

Health Monitoring System Using Iot

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ABSTRACT

Health monitoring has become an essential aspect of our daily lives. With the advent of the Internet of Things (IoT), there has been a significant shift in the way healthcare is being delivered. IoT-based health monitoring systems can provide continuous, non-invasive, and real-time monitoring of various vital signs. This paper presents a detailed review of the state-of-the-art in IoT-based health monitoring systems. The Internet of Things (IoT) is useful in many aspects of daily life, including smart homes, cities, the environment, agricultural fields, and medical fields. Nowadays, a lot of people who work full-time struggle to keep an eye on their loved ones, especially elderly patients. Therefore, we are adopting this IoT based patient health monitoring system to solve this problem. The user can monitor their loved ones with the aid of sensor technologies, a microcontroller, and a Wi-Fi module. By employing this approach, those persons who are typically unable to talk can communicate. When there is no one available to care for the patient, this system monitors the situation and notifies the appropriate authorities by sending a message through Wi-fi.

Keywords: IoT, Arduino(Node MCU ESP8266), Wi-fi Module ESP8266, IoT Platform.

I. INTRODUCTION

Healthcare monitoring is becoming an important issue in today's society due to the increasing number of chronic diseases and aging populations. The Internet of Things (IoT) technology offers great potential for healthcare monitoring systems to monitor and manage chronic diseases and elderly people. The objective of this research paper is to design and develop a health monitoring system using IoT that can monitor and manage the health of elderly people and patients with chronic diseases. This system will help to improve the quality of life of patients and reduce the burden on caregivers. The number of elderly people worldwide is rising, and they are the population most at risk of contracting diseases. As

a result, this population needs specialized medical treatment and solutions for close health monitoring. The IoT is one of the greatest solutions since it makes it possible to quickly and continuously gather crucial health information about the elderly. This enables the sharing of such information across medical professionals in different locations, improving the standard of treatment delivered. The bulk of older people suffer from common ailments that call for routine examinations by human medical personnel. IoT technology can help with time savings and cost-effective, accurate results in this regard. The IoT Technology has the capacity to transmit and receive health-related data including high blood pressure (hypertension), diabetes, and other conditions that are crucial for identifying and monitoring the health problems of the elderly. In addition to the aforementioned issues, many elderly people find it difficult to regularly visit a health facility, which makes health monitoring for them difficult. IoT technologies enhance health monitoring from home and make it simple for medical staff to follow-up on the elderly on a regular basis, precisely, and swiftly.

II. PROPOSED SYSTEM

A proposed system for health monitoring using IoT could involve the use of sensors to collect data on various health parameters such as heart rate, blood pressure, body temperature, oxygen levels, and more. This data could then be transmitted wirelessly to a central hub, such as a mobile application or cloud-based platform, for analysis and monitoring.

Here are the key components of a health monitoring system using IoT:

1. **Wearable or Implantable Sensors:** These sensors would be attached to the patient's body, either as a wearable device or as an implant, to collect vital health data.
2. **Gateway Device:** The gateway device is responsible for collecting the data from the sensors and transmitting it to the cloud server.

3. Cloud-based Server: The cloud-based server receives the data from the gateway device and stores it for analysis.
4. Mobile Application: The mobile application allows the patient to access their health data, receive notifications and alerts based on the analysis of their data, and communicate with their healthcare provider.
5. Healthcare Provider Dashboard: The healthcare provider dashboard provides a comprehensive view of the patient's health data, allowing the provider to monitor their condition and provide treatment recommendations

Overall, a health monitoring system using IoT can provide valuable insights into a patient's health status, enabling early detection of potential health problems and timely interventions by healthcare providers.

HARDWARE MODULE

Arduino

Arduino is an open-source electronics platform that is widely used by hobbyists, students, and professionals to create interactive projects. It consists of a microcontroller board, development environment, and a community of developers who contribute to its growth and development.

Node MCU ESP8266 is one of the most popular development boards used with Arduino. It is based on the ESP8266 Wi-Fi module, which provides wireless connectivity to the board. The Node MCU ESP8266 is compatible with the Arduino development environment and can be programmed using the same tools and syntax.



Figure 1: Arduino Node MCU

Temperature sensor

A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors. Some temperature sensors require direct contact with the physical object that is being monitored (contact temperature sensors), while others indirectly measure the temperature of an object (non-contact temperature sensors).

Pulse rate sensor

A pulse rate sensor is a device used to measure the heart rate or pulse rate of an individual. It works by detecting the pulse in a particular part of the body, usually the fingertip, and converting it into an electrical signal that can be processed and analyzed.

Humidity sensor

A humidity sensor is a device used to measure the amount of moisture or water vapor in the air. It is a type of sensor that detects changes in the relative humidity (RH) of the surrounding environment and converts them into an electrical signal that can be measured and analyzed.

ARCHITECTURE OF HEALTH MONITORING SYSTEM USING IOT

The architecture of the health monitoring system using IoT is shown in Figure 2. The sensors are placed on the body of the patient and collect physiological data continuously. The collected data is sent to the gateway through a wireless communication protocol such as Wi-Fi or Bluetooth. The gateway is responsible for collecting data from the sensors and transmitting it to the cloud server. The cloud server stores, processes, and analysis the data collected from the sensors. The caregivers and doctors can access the data from anywhere and at any time through a web application. The collected data is sent to the gateway through a wireless communication protocol such as Wi-Fi or Bluetooth. The gateway is responsible for collecting data from the sensors and transmitting it to the cloud server. The cloud server stores, processes, and analysis the data collected from the sensors. The caregivers and doctors can access the data from anywhere and at any time through a web application.

Overall, the architecture of a health monitoring system using IoT is designed to collect and analyze patient data in real-time, providing healthcare providers with a more comprehensive

view of the patient's health status. The architecture can be customized depending on the specific requirements, and each layer can be tailored to meet the system's needs. By implementing a robust

and scalable architecture, an IoT-based health monitoring system can improve patient outcomes and quality of life while reducing healthcare costs and improving access to care.

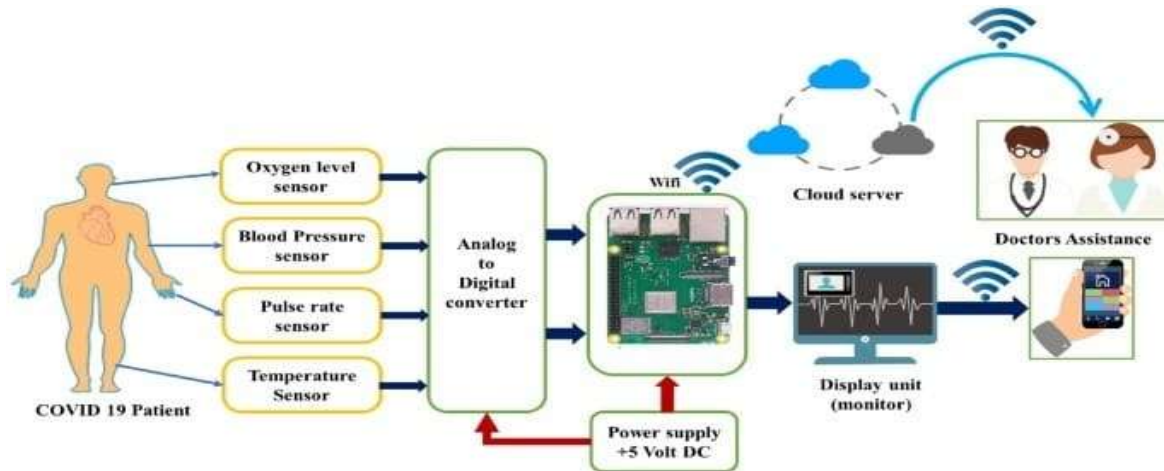


Figure 2: Architecture of health monitoring system

IMPLEMENTATION

In this paper, we have proposed a system in which patient's body temperature, heart rate, body movements and blood pressure reading results that are being monitored by the system. The various sensors are placed on the patient's body and they take the readings and send the corresponding signal to the Arduino. The Arduino is a credit card-sized single-board computer that operates on Linux OS. Here, various sensors are used to measure the patient's body temperature, heart rate, Blood Pressure and their respective results are sent to the database via Raspberry Pi and can be monitored from anywhere worldwide through the internet facilitated via wi-fi module.

The programming in is done in c language and it sends the data related to the patients' health to the server connected via Internet. The details can be easily accessed online by proper authentication and health status of the patient can be monitored. Here are the general implementation steps for a health monitoring system using IoT:

1. Define the requirements: Identify the specific requirements of the health monitoring system, such as the type of sensors, the data to be collected, the frequency of data collection, and the method of data transmission.
2. Choose the sensors: Select the appropriate sensors based on the requirements, such as heart rate sensors, blood pressure sensors, temperature sensors, or humidity sensors. Make sure the sensors are compatible with the IoT platform you plan to use.

3. Choose the IoT platform: Choose an IoT platform that supports the sensors you plan to use and provides the necessary features, such as data storage, data visualization, and analytics.
4. Develop the hardware: Develop the hardware components, including the sensors, microcontrollers, and wireless modules. This may involve soldering and assembling the components onto a printed circuit board (PCB).
5. Develop the software: Develop the software components, including the firmware for the microcontrollers, the software for the IoT platform, and any mobile or web applications for user interfaces.
6. Test the system: Test the health monitoring system to ensure that the sensors are collecting accurate data, the data is being transmitted and stored correctly, and the user interfaces are functioning properly.
7. Deploy the system: Deploy the health monitoring system in the desired environment, such as a hospital, nursing home, or personal residence.

Overall, implementing a health monitoring system using IoT involves selecting appropriate sensors, choosing an IoT platform, developing the hardware and software components, testing the system, deploying it, and maintaining and updating it over time.

III. CONCLUSION

In conclusion, a health monitoring system using IoT has the potential to revolutionize healthcare by enabling real-time monitoring of patients' health conditions and providing timely interventions when necessary. The system can be designed to collect and analysis various health parameters, including heart rate, blood pressure, temperature, humidity, and others, depending on the specific requirements.

One of the significant advantages of an IoT-based health monitoring system is its ability to collect and analyze data continuously, providing a more comprehensive view of patients' health status than traditional periodic check-ups. This data can be used to identify trends and patterns, enabling healthcare providers to provide personalized care and preventive measures that can help patients manage chronic conditions effectively.

Moreover, an IoT-based health monitoring system can improve the quality of life for patients by enabling remote monitoring, reducing the need for hospitalization and visits to healthcare facilities. This can save time and costs for both patients and healthcare providers, making healthcare more accessible and affordable.

Despite these challenges, the potential benefits of an IoT-based health monitoring system are significant, making it a promising area of research and development in healthcare. As technology continues to advance and become more accessible, it is likely that IoT-based health monitoring systems will become more prevalent, enabling patients to take control of their health and improve their quality of life.

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