SMART HEALTH MONITORING & ALERT SYSTEM USING IOT

A Project Report by Naveen Singh

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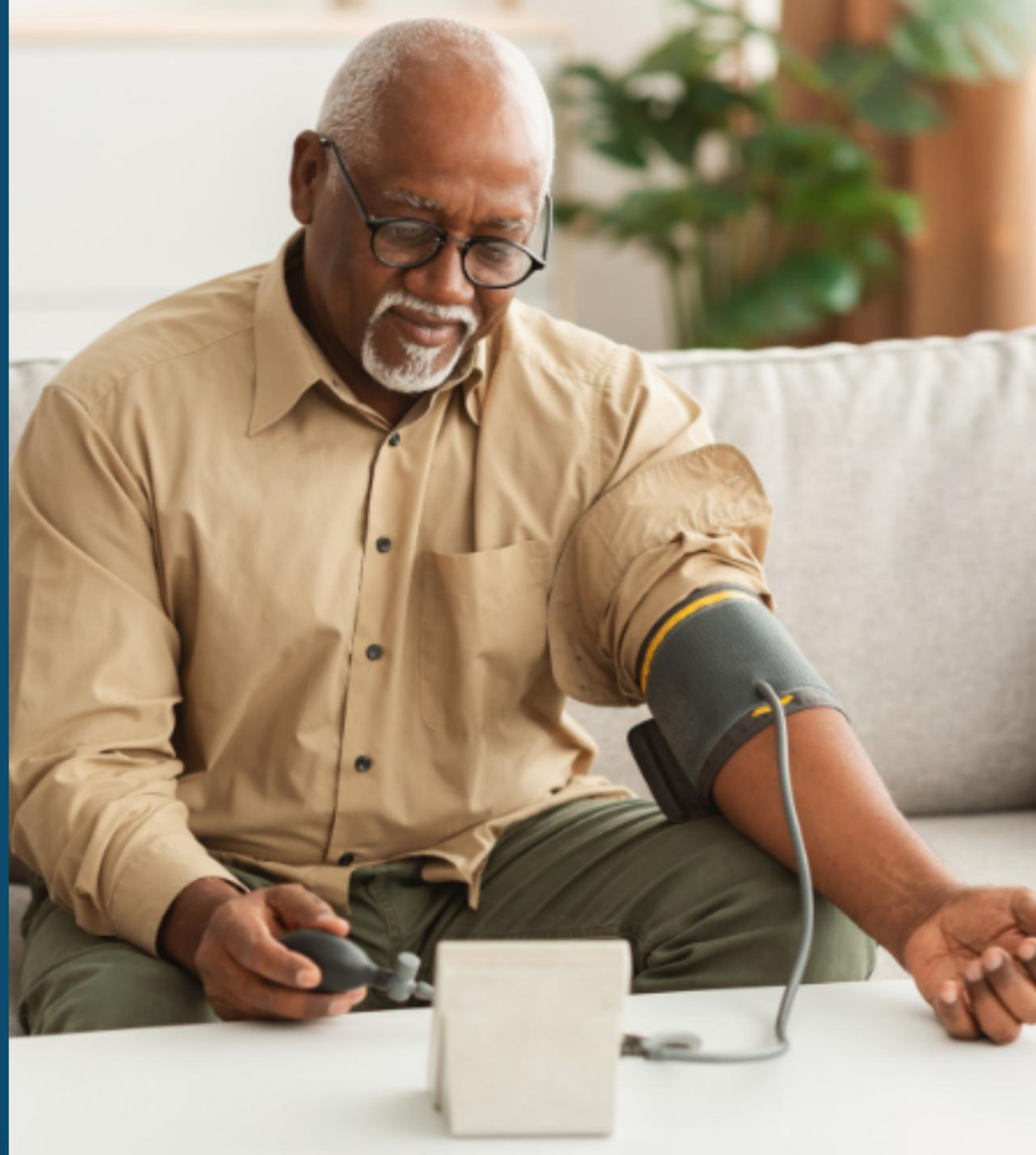
The Challenge

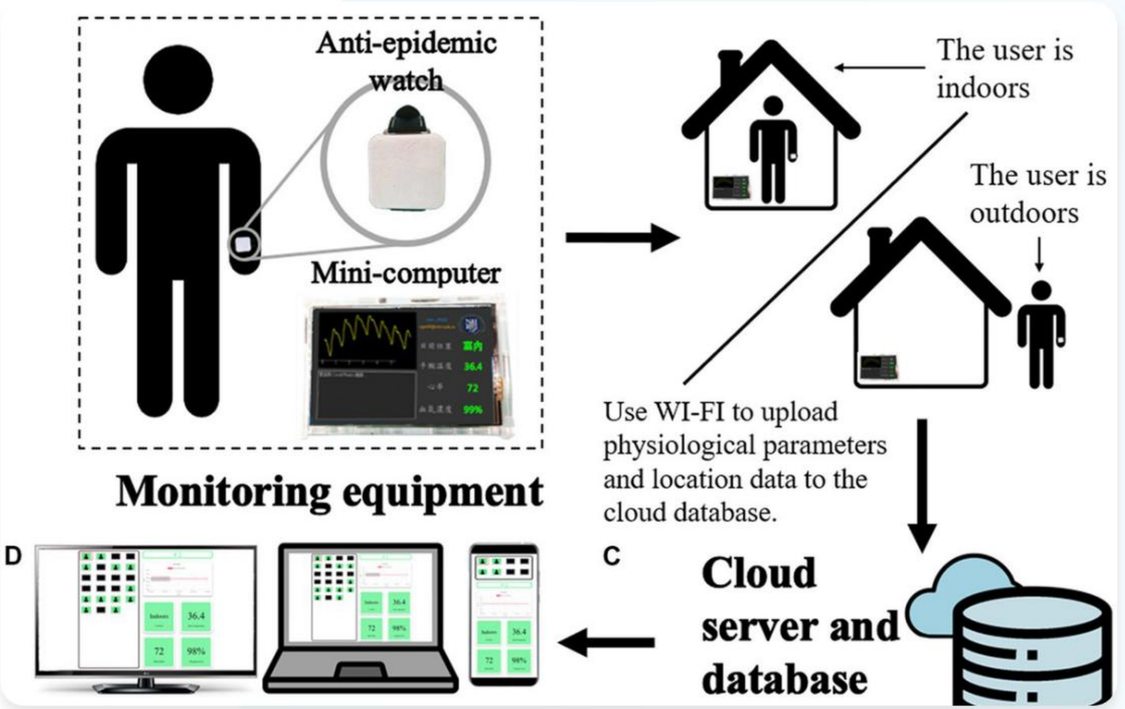
Modern lifestyles, chronic illnesses, and limited access to medical facilities in rural areas create significant healthcare gaps.

Without continuous monitoring, critical vitals like heart rate and oxygen levels can fluctuate unnoticed, leading to delayed medical responses and preventable emergencies.



Proposed Solution

- **IoT-Based Architecture:** A smart, low-cost system using NodeMCU ESP8266 to collect and transmit data wirelessly, bridging the gap between patients and doctors.
- **Real-Time Tracking:** Unlike periodic checks, this system monitors SpO_2, Pulse Rate, and Temperature 24/7, making data instantly available on the cloud.



Key Objectives

Continuous Monitoring

To track vital signs (Heart Rate, SpO_2, Temp) continuously without manual intervention.

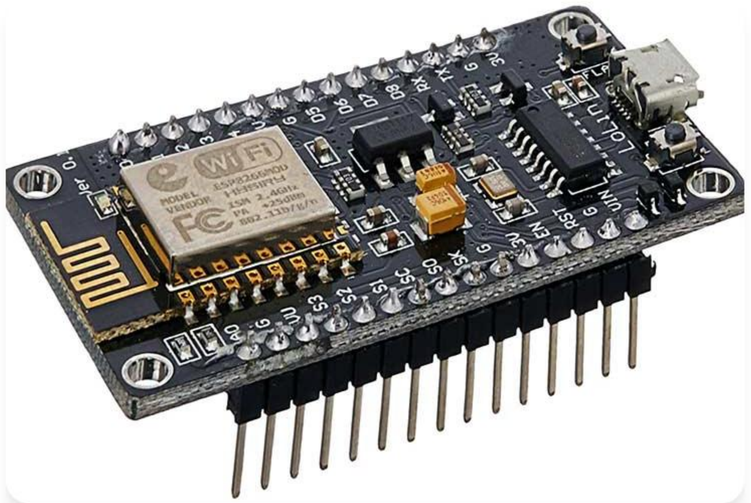
Instant Alerts

To automatically trigger notifications via App/SMS when readings cross safe thresholds.

Remote Access

To enable doctors and caregivers to view patient data from anywhere via Cloud Dashboards.

Core Hardware Components



NodeMCU ESP8266

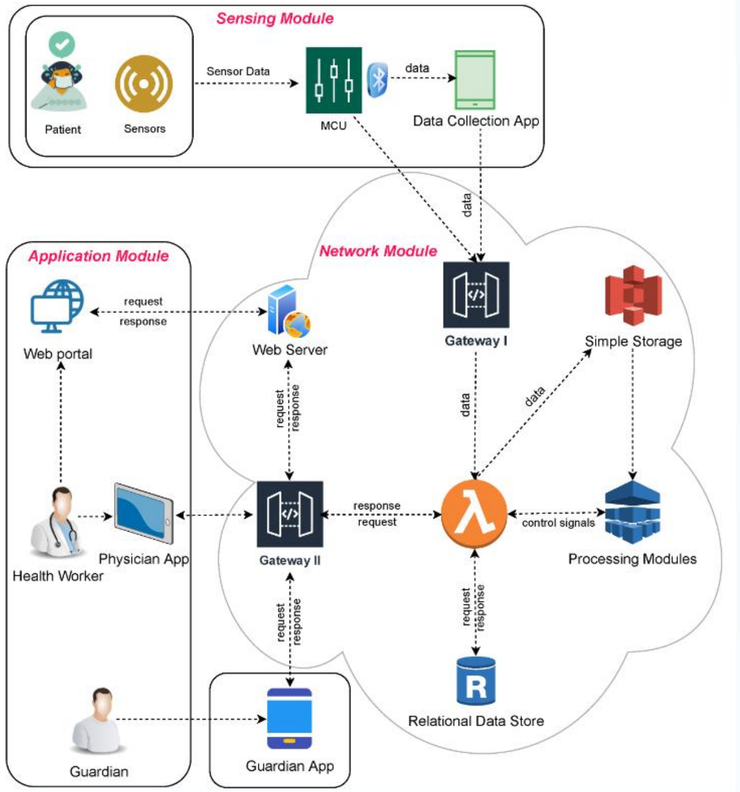
MAX30102 Pulse Oximeter Sensor

MAX30102 (Pulse & SpO_2)

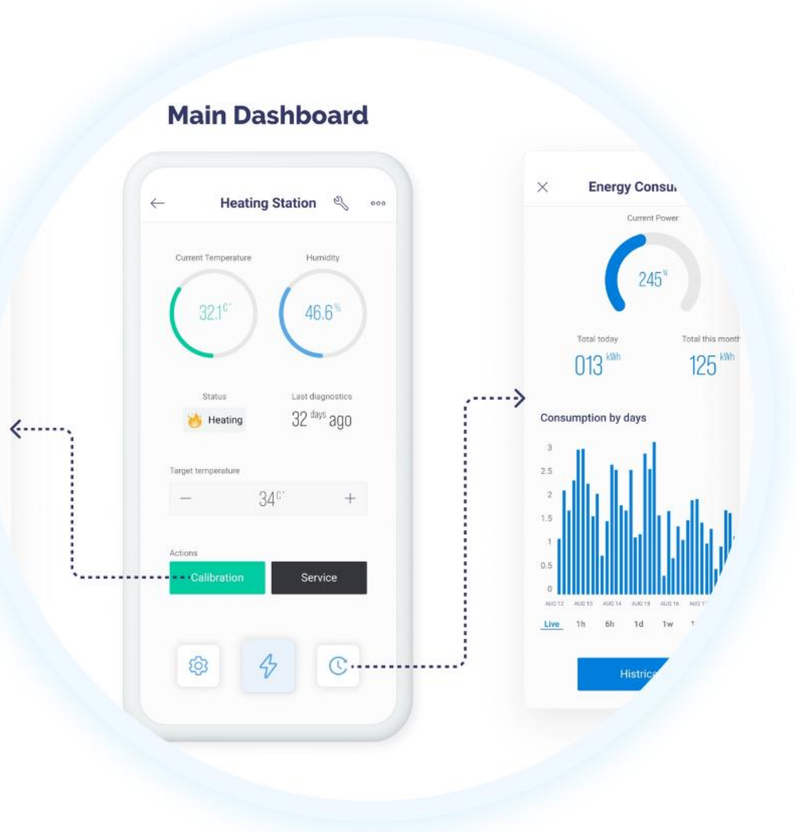
DS18B20 (Temperature)

System Architecture

- **Sensing Layer:** Biomedical sensors (MAX30102, DS18B20) collect raw analog/digital data from the patient.
- **Processing Layer:** The NodeMCU processes signals, filters noise, and checks against safety thresholds.
- **Transmission:** Data is encrypted and sent via Wi-Fi to the Cloud.
- **Application Layer:** Blynk and ThingSpeak platforms visualize data and manage alerts.



Software & Cloud Integration



Visualization & Control

The system leverages **Blynk Cloud** for real-time mobile visualization. Widgets display live Heart Rate, SpO_2, and Temperature data.

ThingSpeak is utilized for long-term data logging and trend analysis, allowing doctors to review historical patient data graphs.

Operational Workflow

Data Collection

Sensors measure Vitals

Processing

NodeMCU filters data

Cloud Upload

Sent to Blynk/ThingSpeak

Alerting

Notification if Abnormal

Project Impact

24/7

Continuous Monitoring Capability

<2s

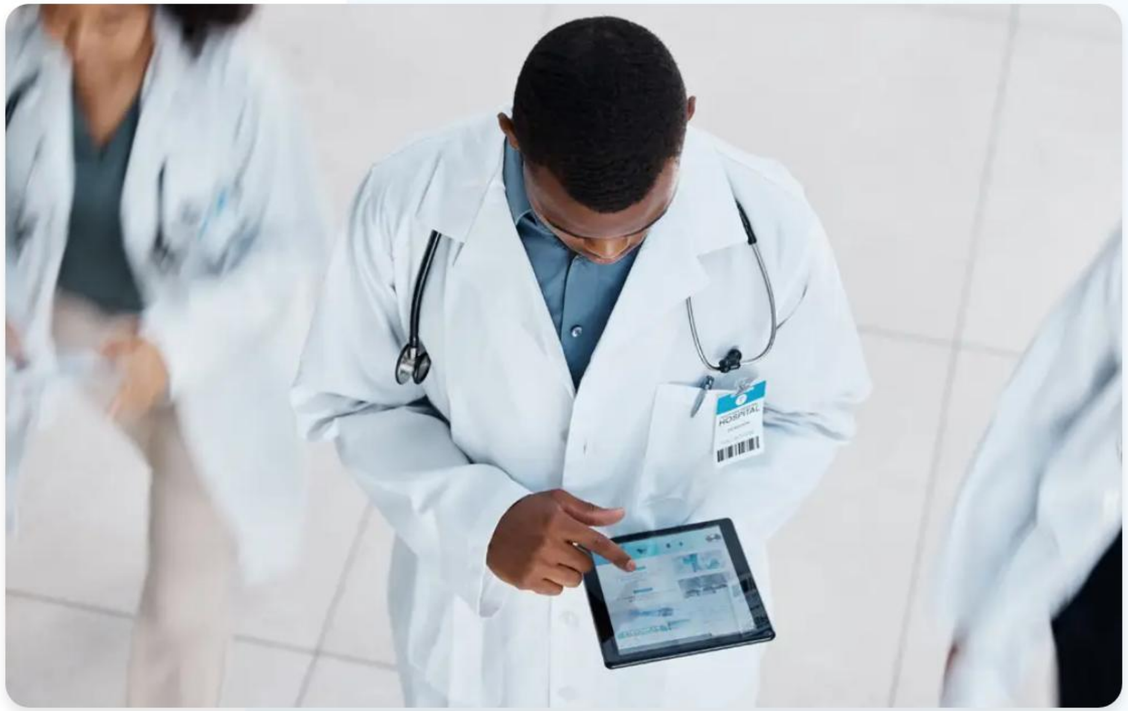
Latency for Emergency Alerts

100%

Remote Access for Caregivers

Key Benefits

- **Early Detection:** Identifies health deterioration before it becomes critical.
- **Reduced Hospitalization:** Minimizes unnecessary hospital visits for routine checks.
- **User-Friendly:** Simple mobile interface accessible to non-technical users.
- **Cost-Effective:** Uses affordable components, making healthcare accessible to rural areas.



Future Scope

Expanding Capabilities

Future iterations can integrate **AI & Machine Learning** to predict heart anomalies before they occur.

Additional sensors for Blood Pressure and Glucose monitoring can be added to create a comprehensive "Hospital-in-a-Box" solution.

Thank You

Smart Health Monitoring & Alert System

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Questions?

Image Sources

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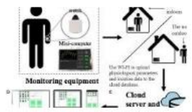
Source: www.tunstallhealthcare.com.au



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Source: docs.blynk.io

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