of advanced sensors (ECG, BP)
- AI-based health prediction
- Mobile app development
- Wearable healthcare devices
- Cloud-based medical records

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