



ARDUINO BASED HEALTH CARE DEVICE TO DETECT SPO₂, ECG, HEART RATE, BODY TEMPERATURE & BLOOD SUGAR

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ABSTRACT

Patients' health will be severely impacted and many illnesses may spread if they do not receive the proper care when they need it. It has become more difficult to exercise patient observation in the last several years. Therefore, a solution is required so that medical professionals may constantly monitor their patients as needed. With the rise of Internet of Things (IoT) devices in recent years, a response is expected for this. The significance of health in day-to-day living This study will help researchers and industry experts identify major IoT difficulties and comprehend the great potential of IoT in the medical arena. Being well is necessary in order to try to do the everyday work property. This project aims to develop a sensor that can be used to measure a patient's heartbeat in real time using Internet of Things technology and cell phones. This project displays a portable framework that continually monitors the patient's temperature, heart rate, and other room-related parameters using a Wi-Fi module. A recommended IoT-enabled smart home and health monitoring system allows for the use of my IoT platform to access authorised personal data and allows a doctor to diagnose a particular condition even when they are far away based on the output values obtained. An easy, practical, and reasonably priced solution to monitor your blood pressure. A Node MCU, a pressure sensor, and other Internet of Thing's concepts are combined to build an Internet of Things-based blood pressure monitoring system that uses wireless technology. The project's objective is to set up a network that will enable interested parties to remotely access the blood pressure readings of patients. Bluetooth and Wi-Fi technology enable results to be accessed on a mobile device, tablet, laptop, and other portable devices.

Keywords: Node MCU, Blynk Cloud, ESP32, and GSM.

Introduction

The Internet is a global system that can be used for sharing information and providing worldwide services and communication. The main purpose of IoT devices is to generate real-time data that we can then analyse and use to desired business outcomes. In an Internet of Things (IoT) ecosystem, two things are very important: the Internet and physical devices like sensors and actuators [1]. A healthcare monitoring system is necessary to constantly monitor the patient's physiological parameters. The main advantage of this system is the result can be viewed at any time and place. The doctors can be notified using mobile phone messages if a patient's health is abnormal. The system was using both the sensors like heartbeat sensor, temperature sensor, and blood pressure sensor. Every day, more gadgets are added to the IoT's network. The majority of these technologies are being efficiently developed in healthcare. In this project, we outline a number of scenarios in which the health monitoring system might be helpful to both patients and doctors. When there are car accidents, health monitoring systems are helpful since they allow for patient monitoring all the way to the hospital. A health monitoring system can be used for patients whose long-term surveillance makes hiring a nurse more expensive necessary. Patients who reside in remote places without access to a hospital are helped by the module.

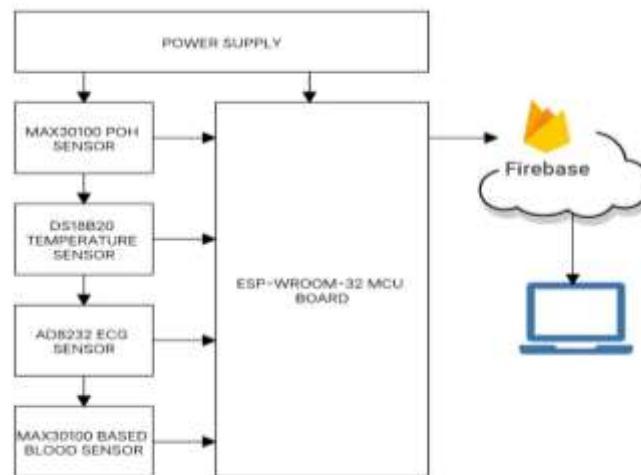


Fig.1: Block diagram

Literature

With the development of IoT networking, many researchers can evaluate the monitoring of essential parameters for healthcare services.

Tanveer Reza et al. [1] concentrate on an android-based pulse monitoring system that interfaces with a cardiac monitor. The European Journal of Molecular & Clinical Medicine ISSN 2515-8260 Volume 7, Issue 4, 2020 2648 user created an app for mobile devices using Android Studio and a web portal as the doctor's interface. The app used Bluetooth module HC-05. The created algorithm analyses the website's individual users' beats per minute data and predicts them as a graph. Arduino serves as the system's gateway and is connected to the pulse sensors in the system's architecture.

Ravi Kishore Kodali et al. [2] present the experimental configuration for the healthcare-based IoT device that uses XBee S2 modules' network protocol to monitor a patient's temperature.

The system connected the LM35 temperature sensor to Intel Galileo version 2 through its gateway. Using the Internet of Things, Surya Deekshith Gupta et al. [3] present the system design for healthcare. The Raspberry Pi and GSM module are combined in this system to observe various ECG processes that are tracked to determine the sort of heart ailment by utilizing Python coding techniques. Using the MySQL module, the outcome of heartbeat data is automatically updated in the website database. Additionally, a USB 2.0 connector with an Ethernet interface for networking can be used to obtain Wi-Fi updates.

Punit Gupta et al [4]'s service survey of the idea of medical care offers medical data information by connecting a temperature and heart rate sensor to the internet via Wi-Fi/Ethernet. The created system uses a second-generation Intel Galileo board and a Xampp-based database server to monitor patient data on a live graph and analyse health reports for further tracking.

Using phonocardiography, Jusak Jusak et al. [5] investigated a smart method for recording all the heart's sounds throughout a cardiac cycle (PCG). A framework based on the Internet of Medical Things was created, similar to the mobile module. Using a heart sound sensor, cardiac activity can be found as an ECG or PCG signal. Data about patients can be accessed by doctors.

Using a cloud data centre, media may be accessed from anywhere. In terms of sampling frequency band ratio and bandwidth utilization characteristics, the system's performance is evaluated.

Two transceivers are used in the system established by Omkar S. Alwan et al. [6] to monitor the body temperature parameter cone. The wireless transmission system is made up of two devices: an Arduino connected to a Zigbee shield and a Raspberry Pi 2 for the first device.

R. Kumar et al. [7] describe a smart monitoring system that uses a Raspberry Pi without the addition of environmental sensors or alert customization. Emre Oner Tartan et al. [8] present an Android application for alarm system-based geo-location-based health monitoring consultancy. Real-time remote heart rate monitoring, patient location tracking, decision-making for various warning



circumstances on smartphones, and consultation modules with medical professionals are all included. The prototype framework is outfitted with an Arduino Uno board and Bluetooth HC-05 module for wireless sensor data transmission to a smartphone (GPS sensor and pulse sensor). Based on 3G and 4G wireless technology, cellular networks provide internet access.

Tyagi [9] presented the various applications of IOT and also mentioned some important parameters and functionalities of each of the applications in IOT. They mainly concentrated on the roles and features of IOT in healthcare. Also discussed on the technologies that make this IOT possible in healthcare. In this paper, they have even proposed how cloud is also used for healthcare industry.

Richa [10] proposed patient health monitoring system can be used extensively in an emergency condition as they can be monitored daily, recorded and stored as a database. In the future IOT device can be integrated with computer computing so that the database can be shared across intensive care and treatment hospitals. And also, in this pandemic this health monitoring is very useful, we can avoid go to hospital regularly in this pandemic and check our self in our house only.

Conclusion

Globally, IoT-based health monitoring is expanding more quickly. Because the internet is so widely used, this work is focused on using internet technology to create a system that would communicate via the internet for better health. The healthcare industry is one of several areas where the Internet of Things is king. As a result, the current effort is being done to design an ESP32-based Internet of Things-based smart patient health monitoring system. In this, a pulse rate sensor is used to detect the heartbeat, a bp sensor to check the bp, an ECG sensor for ECG report, and a temperature sensor to read the temperature and sends the data to the cloud using the internet. This information is also sent to the LCD display, so the patient can easily know their health status. During critical situations to alert the doctor, a warning message is sent to the doctor's phone and at the same time buzzer turns to alert the caretaker. The doctor can view the sent data by logging the specific website or IP address. Hence continuous patient monitoring system is designed.

References

- [1] S.H. Almotiri, M. A. Khan, and M. A. Alghamdi. Mobile health (m- health) system in the context of IoT. In 2016 IEEE 4th International Conference on Future Internet of Things and Cloud Workshops (FiCloudW), Aug 2016.
- [2]. Gulraiz J. Joyia, Rao M. Liaqat, Aftab Farooq, and Saad Rehman, Internet of Medical Things (IOMT): Applications, Benefits and Future Challenges in Healthcare Domain, Journal of Communications Vol. 12, No. 4, April 2017.
- [3]. Shubham Banka, Isha Madan and S.S. Saranya, Smart Healthcare Monitoring using IoT. International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 15, pp. 11984-11989, 2018.
- [4]. K. Perumal, M. Manohar, A Survey on Internet of Things: Case Studies, Applications, and Future Directions, In Internet of Things: Novel Advances and Envisioned Applications, Springer International Publishing, (2017) 281-297.
- [5]. S.M. Riazulislam, Daehankwak, M.H.K.M.H., Kwak, K.S.: The Internet of Things for Health Care: A Comprehensive Survey. In: IEEE Access (2015).
- [6]. P. Rizwan, K. Suresh. Design and development of low investment smart hospital using Internet of things through innovative approaches, Biomedical Research. 28(11) (2017).
- [7]. K.R. Darshan and K.R. Anandakumar, "A comprehensive review on usage of internet of things (IoT) in healthcare system," in Proc. International Conference on Emerging Research in Electronics, Computer Science and Technology, 2015.
- [8]. Internet of Things (IoT): Number of Connected Devices Worldwide From 2012 to 2020 (In billions).



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- [9]. Balakrishna D, Sujeethnanda M, Dr. G. Rama Murthy, “Mobile Wireless Sensor Networks: Healthcare in Hospitals”, ifth International Conference on eHealth, Telemedicine, and Social Medicine (eTELEMED 2013)
- [10]. Richa, Anwasha Das, Ajeet Kumar Kushwaha, Mini Sreejeth, 2021, An IoT based Health Monitoring System using Arduino Uno, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) Volume 10, Issue 03 (March 2021).