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IOT Based Health Monitoring System

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Abstract: ***As we know that Health is a very important factor for humans. In order to maintain good health and to be able to overcome diseases it is essential to have a good healthcare system. Coronavirus outbreaks have put more emphasis on health care these days. A remote monitoring system based on IOT seems to be the better solution for pandemic such as Coronavirus. Taking advantage of the new revolution of the internet that is Internet of Things, which is an expanding research area, especially in the healthcare industry. The objective of this system is to monitor health care remotely from wherever you wish.***
Keywords: IOT, GSM Module, ESP8266, Pulse Sensor , Temperature Sensor.

I. INTRODUCTION

Maintaining a good health condition is one of the most crucial elements for human beings, and that is why a good healthcare system is necessary. Today, the health care system has become more important in light of current events such as the covid pandemic. Also, people who are physically challenged and the elderly need health care systems. This scenario can be overcome with the help of remote health monitoring systems. Remote based health monitoring systems are best implemented on the IOT given the rapid growth of technologies. As well as allowing a proper diagnosis to be made in cases when physicians are not available, IOT-based health monitoring services help prevent the rapid spread of diseases like covid-19.

A remote doctor can use IOT to monitor health and diagnose the patient's current state even if the doctor is a long way away. The patient's heartbeat, temperature, and other basic parameters of the room are constantly monitored by a portable physiological monitoring framework. To monitor the patient's health and keep the patient's data on the server, We recommended a continual surveillance and control system. IOT is proposed for remote health monitoring with the aid of data stored by authorized persons and doctors are able to diagnose diseases remotely based on the data they receive from the IOT platform.

We are designing and implementing a Smart health monitoring system as the main goal of the project. Sensors track the patient's live health status and information is sent via the internet to the doctor. In addition, the purpose of developing the health monitoring system is to make health care cost feasible for the individual by reducing the amount of time spent in meetings with doctors in hospitals. Those who require continuous monitoring outside of hospitals need smart healthcare. Furthermore, it is important if nearby clinics can communicate with city hospitals about the health status of their patients. The purpose of this work is to present a smart health monitoring system that uses various sensors to monitor patient conditions and informs the concerned party of such developments through the internet.

A website and Android application are developed to view the results of the biomedical sensors connected to an ESP8266. For storing and visualizing data on a smartphone, data is communicated to the server. For patients and family members to easily access the patient's information, an Android application has been developed.

This project aims to develop a smart patient health tracking system, which uses sensors to track patient's health and uses the internet to inform loved ones if anything goes wrong. Health care costs can be reduced by reducing physician office visits and hospitalizations with the development of remote monitoring systems.

II. LITERATURE SURVEY

Lei Ru , Bin Zhang, et al. [1] In the study, the wireless sensor technology is combined with the human health monitoring terminal based on the IoT to test health-related indexes. The test results are analyzed. It is observed that the human health monitoring system of the Internet of Things is relatively stable and has functions such as an accurate collection of human health data, real-time monitoring and alarming, and evaluation of subjects. The subjects were assessed for temperature using the thermometer, which provides temperature values of 36.4, 36.7, and 36.5 (°C), respectively, demonstrating relatively accurate and stable testability. Similarly, the pulse rate monitoring module employing the ECG observes the test outcomes of 78, 78, and 79 (times/min), respectively, similar to the medical pulse meter results.

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Prajjwal Soam, Prateek Sharma, et al[2]. This paper is composed of the details on the fitness tracking applications developed in the past few years and which have a good impact on the present technology. From the review of these researches we came to know about the particular mindset of innovators to develop these systems using common sensors like normal temperature sensor, Arduino as microcontroller board, local servers or clouds. With the deep study of these researches the perfect cloud for these kinds of applications is Amazon Web services because of its security as well as the easy technique of usage. Other clouds can also be used for sending the details and for regular tracking. Also, if we can focus on these tracking systems for particular diseases or age group then they can be used accordingly with the previous data of the individual. And this data can help the patient or an individual to predict his or her fitness with the help of Machine Learning technique. As because every individual have different range of body temperature and different other details.

Bertrand Massot, Claudine Géhin, Ronald Nocua, et.al.[3] This research involved the development of wearable and ambulatory monitoring systems. The ambulatory aspect of the device leads to variety of applications, in the study of vigilance when driving, where signals can be interpreted in real-time, during continuous monitoring under extreme conditions, in the study of sports performance, for health monitoring at home, with a telemedicine system.

Shubham Banka, Isha Madan & S.S. Saranya [4]. In this paper, they have presented and proved the prototype for an automatic system that guarantees a constant monitoring of various health parameters and prediction of any kind of disease or disorder that prevents the patient from the pain of paying frequent visits to the hospitals. The proposed system can be set-up in the hospitals and a massive amount of data can be obtained and stored in the online database. Even the results can be made to be accessed from mobile through an application.

Anurag Anil Saikar, Mihir Pradeep Parulekar, et.al.[5]. This paper is primarily based on previously published papers, MedCare: Tele-admonishing system VMATap: Virtual medical assistance on tap and emergency telemedicine system for ambulances by the same authors. Here the authors propose enhancements over the constraints in the previous system, amongst various other aspects. In this paper a solution has been proposed for providing better health care services in developing countries like India, keeping in mind and attempting to overcome the infrastructural (and other) issues. The proposed system specifically focuses on providing panacea during the emergency medical situations, while keeping the system as stable as possible.

Ms. Shinde Sayali P , Ms. Phalle Vaibhavi N [6]. Smart health care system has enhanced features due to IOT. Intelligence of work has been acquiring with the help of premises of IOT. Health care system has minimized complication and complexity with the environment of IOT. All of the results of our survey of the entire medical system point to unsustainable maintenance and unutilized technologies. This problem is to be overcome by utilising upgraded and new-generation technology to its fullest extent. Evolving smart healthcare devices is a feasible way to manipulate existing healthcare. Intensification of awareness of smart diseases and implementation of government schemes to improve quality of life.

Shola Usha Rani, Antony Ignatius, Bhava Vyasa Hari, Balavishnu V J [7]. The suggested system may gather, read numerous significant patient indications, assess them in the cloud, and then alert the doctor or other concerned parties about the patient's health. It keeps track of the vital signs and looks for anomalies. These anomalies alert the medics and thus reduce the manual monitoring. The system uses MQTT communication to send the data to cloud platform. This message protocol transmits the vital signs of significant patients and enables a web interface to display information in pictures.

R. Anandh & G. Indirani [8]. In this model patient information are collected using various sensors and the gathered information are put in the cloud through Thing Speak. The gathered information are also shown through LCD. Doctors can access the data from anywhere and there is no problem even if patients forgot to bring their report while consulting a physician.

Samir K Amin, Dinesh Kumar Saini, Yazan S.K.Al-Gnabi [9]. Agent technologies are rapidly gaining pace in health informatics and proved to be very useful in the designing health informatics systems. Multi agent systems are becoming proactive and intelligent in terms of health data and clinical follow up. MAS which are capable of realising a role oriented communication process in a clinical follow up. The development and use of such MAS are described, which should help to manage the course of a clinical follow up. Special attention is given to improving the communication process between follow-up doctors and nurses with patients by making appointments easier, according to patient preference with a reminder on necessary actions such as taking scheduled prescribed medicine, engaging in exercises, avoiding some kinds of food and harmful habits such as smoking before and after patient visits. Health informatics is an ongoing developing field of research and MAS has a solid role to play. With the MAS systems in place we can reduce the load on hospitals and can facilitate the doctors in follow up of the patients.

A. D. Caballero , J. J. Cabrera Lopez [10]. A general-purpose embedded system-on-chip was developed for the measurement of human-body joint angles using information gained from MEMS accelerometers.

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The contactless sensing system focuses on two inertial algorithms called Common-Mode-Rejection (CMR) and Distributed CMR (DCMR). The CMR algorithm requires two biaxial accelerometers mounted in the joint center, but this can prove to be really difficult in human limbs. Instead, the DCMR algorithm has no requirement on placing the sensors close to the joint center and uses a minimum of two uniaxial accelerometers in each segment; this provides increased adaptability for sensor installation. It is shown that, assuming rigid-body kinematics and simple hinge joints, human-body joint angles can be successfully calculated without the integration errors reported by other studies when using gyroscope data. In order to ensure accuracy in the joint angle calculation process, an auto-adjustment hardware procedure is executed for each sensor. The system was characterized on a rigid body robot arm model and compared with a reference system. The experimental results showed that the algorithms were able to measure joint angles in real time, and their accuracy was high enough to be used in ambulatory human-body joint angle measurements and feedback control systems for gait assistance. Technically, the system is portable, inexpensive and easily attachable to a patient.

III. EXISTING SYSTEM

Various research studies have proposed IOT-based health monitoring systems and the prediction of disease types using various techniques. In comparison with the proposed system, the existing systems are quite different. The data is viewed only in the location of the patient in the existing IOT-based health monitoring system, which uses pulse sensors, temperature sensors, and Bluetooth modules. A Wi-Fi module is installed with some existing systems along with sensors and a cloud is accessed to view data. AC power is used by existing IOT-based health monitoring systems.

IV. PROPOSED SYSTEM

The health of a person is one of the most crucial elements of a happy and healthy life, so it is imperative to have a good healthcare system. The result of recent circumstances, such as the COVID pandemic, the health care system has become increasingly important. There were lots of people whose lives were lost due to the covid pandemic because they didn't receive treatment and didn't have beds available in hospitals. Physically disabled people and the elderly need a flexible and good health care system. As a result of a stroke, bedridden patients who are partially or completely paralyzed need continuous health monitoring. In the case of financially backward people as well as people from rural areas, visiting hospitals is extremely difficult. The monitoring of health will stop in some cases for existing systems. Moreover, doctors should be able to view patients' health data by being close to them. This situation can be avoided by using a Remote Health Monitoring system.

IOT has become the best platform for remote based smart health monitoring systems due to its rapid growth of technologies. The ESP2866 mini module provides microcontrollers with the capability to connect to a WiFi network and create TCP/IP connections. The proposed system consists of a nonstop health monitoring system along with basic parameters such as the patient's condition and that of the room. In order to determine the health condition of a person, pulse rate and body temperature are the main parameters. We proposed that pulse rate would be measured with Pulse sensors, body temperature would be measured with TMP37FT9Z sensors, and humidity and room temperature would be measured with DHT 11 sensors. In addition to the patient's health, the surrounding environment is also important.

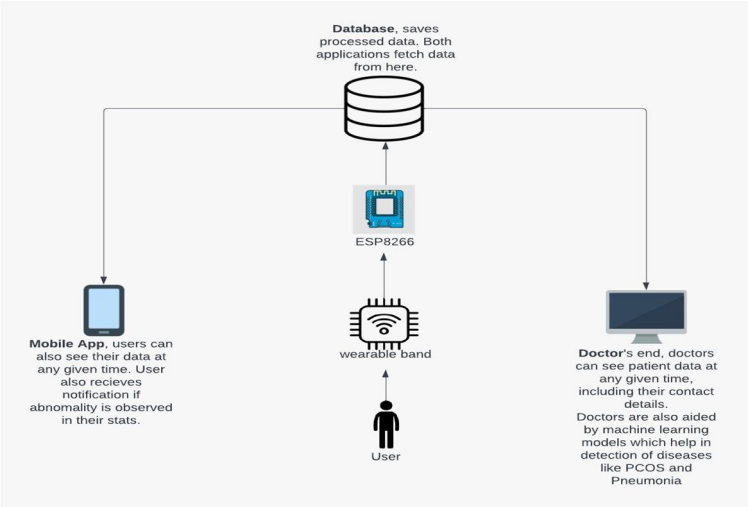


Figure: System Architecture

Through the GSM module, data is sent into a cloud where the doctor can access the patient's health from a distance. By using AC power, we powered the battery that powers the health monitoring system. These two methods allowed us to propose a continuous health monitoring system. An LCD display can be used to monitor the patient's health. Our proposal is that the health monitoring system should work in remote areas without requiring any other technologies. There will be an Android application which will show the results of the IOT readings in the application directly and also to the web application whose access will be present to the hospital the patient is being treated.

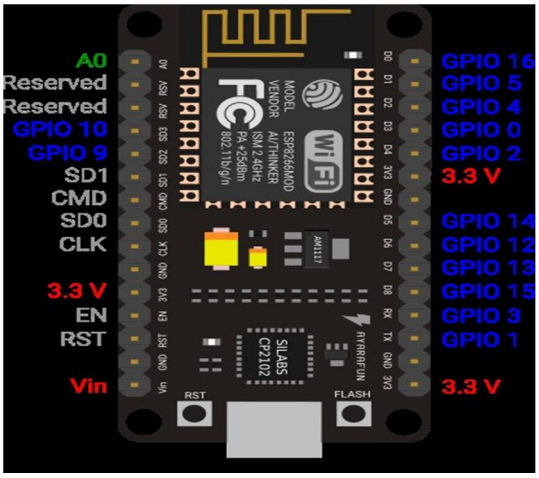


Figure: Pin Diagram ESP8266

V. IMPLEMENTATION

Developing a Smart Health Monitoring System is our main objective so the patient's health status can be monitored continuously without any disruption. In order to provide a solution for the field of health care, we invited the Smart health monitoring system to come up with a list of many drawbacks of the existing system and its shortcomings.

Using a smart health monitoring system, the patient's state of health is continuously monitored and obtained data is directly sent to a server and the website is updated. We can inform caretakers of the patient's state of health so the doctor can access patient data continuously. We proposed nonstop health checking and control instruments storing patient information in a database and continuously monitoring the patient's health. IOT is used in remote healthcare monitoring systems. By accessing the information stored using an IOT platform, the authorized person can virtually diagnose a patient's disease based on the collected values from the patient information.

When a fitness enthusiast purchases our model solely for fitness purposes, the results of the sensors will be sent directly to the user's application, where he must first provide his basic information in order for the device to recognize the user's current health status. If a doctor suggests a patient to use our device for continuous monitoring of the patient's health, he will receive an ID that he will use to register on the application. His continuous health details will then appear on the web application that hospitals can use for continuous diagnosis of the patient and immediate actions if the patient's health worsens suddenly.

VI. CONCLUSION

Regardless of the presence of the doctor, an efficient Health Monitoring System is developed to monitor the current status of the patient. As part of the system, information such as the patient's temperature, blood pressure, and pulse rate is collected and sent to the physician.

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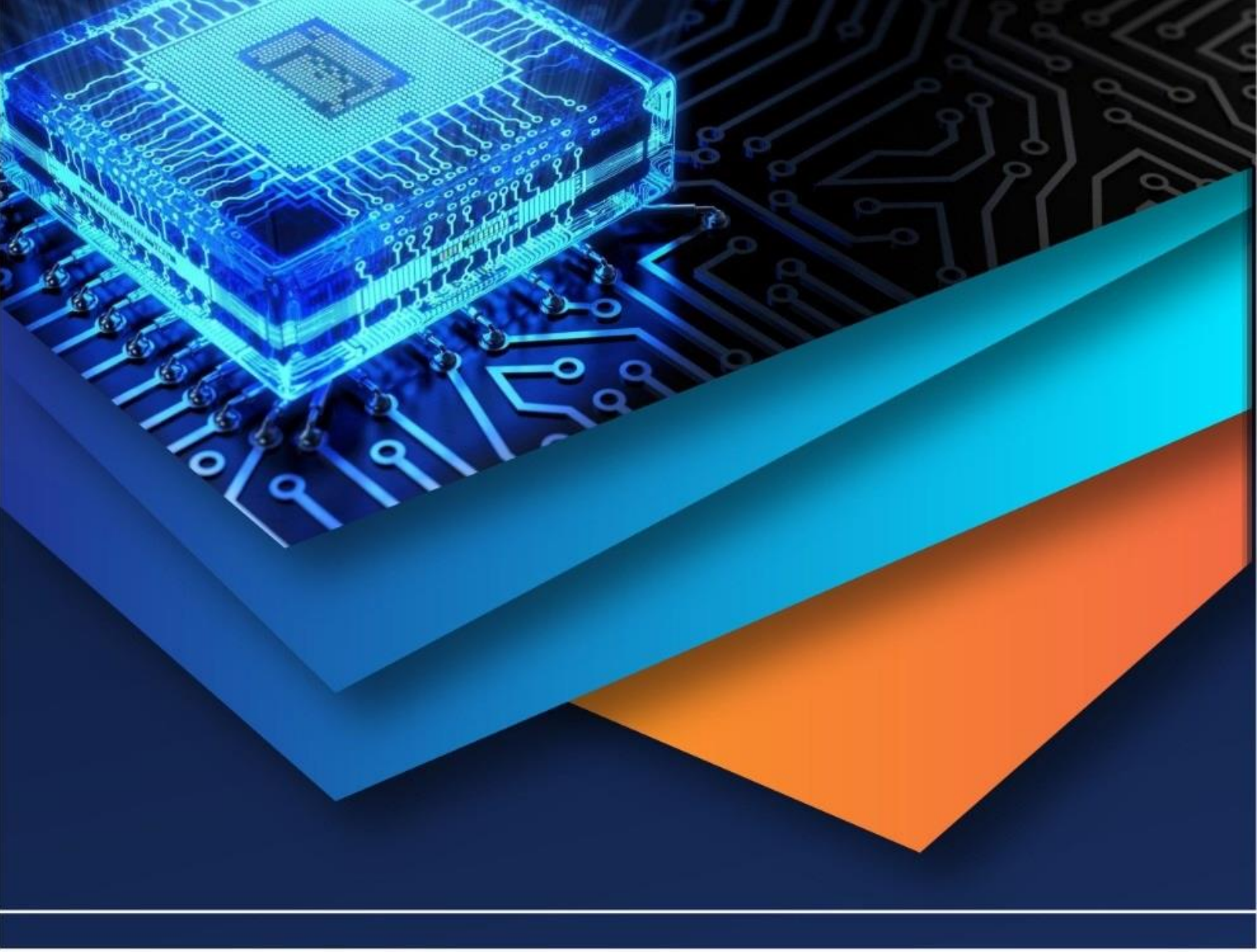
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