



Iot Based Health Monitoring System

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Abstract: -

With the proliferation of Internet of Things (IoT) technology, there has been a paradigm shift in healthcare towards remote and continuous health monitoring systems. This paper proposes an IoT-based health monitoring system designed to provide real-time monitoring of vital health parameters for individuals in both clinical and home settings. The system integrates various sensors, wireless communication technologies, and data analytics algorithms to collect, transmit, and analyse health data in real-time. Key features include continuous monitoring of vital signs such as heart rate, body temperature, blood glucose, and oxygen saturation levels, as well as the ability to detect anomalies and trigger alerts for timely intervention. The collected data is securely transmitted to a cloud-based platform for storage, analysis, and visualization, enabling healthcare professionals to remotely monitor patients' health status and provide personalized care. The proposed system offers several advantages, including early detection of health issues, proactive intervention, improved patient outcomes, and reduced healthcare costs. Through its seamless integration of IoT technology with healthcare, this system aims to revolutionize the way healthcare is delivered, making it more accessible, efficient, and patient-centric.

Keywords- IOT, Real-Time, Sensor, Wireless Communication, Cloud Storage.

1. INTRODUCTION: -

The Internet of Things (IoT) has revolutionized various industries by enabling seamless connectivity and data exchange between physical devices. One area where IoT has immense potential is healthcare, where it can be leveraged to create innovative solutions for remote health monitoring and management. In this context, the implementation of an IoT-based health monitoring system using the ESP8266 Wi-Fi module presents a promising opportunity to enhance healthcare delivery and improve patient outcomes.

The ESP8266 is a versatile and cost-effective Wi-Fi module that provides connectivity capabilities to microcontroller-based projects. By leveraging the ESP8266's connectivity features, we can develop a system that allows continuous monitoring of vital health parameters remotely, enabling early detection of health issues, proactive intervention, and personalized healthcare delivery.

This project aims to design and implement an IoT-based health monitoring system using the ESP8266 module, which can monitor vital health parameters such as heart rate, body temperature, blood pressure, and oxygen saturation levels. The system will collect real-time data from wearable sensors or medical devices, transmit it securely over Wi-Fi to a cloud-based platform or a local server for processing and analysis, and provide timely insights and alerts to healthcare providers and caregivers.

Key components of the proposed system include wearable health sensors, ESP8266 Wi-Fi module, microcontroller (e.g., Arduino or Raspberry Pi), cloud-based platform or local server for data storage and analysis, and a user interface for visualization and interaction. The system will prioritize data security and privacy to ensure compliance with healthcare regulations and standards.

2. LITERATURE SURVEY

Dalvi, Monika. (2024). HEALTH MONITORING SYSTEM. International Scientific Journal of Engineering and Management. 03. 1-9. 10.55041/ISJEM01444. After people died from infections during COVID-19 epidemic, this attracted a lot of attention. COVID-19 causes symptoms such as fever, headache, sore throat, shortness of breath, and others. Many deaths are asymptomatic, which it makes the problem even bigger. Therefore, real-time system monitoring is needed. Monitoring will be carried out about measuring body temperature and oxygen saturation in patients. Monitoring body temperature is necessary because it can detect symptoms of COVID-19 in patients earlier. Monitoring system to be built uses ESP32, DS18B20 sensor, and MAX30100 sensor. Data communication is used in exchange of information. This system is expected to reduce number of deaths due to COVID-19. DS18B20 sensor has a sensor accuracy of 99,73% and an average error of 0,27%. MAX30100 sensor has an accuracy rate of 99,18% and an average error of 0,82%. Delay test results show an average of 155,57 ms, and packet loss test results show an average of 0%. Result of system that has been tested said the both sensors can read well.

N M, Archana. (2024). IoT based Health Monitoring System. INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT. 08. 1-11. 10.55041/IJSREM29311. The Internet of Things (IoT) is essential in innovative applications such as smart cities, smart homes, education, healthcare, transportation, and defense operations. IoT applications are particularly beneficial for providing healthcare because they enable secure and real-time remote patient monitoring to improve the quality of people's lives. This review paper explores the latest trends in healthcare-monitoring systems by implementing the role of the IoT. The work discusses the benefits of IoT-based healthcare systems with regard to their significance, and the benefits of IoT healthcare. We provide a systematic review on recent studies of IoT-based healthcare-monitoring systems through literature review. The literature review compares various systems' effectiveness, efficiency, data protection, privacy, security, and monitoring. The paper also explores wireless- and wearable-sensor-based IoT monitoring systems and provides a classification of healthcare-monitoring sensors. We also elaborate, in detail, on the challenges and open issues regarding healthcare security and privacy, and QoS. Finally, suggestions and recommendations for IoT healthcare applications are laid down at the end of the study along with future directions related to various recent technology trends. Keywords: IoT, IoWT, healthcare, monitoring, remote

S., Senthazhai & N., Anbarasi & N, AshaPriya & S, Nivedha & M., Saranya. (2024). Techno Medicare Glucose and Health Monitoring System Using IOT. International Journal of Innovative Science and Research Technology (IJISRT). 1439-1446. 10.38124/ijisrt/IJISRT24MAR1672. Monitoring vital signs and stress levels plays a pivotal role in healthcare, yet challenges such as limited access to medical professionals, high consultation

expenses, and infrastructure upkeep pose barriers to widespread monitoring. This paper proposes a streamlined solution by introducing an electronic health wearable capable of monitoring vital signs and glucose levels through IR sensors, alongside a stress monitoring headband. Additionally, the system integrates reminders for sedentary behavior and hydration, and features fall detection mechanisms using vibration motors and gyro sensors. To bolster accessibility, individuals can consult healthcare professionals via chat and video calls to review their health metrics. Moreover, appointments with doctors can be conveniently pre-scheduled, reducing consultation expenses and circumventing the need for extensive medical infrastructure. This approach offers a promising avenue for efficient and economical monitoring of vital signs and stress levels, thereby enhancing healthcare accessibility.

3. REQUIRED EQUIPMENTS:

Required hardware:

- ESP8266 NODE MCU BOARD
- 0.96 Inch OLED I2C Display
- MAX30100 Sensor
- NTC 100K Thermistor
- DHT11 Sensor
- KA7805 Voltage Regulator
- Zero PCB Board
- 12v DC Adapter

4.1 BLOCK DIAGRAM:

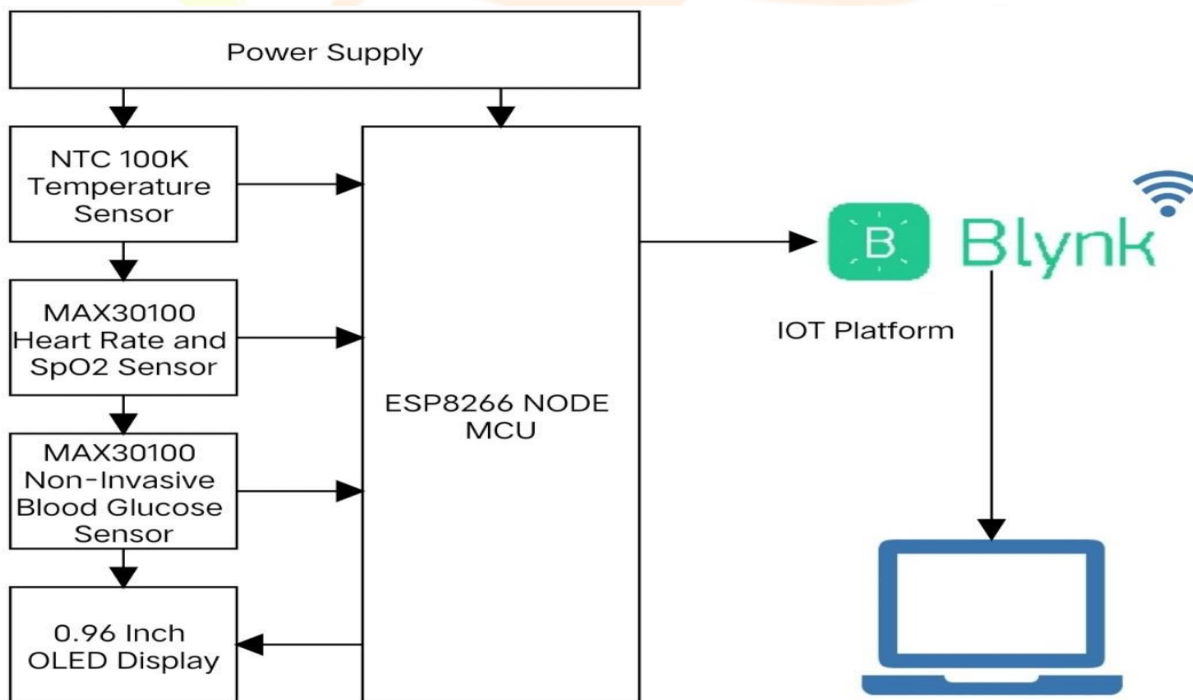


Figure 1. Block Diagram

4.2 RECOMMENDED APPROACHE:

A recommended approach for developing a health monitoring system using ESP8266 Nedemcu involves several key steps. First, gather the necessary components, including the NodeMCU board, various sensors such as heart rate, temperature, and ecg sensors, a power source, and optionally a display. Next, establish a system architecture that encompasses sensor data acquisition, processing, storage, user interface implementation, communication, alerts, and power management.

Begin by connecting the sensors to the NodeMCU and verifying their functionality individually. Then, write code to collect data from each sensor and process it to derive health parameters like heart rate, body temperature, and activity levels. Ensure the implementation of Wi-Fi connectivity to enable data transmission to a remote server or cloud platform for further analysis and monitoring. Additionally, consider developing a user interface to display real-time health parameters for user convenience.

Implement robust data storage mechanisms and secure communication protocols to ensure data integrity and privacy. Incorporate alerts and notifications to notify users or caregivers of any abnormal health readings or emergencies. Furthermore, optimize power management by employing techniques such as sleep modes and low-power sensors to extend battery life, especially in wearable applications.

Thoroughly test the system to validate its accuracy, reliability, and efficiency. Finally, deploy the system in real-world health monitoring scenarios, considering usability, durability, and compliance with relevant regulations. By following this approach, you can create an effective health monitoring system using ESP8266 NodeMCU that enhances healthcare management and promotes proactive wellness monitoring.

5. PROJECT MODEL:

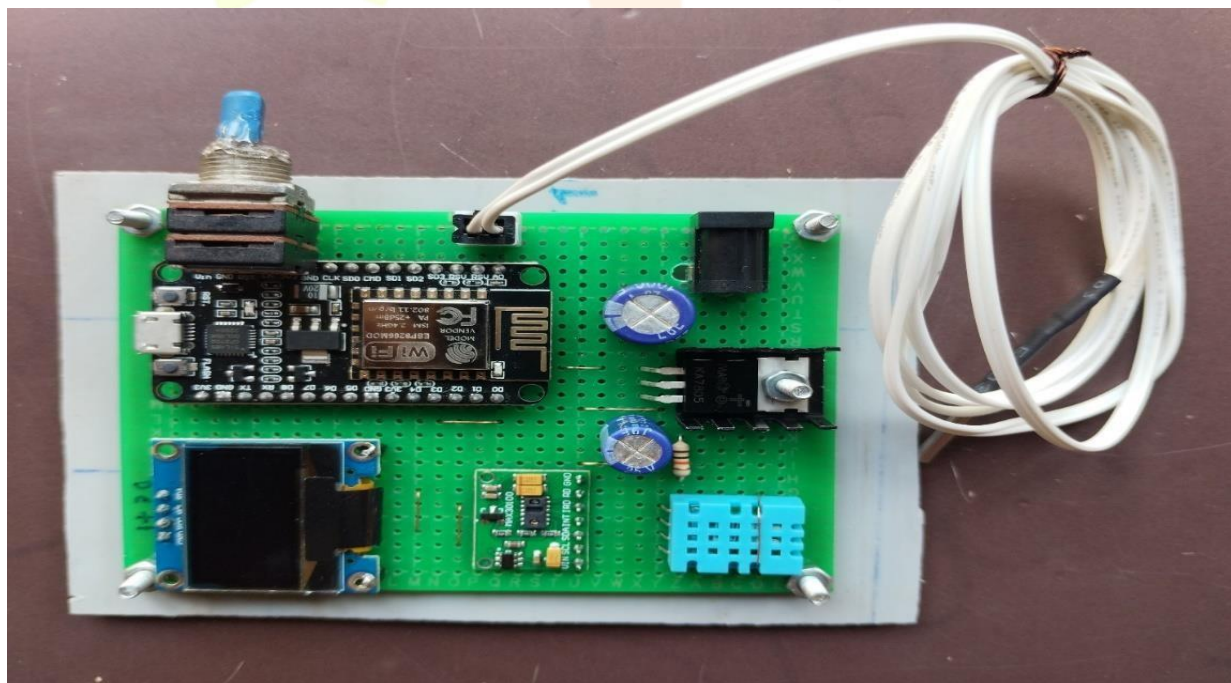


Figure 2. Project Model

6. RESULTS:

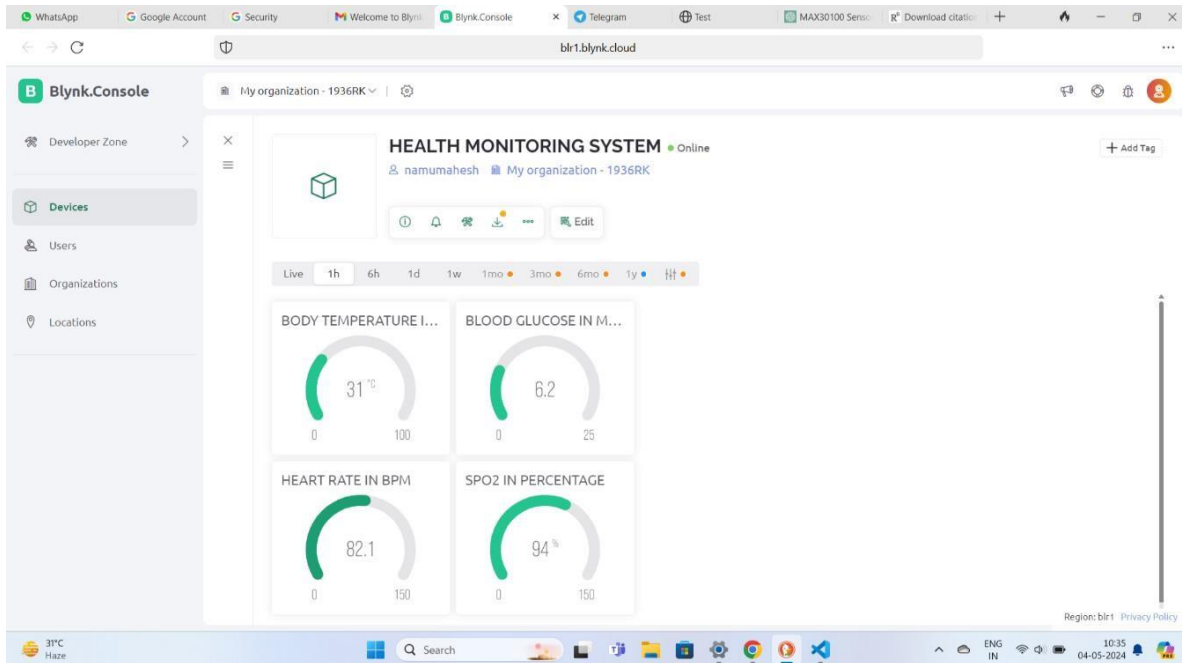


Figure 3. Project Result in Blynk IOT Application

The Iot based health monitoring project shows the results of many parameters of human body like body temperature in Celsius and also shown in the Fahrenheit, other factors are like heartRate of the human body using a without blood drop, in bpm unit and also measure the blood saturation spo2 in percentage. And also, this project the main parameter of this project using max30100 the blood glucose.

This all data of health monitoring system is sent to the blynk application for cloud storage for a future purpose to monitor historical data for the study.



Figure 4. Project Hardware Manually Result in Display

7. CONCLUSION:

In summary, developing a health monitoring system using ESP8266 NodeMCU presents a compelling approach to proactive healthcare management. By harnessing the capabilities of this platform alongside a range of sensors and Wi-Fi connectivity, real-time collection and processing of vital health parameters become feasible. Through robust system architecture and implementation, including secure data handling and efficient communication protocols, the system ensures reliability and accuracy. By delivering timely alerts and notifications, it empowers users and caregivers to respond effectively to any detected anomalies or emergencies. Ultimately, the deployment of such a system holds the potential to revolutionize healthcare by enabling continuous monitoring, early detection of health issues, and personalized interventions, thereby enhancing health outcomes and fostering overall well-being.

8. FUTURE PROSPECTS:

Looking ahead, the future prospects for health monitoring systems using ESP8266 NodeMCU appear promising and multifaceted. One key aspect involves further advancements in sensor technology, enabling the integration of more sophisticated sensors capable of capturing a wider array of health parameters with greater accuracy and efficiency. Additionally, advancements in data analytics and machine learning algorithms hold the potential to enhance the system's capabilities for data interpretation and predictive analytics, facilitating more personalized and proactive healthcare interventions. Moreover, the proliferation of Internet of Things (IoT) devices and the evolution of wireless communication standards are expected to contribute to the scalability and interoperability of these systems, enabling seamless integration with other healthcare infrastructure and promoting remote monitoring solutions. Furthermore, the increasing focus on telemedicine and remote healthcare delivery is likely to drive the adoption of such systems, particularly in underserved or remote areas, offering a cost-effective and accessible means of healthcare management. Overall, the future of health monitoring systems using ESP8266 NodeMCU is characterized by continuous innovation, expanded functionality, and broader accessibility, ultimately contributing to improved health outcomes and enhanced quality of life for individuals worldwide.

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