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IOT BASED HUMAN BODY VITAL DATA MONITORING SYSTEM

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ABSTRACT

Health monitoring has become one of the most pressing concerns in today's fast-paced world. Due to the lack of continuous and accurate health monitoring, patients often suffer from undiagnosed health conditions, leading to serious health complications. Traditional methods of health monitoring involve frequent hospital visits, which can be both time-consuming and costly. In recent years, the advent of Internet of Things (IoT) technology has revolutionized healthcare, allowing health professionals to monitor patients remotely using various smart devices. These IoT-based health monitoring systems offer a promising solution by providing real-time data on a patient's health status, facilitating timely medical intervention.

In this project, we aim to design and develop a Human Body Vital Data Monitoring System that allows continuous tracking of vital health parameters such as heart rate and body temperature. This system records these parameters using IoT-enabled devices and transmits the data over Bluetooth technology to a mobile or web application. By leveraging Bluetooth software, the system enables seamless communication between the patient's monitoring devices and healthcare providers, ensuring that the patient's health can be monitored remotely, anywhere in the world, over the internet.

The main components of the system include sensors to measure the heart rate and body temperature, a microcontroller for data processing, and Bluetooth modules for wireless data transmission. The data collected by these sensors is sent to an application, where health professionals can monitor the patient's condition in real time. The system also provides a user-friendly interface for both patients and healthcare providers, allowing them to visualize health trends over time and receive notifications in case of abnormal readings.

The project aims to improve the efficiency and accessibility of healthcare by enabling continuous health monitoring without the need for patients to be physically present in medical facilities. By providing early detection of potential health issues, this system helps in reducing the chances of serious health emergencies, promoting a healthier lifestyle for patients. Additionally, this system can be integrated with cloud-based platforms for long-term health tracking and data storage, further enhancing its utility for both patients and healthcare providers.

INTRODUCTION

In today's world, timely health monitoring has become crucial due to the increasing prevalence of chronic diseases and the need for continuous patient care. Traditional healthcare monitoring methods require frequent in-person visits, which can be both time-consuming and expensive, especially for patients in remote locations. To address this, IoT-based health monitoring systems offer a practical solution by providing continuous, real-time tracking of vital health parameters.

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This project aims to design and develop a Human Body Monitoring System that continuously monitors two critical health parameters: heart rate and body temperature. The system will use a NodeMCU ESP8266, a low-cost Wi-Fi module, to wirelessly transmit the data to a cloud-based platform or mobile application, enabling healthcare professionals to monitor the patient's health remotely. The project will also incorporate a MAX30102 pulse oximeter sensor to measure heart rate and a DHT11 temperature and humidity sensor to measure body temperature. Additionally, visual feedback will be provided to users through an OLED display, while a buzzer and LED will serve as indicators for abnormal readings.

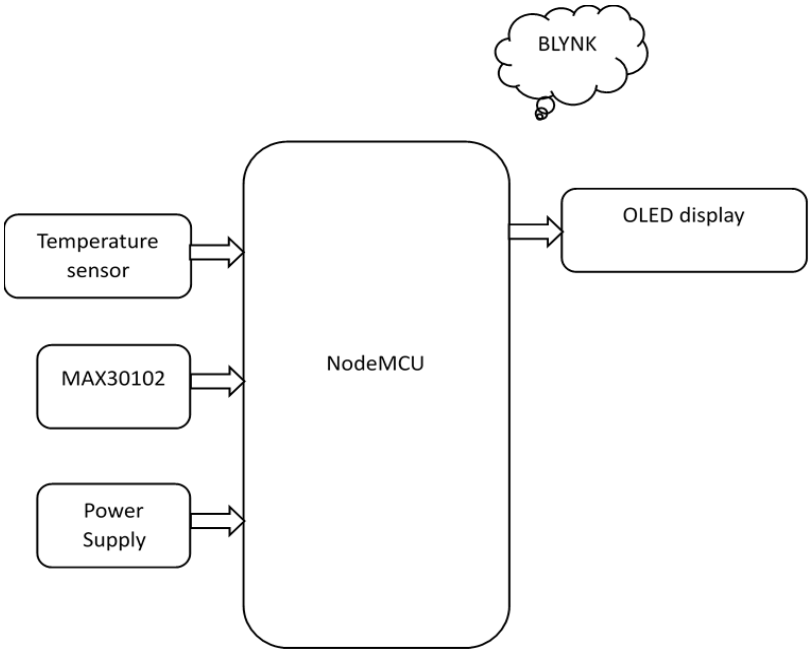

Figure.1 Block Diagram

LITERATURE SURVEY

Early Health Monitoring Systems

The initial health monitoring systems were large, expensive, and limited to hospital settings. These devices were primarily used for measuring basic parameters like heart rate, body temperature, and blood pressure. They required manual intervention and were not connected to any network, limiting their ability to provide real-time data or remote monitoring capabilities.

The Advent Of Iot In Healthcare

With the rise of Internet of Things (IoT) technology, health monitoring systems evolved from traditional standalone devices to more advanced and connected systems. IoT allowed for the integration of sensors with wireless communication, enabling real-time transmission of health data. This shift was particularly beneficial for remote patient monitoring, as healthcare providers could now access patient data from anywhere, reducing the need for in-person visits and facilitating early intervention.

Bluetooth-Based Health Monitoring Systems

As IoT technology evolved, Bluetooth became a popular choice for short-range wireless communication in health monitoring systems. These systems used Bluetooth-enabled sensors

to measure parameters like heart rate and body temperature. The data was transmitted to mobile apps or other devices for analysis. Bluetooth-based systems, while affordable and easy to integrate, had limitations in terms of range and scalability, making them more suitable for personal health monitoring.

PROPOSED SYSTEM

This system is designed to continuously track essential health parameters. At the core of the system is the NodeMCU microcontroller, a Wi-Fi-enabled device that facilitates seamless communication between various sensors, output devices, and an IoT platform.

The system integrates multiple input components for real-time health monitoring. A temperature sensor is responsible for measuring body temperature, while the MAX30102 pulse oximeter and heart rate sensor enable accurate tracking of vital signs, including oxygen saturation and pulse rate. A power supply unit ensures stable and consistent operation of the system.

For the user interaction and alert mechanisms, the system incorporates essential output components. An OLED display provides a clear and real-time visual representation of the measured health parameters. A buzzer serves as an audible alert mechanism, notifying users of abnormal readings or critical health conditions.

Furthermore, the system leverages the Blynk IoT platform, enabling remote monitoring and data access through a mobile application. This feature enhances usability by allowing users, caregivers, or medical professionals to track health data from anywhere, ensuring timely interventions when necessary.

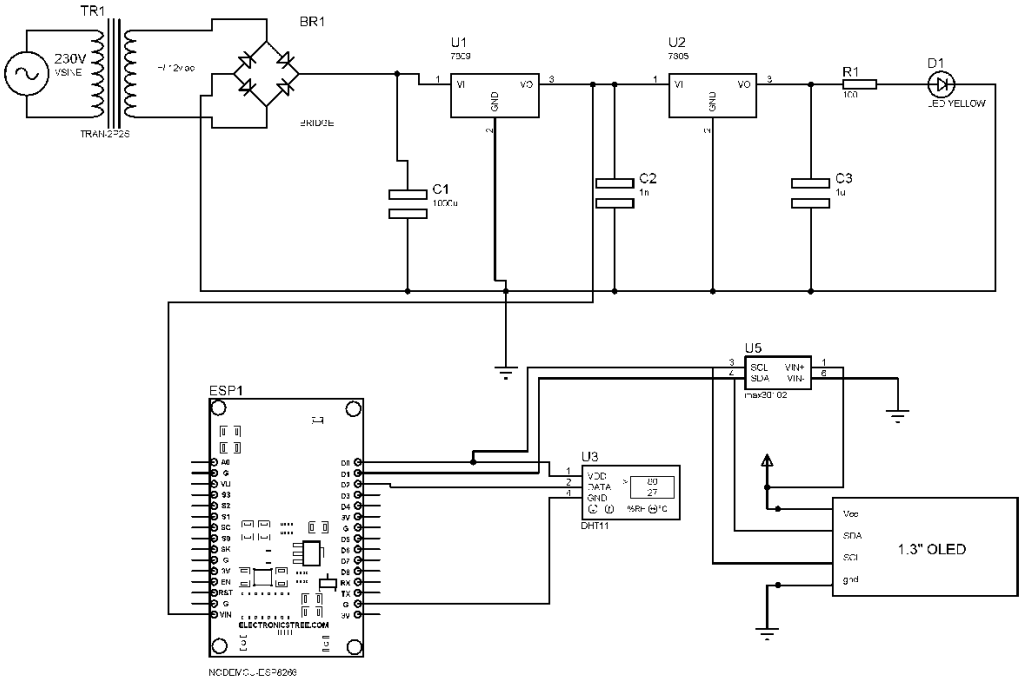

Figure.2 Schematic Diagram

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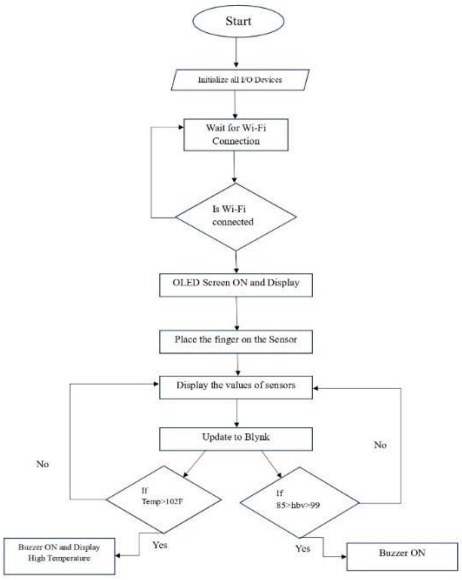

Figure.3 Flow Chart

RESULTS

The Human Body Vital Data Monitoring System was designed to continuously monitor and display critical health parameters such as heart rate, oxygen saturation, and body temperature using IoT technology. The system utilized several components, including the NodeMCU ESP8266, MAX30102, DHT11, Buzzer, OLED Display, and Transformer. The following presents the results observed during testing and the discussion of their significance.

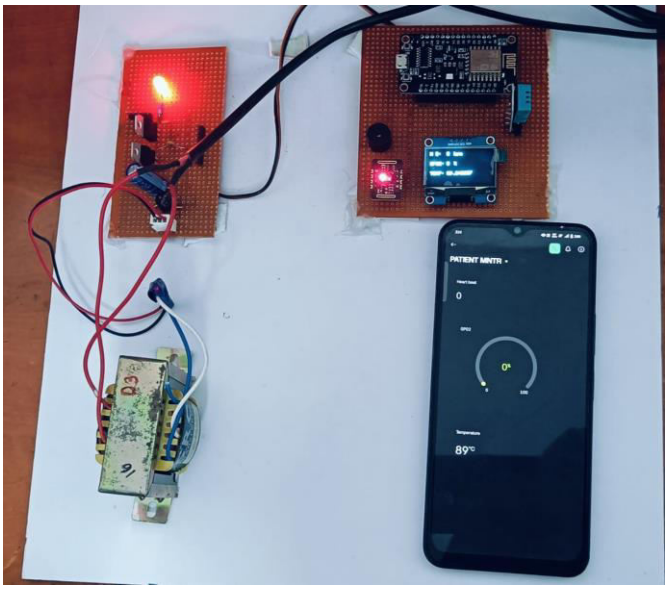

Figure.4 Hardware Working Kit

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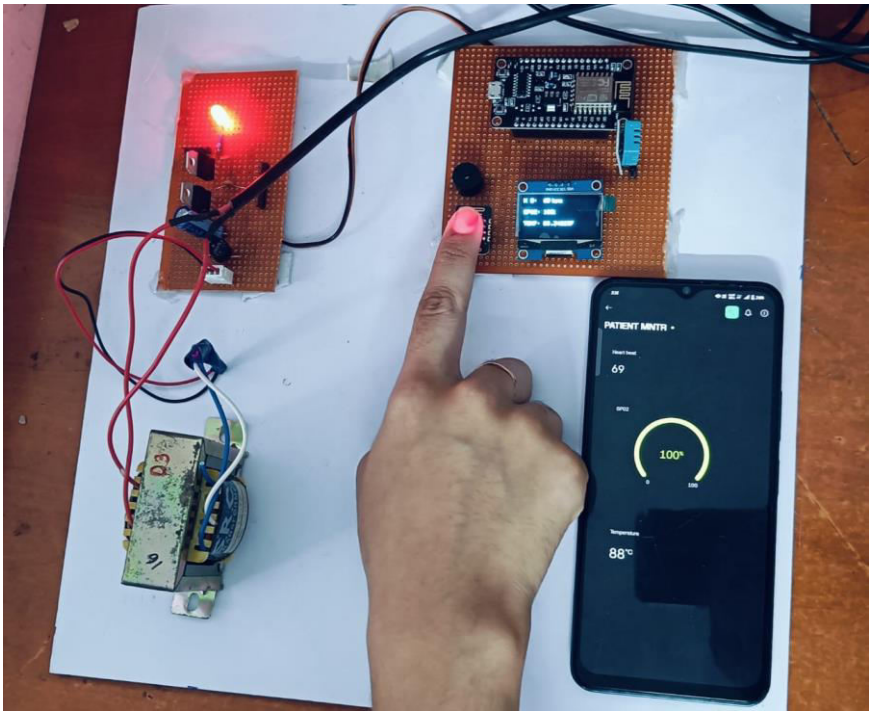

Figure.5 Showing the vital data in OLED & Blynk

Figure.6 Result in Blynk App

APPLICATIONS

1. **Healthcare Monitoring –** Enables real-time tracking of vital signs such as heart rate, temperature, oxygen levels, and blood pressure for patients in hospitals or home care.
2. **Remote Patient Monitoring –** Allows doctors to monitor patients with chronic diseases remotely, reducing hospital visits and ensuring timely medical intervention.

3. **Elderly and Disabled Care –** Provides continuous health monitoring for senior citizens and individuals with disabilities, improving safety and quality of life.
4. **Wearable Health Devices –** Integrated into smartwatches and fitness trackers to provide continuous health updates and early warnings for potential health risks.
5. **Sports and Fitness –** Helps athletes track their physiological parameters during training to optimize performance and prevent injuries.
6. **Emergency Response Systems –** Automatically alerts emergency services in case of abnormal health readings, ensuring quick medical assistance.
7. **Workplace Safety –** Used in industries with hazardous environments to monitor workers' health conditions and prevent workplace-related health issues.

CONCLUSION

The Human Body Vital Data Monitoring System successfully demonstrates the use of IoT technology for real-time tracking of vital health parameters, including heart rate, oxygen saturation (SpO2), and body temperature. By integrating MAX30102, DHT11 sensors, NodeMCU ESP8266, and Bluetooth/Wi-Fi communication, the system enables continuous health monitoring and remote access via a mobile or web-based platform. The system efficiently processes and transmits data, with alerts triggered for abnormal readings using buzzer notifications and an OLED display.

The system's real-time monitoring capabilities help in early detection of health issues, reducing the dependency on frequent hospital visits. The integration with Blynk cloud services ensures that patient data is accessible remotely, making it particularly useful for individuals in remote or underserved areas. While the system performed reliably under standard conditions, minor environmental factors like ambient light and sensor positioning slightly affected accuracy.

FUTURE SCOPE

- Implementing predictive analytics to detect health abnormalities based on historical data.
- Using AI to automatically classify risk levels and recommend actions.
- Upgrading to more precise medical-grade sensors for clinical applications.
- Implementing calibration algorithms to improve temperature and heart rate measurements.
- Enabling long-term health tracking for better diagnostics.
- Securely storing data on cloud platforms with enhanced encryption for privacy protection.

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