IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Development Of Iot Based Health Monitoring System For Disables Using Microcontroller

R.RAJ GOWRI[1], R. LOGANATHAN[2], YOGESHVAR. P[3], RIYAS AHAMED.A[4], RAHAMATHULLA. K[5]

1,2 ASSISTANT PROFESSOR, 3,4,5 UG SCHOLAR

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING, MUTHAYAMMAL ENGINEERING COLLEGE, TAMILNADU, INDIA

ABSTRACT

The development of an IOT-based health monitoring system for disabled individuals aims to provide continuous, reliable, and real-time observation of vital health parameters using a microcontroller-based embedded platform. Disabled persons often require constant medical supervision due to limited mobility or underlying health conditions, and conventional healthcare systems may not offer timely assistance during emergencies. This system integrates physiological sensors such as heart rate, body temperature, and ECG sensors with a microcontroller to continuously acquire and process health data. The collected data is transmitted through an IOT communication module, such as Wi-Fi or GSM, to a cloud-based platform where it is securely stored, analyzed, and visualized for remote access by caregivers, family members, or healthcare professionals. Predefined threshold values are used to detect abnormal health conditions, and an automatic alert mechanism is activated to notify concerned personnel through notifications or messages, enabling rapid medical intervention. The proposed system is designed to be low-cost, energy-efficient, and user-friendly, making it suitable for long-term use in home-based healthcare environments. By enabling real-time monitoring and remote supervision, this system enhances patient safety, reduces the need for constant physical presence of caregivers, and significantly improves the quality of life and independence of disabled individuals.

KEYWORDS: Arduino Microcontroller, Internet of Things (IOT), Heart Beat Sensor, Temperature Sensor

1. INTRODUCTION

The increasing number of disabled individuals across the world has created a strong need for efficient, continuous, and accessible healthcare monitoring solutions. Many disabled persons face mobility limitations and depend heavily on caregivers or family members for regular health supervision. Traditional healthcare systems primarily rely on periodic hospital visits and manual monitoring, which may not provide timely assistance during sudden health emergencies. Delays in detecting abnormal health conditions can lead to severe complications or even life-threatening situations. Therefore, there is a growing demand for intelligent systems that can continuously monitor health parameters and provide immediate alerts when necessary.

Recent advancements in embedded systems and Internet of Things (IoT) technology have made it possible to develop real-time health monitoring solutions that are both affordable and reliable. By integrating biomedical sensors with microcontrollers and wireless communication modules, vital health data can be collected, processed, and transmitted to remote servers for continuous observation. IoT-based health monitoring systems enable caregivers and medical professionals to track patient health conditions from any location, ensuring faster response times and improved medical care. This project focuses on the development of an IoT-based health monitoring system for disabled individuals using a microcontroller,

aiming to enhance patient safety, promote independent living, and improve the overall efficiency of healthcare services.

2.LITERATURE SURVEY

B. S. Mostafa, A. H. Miry, -In this work, a system for monitoring vital health markers using IoT is proposed and implemented with artificial intelligence, specifically through fuzzy logic. The system uses AT Mega and ESP32 microcontrollers to achieve the goal of health monitoring. To help caregivers or doctors make decisions, the results are shown on a dashboard. Several sensors are used to get three applications, two of which are directly related to health, and one is related indirectly. The first application is the most important one, which checks the condition of the person and tells if it's normal, abnormal, or dangerous by measuring three vital signs—heartbeat, body temperature, and blood oxygen level. Fuzzy logic is used in the controller (Arduino) because it provides precise and fast data processing, leading to smart health services that are close to reality. The second application is for detecting the coronavirus, which is especially risky for the elderly. It uses two important signs: body temperature and blood oxygen percentage.

Saleh, B. Cherradi, O. El Gannour, -In the past ten years, healthcare systems have played a key role in improving medical services by allowing remote monitoring and diagnosis of patients' health. These systems, whether in hospitals or other health centers, have grown a lot with the help of new technologies. They are now of great interest to many countries around the world. Portable healthcare monitoring systems (HMS) rely heavily on IoT technology because of its effectiveness and reliability in many areas, including telemedicine. This paper introduces a portable healthcare system that works in an IoT environment and can be controlled via a smartphone app. The goal is to make it easy to use. The system tracks a patient's body signals and their living environment in real time and manages databases automatically. Also, the paper compares three servers to see which one is best for transferring data from the system to the servers.

M. Beri, B. Kumar, S. Tiwari -This system uses gadgets and sensors to monitor health, and it uses light to measure the amount of oxygen and other gases in the user's blood. This is something new and innovative in this era, and we have developed and achieved this IoT-based health monitoring system based on the ESP32 project. It checks the patient's levels and shows the results to the doctor online. It's small and easy to carry. It helps in finding and stopping illnesses by providing many results that show the patient's status. It is based on IoT theories. It is cheaper and smarter compared to similar hardware.

D. Hercog, T. Lerher, M. Trunti, -The Internet of Things (IoT) has become a big change in many areas, including home automation, industrial control, environmental monitoring, agriculture, wearables, health monitoring, and more. The growing number of IoT devices has encouraged schools and colleges to include IoT in their education because there is a high demand for these skills in the job market. This paper introduces educational tools and technologies that make it easier to design, build, and test IoT applications. The paper also describes an introductory IoT course that students take first, and then presents some of the projects they develop and implement later on their own.

3. EXISTING SYSTEM

In the existing healthcare monitoring systems for disabled individuals, health conditions are primarily observed through manual methods or periodic medical check-ups conducted in hospitals or care centers. These systems rely heavily on the physical presence of caregivers, nurses, or family members to measure vital parameters such as body temperature and pulse rate using standalone medical devices. In many cases, health data is recorded manually, which increases the possibility of human error and makes continuous monitoring difficult. Emergency situations may go unnoticed for long periods, especially when the disabled person is alone or unable to communicate effectively. Additionally, traditional systems do not support real-time data transmission or remote access to health information. The absence of automated alert mechanisms results in delayed medical response during critical conditions such as sudden illness, falls, or abnormal vital signs. These systems are often time-consuming, costly, and inefficient, particularly for long-term care. As a result, existing health monitoring approaches fail to provide reliable, continuous, and immediate healthcare support required to ensure the safety and well-being of disabled individuals.

4. PROPOSED SYSTEM

The proposed system introduces an IOT-based health monitoring solution designed specifically to meet the continuous healthcare needs of disabled individuals. In this system, multiple physiological sensors such as heart rate, body temperature, and ECG sensors are integrated with a microcontroller to continuously monitor the user's health condition. The microcontroller collects and processes sensor data in real time and transmits it to a cloud-based IOT platform using a wireless communication module such as Wi-Fi or GSM. This enables remote monitoring of health parameters by caregivers, family members, or medical professionals through a web or mobile interface. The system is programmed with predefined threshold values for each health parameter to identify abnormal conditions automatically. The proposed system is low-cost, energy-efficient, and easy to use, making it suitable for continuous home-based healthcare monitoring. By providing real-time data, automatic alerts, and remote accessibility, the system significantly improves patient safety, reduces dependency on constant human supervision, and enhances the quality of life and independence of disabled individuals.

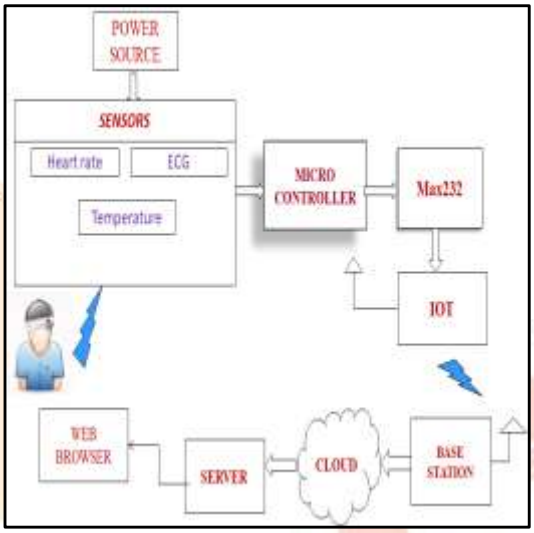


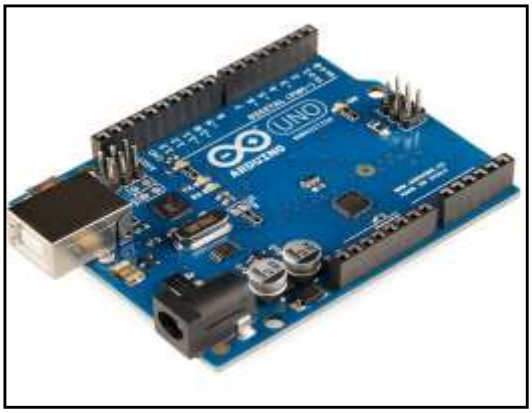
Fig :1 Block Diagram

5.HARDWARE DESCRIPTION

5.1 POWER SUPPLY

The AC power is given to a 12V step-down transformer. This transformer produces 12V AC, which is then converted into DC using a diode bridge. The 12V DC output from the diode bridge is smoothed out with the help of capacitors.

5.2 ARDUINO UNO R3 MICROCONTROLLER



The Arduino Uno R3 is a microcontroller board built around the ATmega328 chip. It has 14 digital input/output pins, of which 6 can be used for PWM output. It also has 6 analog input pins, a 16 MHz crystal oscillator, a USB port, a power input jack, an ICSP header, and a reset button. Everything required to run the microcontroller is built into the board. You can connect it to a computer via USB or power it using an AC-to-DC adapter or battery to start using it.

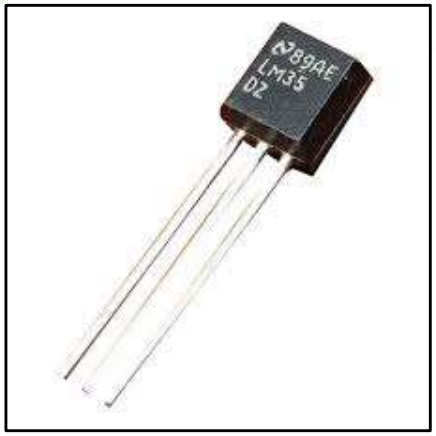
5.3 NODE MCU

Node MCU is an open-source IoT platform. It was initially built using firmware that runs on the ESP8266 Wi-Fi microcontroller from Espressif Systems, along with hardware based on the ESP-12 module. Later, support for the ESP32 microcontroller was added. When setting up the ESP8266 with Node MCU firmware, you need to use an IDE (Integrated Development Environment) for programming. Lua is the main programming language used for Node MCU. Lua is an open-source, lightweight scripting language that is built on top of C.

5.4 LCD

LCD modules are widely used in many embedded projects due to their low cost, easy availability, and user-friendly interface. Most people have seen these displays in everyday items like calculators or PCs. The physical look and pin layout are already described above. Now, let's get a bit technical. A 16x2 LCD is named because it has 16 columns and 2 rows. There are several other models like 8x1, 8x2, 10x2, 16x1, etc., but the most commonly used one is the 16x2 LCD. This means it can display 32 characters in total. Each character is made up of 5x8 pixel dots. A single character with all its pixels is shown in the image below.

5.5 TEMPERATURE SENSOR



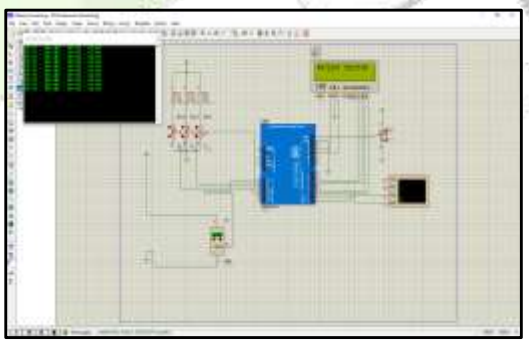
The LM35 sensor is used to measure body temperature. The sensor is placed in contact with the body to sense the temperature. It is calibrated in a linear manner to provide readings in Celsius. It has a low self-heating effect and does not require any external calibration.

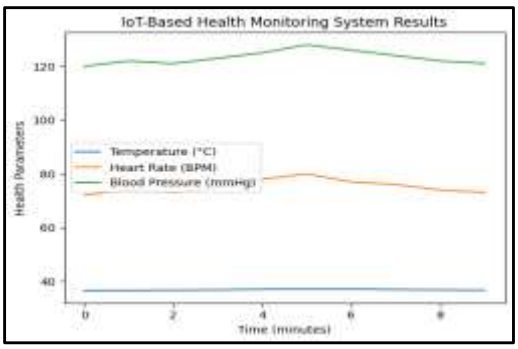
5.6 PULSE SENSOR

The pulse sensor gives an analog output that represents the heart rate when a finger is placed on it. As the heart beats, an LED on top of the sensor starts blinking. The output pin of the sensor is connected to the controller to view the data. The working of the sensor is based on the modulation of light caused by blood flow through the nerves with each heartbeat.

6. RESULT

The developed IoT-based health monitoring system for disabled persons using a microcontroller was successfully designed, implemented, and tested to monitor vital health parameters in real time. The system continuously measures body temperature, heart rate, and movement using appropriate sensors. The microcontroller processes the sensor data accurately and displays it locally as well as transmits it to a cloud platform. Real-time health data is accessible remotely through a mobile or web interface. The system reliably detects abnormal health conditions such as high temperature, irregular heart rate, or sudden falls. When such conditions occur, automatic alert notifications are sent to caregivers or medical personnel. The Wi-Fi communication module ensures smooth and timely data transmission with minimal delay. The system demonstrated stable performance during continuous operation. Sensor readings showed acceptable accuracy within standard tolerance limits. The alert mechanism improved response time during emergency situations. The overall power consumption was low, making the system suitable for long-term use. The user interface was simple and easy to operate for disabled individuals. The system reduced the need for constant physical monitoring by caregivers. It enhanced the safety and independence of disabled persons. Thus, the results confirm that the proposed system is reliable, efficient, and suitable for real-world healthcare monitoring applications.





7. CONCLUSION

The development of an IoT-based health monitoring system for disabled individuals using a microcontroller provides an effective and reliable solution to the challenges associated with traditional healthcare monitoring methods. By continuously tracking vital health parameters such as heart rate, body temperature, and motion, the system ensures real-time observation of the user's health condition without the need for constant physical supervision. The integration of IoT technology enables seamless data transmission to a cloud platform, allowing caregivers and healthcare professionals to monitor patient health remotely and respond quickly during emergencies. The automatic alert mechanism plays a crucial role in minimizing risks by providing timely notifications when abnormal conditions are detected, thereby enabling prompt medical intervention. The proposed system is cost-effective, user-friendly, and suitable for long-term home-based healthcare applications. Overall, this system enhances patient safety, promotes independent living for disabled individuals, and improves the efficiency of healthcare services. With further enhancements such as additional sensors and intelligent data analysis, the system has strong potential for real-world deployment in modern healthcare environments.

8. REFERENCES

[1] B. S. Mostafa, A. H. Miry, and T. M. Salman, "Smart health monitoring and self-analysis system based on internet of things with fuzzy controller," in AIP Conference Proceedings, American Institute of Physics Inc., Jan. 2022. doi: 10.1063/5.0067991.

[2] S. Saleh, B. Cherradi, O. El Gannour, N. Gouiza, and O. Bouattane, "Healthcare monitoring system for automatic database management using mobile application in IoT environment," Bulletin of Electrical Engineering and Informatics, vol. 12, no. 2, pp. 1055–1068, Apr. 2023, doi: 10.11591/eei. v12i2.4282.

[3] M. Beri, B. Kumar, S. Tiwari, N. Sharma, H. Vashishtya, and P. Chaudhary, "IoT Based Health Monitoring System Built on ESP32," in 2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering, ICACITE 2022, Institute of Electrical and Electronics Engineers Inc., 2022, pp. 454–458. doi: 10.1109/ICACITE53722.2022.9823528.

[4] D. Hercog, T. Lerher, M. Truntič, and O. Težak, "Design and Implementation of ESP32-Based IoT Devices," Sensors, vol. 23, no. 15, Aug. 2023, doi: 10.3390/s23156739.

[5] V. Barral Vales, O. C. Fernandez, T. Dominguez-Bolano, C. J. Escudero, and J. A. Garcia-Naya, "Fine Time Measurement for the Internet of Things: A Practical Approach Using ESP32," IEEE Internet Things J, vol. 9, no. 19, pp. 18305–18318, Oct. 2022, doi: 10.1109/JIOT.2022.3158701.

[6] K. K. Mujeeb Rahman, N. N. Mohamed, R. Zidan, I. Alsarraj, and B. Hasan, "IOT-Based Wireless Patient Monitor Using ESP32 Microcontroller," in 2023 24th International Arab Conference on Information Technology, ACIT 2023, Institute of Electrical and Electronics Engineers Inc., 2023. doi: 10.1109/ACIT58888.2023.10453847.

[7] A. Rahaman, M. M. Islam, M. R. Islam, M. S. Sadi, and S. Nooruddin, "Developing iot based smart health monitoring systems: A review," 2019, International Information and Engineering Technology Association. doi: 10.18280/ria.330605.

[8] M. Z. Chaari, R. Al-Rahimi, and A. Aljaberi, "Real-Time Monitoring of Indoor Healthcare Tracking Using the Internet of Things Based IBeacon," in Lecture Notes in Networks and Systems, Springer Science and Business Media Deutschland GmbH, 2022, pp. 332–342. doi: 10.1007/978-3-030-82529-4_32.

[9] S. Abdulmalek et al., "IoT-Based Healthcare-Monitoring System towards Improving Quality of Life: A Review," Oct. 01, 2022, MDPI. doi: 10.3390/healthcare10101993.

[10] V. Bhardwaj, R. Joshi, and A. M. Gaur, "IoT-Based Smart Health Monitoring System for COVID-19," SN Comput Sci, vol. 3, no. 2, Mar. 2022, doi: 10.1007/s42979-022-01015-1.

[11] A. Palamar, M. Palamar, and H. Osukhivska, "Real-time Health Monitoring Computer System Based on Internet of Medical Things."

[12] B. Pradhan, S. Bhattacharyya, and K. Pal, "IoT-Based Applications in Healthcare Devices," 2021, Hindawi Limited. doi: 10.1155/2021/6632599.

[13] S. Boopathi, "Internet of things- integrated remote patient monitoring system: Healthcare application," in Dynamics of Swarm Intelligence Health Analysis for the Next Generation, IGI Global, 2023, pp. 137–161. doi: 10.4018/978-1- 6684-6894-4.ch008.