IoT-Based Patient Health Monitoring System for Rural Clinics

Problem Statement

In rural areas of Pakistan, many clinics lack modern health monitoring systems. Patients with critical conditions often go unnoticed until it is too late. There is no 24/7 monitoring or real-time alerting for vitals like heart rate, temperature, or oxygen levels.

Proposed Solution

A smart IoT-based device that continuously monitors patient vitals and sends real-time data to a doctor's dashboard (web or mobile). If any vital goes beyond the safe range, the system will send alerts (SMS/Email) to assigned medical staff.

Core Features

- Monitor heart rate, temperature, and oxygen level (SpO2).
- Store data in the cloud (Firebase/Thingspeak).
- Real-time visual dashboard for doctors.
- Alert system for abnormal readings.
- Low-cost and scalable for rural clinics.

Hardware Components

- NodeMCU / ESP32 (microcontroller with Wi-Fi)
- Pulse Sensor (heart rate)
- MLX90614 (non-contact temperature sensor)
- MAX30100 or MAX30102 (oxygen & pulse sensor)
- LCD/OLED display (for on-device info)

Software & Tools

- Arduino IDE (programming MCU)
- Firebase / Thingspeak (for data storage)
- Web dashboard (HTML/CSS/JS, React)
- Mobile App (optional – Flutter or Android Studio)
- IFTTT / Twilio (for SMS/email alerts)

Use Case

1. Patient enters a clinic and gets connected to the device.
2. Vitals are monitored continuously.
3. Data is sent to cloud & shown on dashboard.
4. Alerts are triggered if vitals are abnormal.

Benefits

- 24/7 health monitoring at low cost.
- Helps rural doctors manage patients better.
- Prevents emergencies by early detection.
- Easy to use – even by basic staff.
- Useful for both clinics and home-based elderly care.

Project Timeline

Phase	Duration
Requirement Analysis	1 week
Hardware Setup	2 weeks
Software Development	3 weeks
Testing & Debugging	1 week
Final Report	1 week

Conclusion

This project will contribute to solving rural healthcare problems by introducing a reliable and real-time patient health monitoring system using IoT technology. It is affordable, scalable, and can help save lives by providing early warnings.