International Journal of Multidisciplinary Engineering in Current Research
Volume 6, Issue 10, October 2021, http://ijmec.com/

IOT-BASED SYSTEM FOR MONITORING THE HEALTH OF PATIENTS.

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ABSTRACT

New corona viruses have pushed healthcare to the top of national priority lists, and now it's also at the top of the global one. Using an Internet of Things-based health monitoring system is the best way to deal with an outbreak of this kind. Health care is a fast-growing study topic for the Internet of Things, or "IoT," which is the next internet revolution and is known as the "Internet of Things," or "IoT." Wearable sensors and cell phones, both of which are becoming increasingly widespread, are largely to blame for this rapid improvement in remote health care monitoring. The Internet of Things (IoT) may help avoid disease transmission and provide an accurate diagnostic of one's health status, even if the doctor is a long distance away. Here, an example is given of how a portable physiological checking framework may be used to constantly monitor a patient's vital signs. A Wi-Fi Module-based remote communication system was utilised to show a continuous checking and control device that preserved patient information in a centralised database while monitoring the patient's state. We present a remote health monitoring system based on the Internet of Things (IoT) that allows authorised users to access data stored on any IoT platform and diagnose ailments based on the values gathered by physicians working remotely.

KEYWORDS :- Internet of Things, Health, Sensors.

1. INTRODUCTION

As the human species progresses in terms of technology, health is always a major source of concern, and this is particularly true today. With the current corona virus outbreak in China, which has had a substantial negative influence on the country's economic growth, we can see how health care has risen to become a top concern for the Chinese government. Whenever an epidemic has moved to a new location, it is always preferable to monitor the health of those affected via the use of remote monitoring tools. A health monitoring system based on the Internet of Things (IoT) has emerged as the most effective solution as a consequence of this development.

A Remote Patient Monitoring arrangement allows for the monitoring of patients outside of typical clinical settings (e.g., at home), which enhances access to human services offices while also cutting expenses at the same time. As the name implies, the major purpose of this project is the design and implementation of a smart patient health monitoring system that use sensors to track patient health and the internet to warn patients' loved ones when there is a problem with their health. The purpose of implementing monitoring systems is to reduce the number of physician office visits, hospitalizations, and diagnostic testing procedures conducted on patients in order to reduce health-care expenses. Throughout the day, our bodies employ temperature and also pulse recognition to regulate to a healthy state of being. All of the sensors are linked to a microcontroller, which maintains track of their current status and communicates with an LCD display. Aside from that, they are capable of trading alerts with a remote association and conversing with one another. As soon as the framework identifies any sudden changes in the patient's heart rate or body temperature, the framework sends a notification to the client through the Internet of Things (IoT) and, in

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addition, shows subtle aspects of the patient's pulse and body temperature in real time on the web. It is as a result of this that an IOT-based tolerant wellbeing following framework has been developed that effectively utilises the web to screen quiet wellbeing measurements while saving persistent time. When comparing the capabilities of an SMS-based patient flourishing monitoring system with an IOT-based patient checking framework, there is a significant disparity in capabilities. When adopting an IOT-based framework, sensitive features of a patient's well-being may be observed by a large number of clients at the same time. In this case, the information should be confirmed by visiting a website or visiting a URL, which is the logic for this decision. The patient who is linked by GSM, on the other hand,

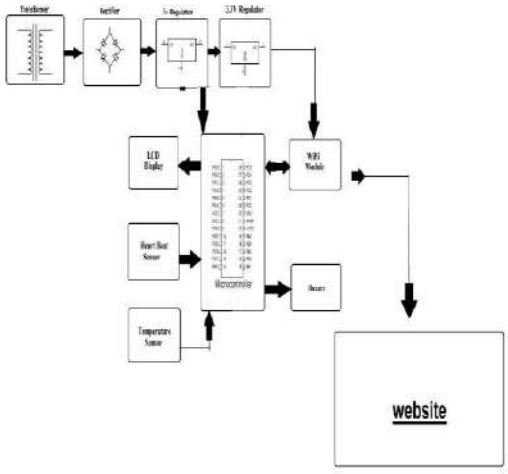

Fig 2 block digram

2. Hardwererequirments

LCD Display

Heartbeat Sensor

Temperature Sensor

Wi-Fi Module

Push Buttons

LED

PCB's

Aurdino UNO

Block diagram:

LCD Display:-

It is a thin, flat panel that is used to electrically show information such as text, photos, and moving videos. It is also known as a liquid crystal display (LCD). It is an electronically-modulated optical device composed of any number of pixels filled with liquid crystals and placed in front of a light source (back light) or reflector to generate pictures in either colouror monochrome, depending on the configuration used.

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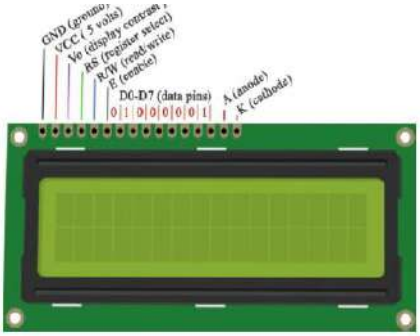

Fig 2: LCD Display

In a broad variety of applications, LCDs are employed, including LCD TVs, computer monitors, instrument panels, aircraft cockpit displays, interior and exterior signs, and many more. Additionally, LCDs are employed in medical equipment. LCD projectors are not the only portable consumer electronics gadgets that use tiny LCD panels. Digital cameras, wristwatches, and digital clocks, as well as smartphones and other mobile devices, are just a few of the goods that use these panels. The absence of phosphors in LCD panels means that they are less susceptible to picture burn-in when a static image is presented on a screen for an extended period of time, such as a table frame for an airline flight schedule displayed on an indoor sign. If you compare an LCD screen to a CRT scan, you'll see that it's both more energy efficient and more environmentally friendly to dispose of than the other kinds of displays available.

Heartbeat Sensor:-

a heartbeat sensor is an electrical device that measures the rate of the heartbeat, or the speed of the pulse Monitoring our body temperature, heart rate, and blood pressure are all important aspects of maintaining our health.

An electronic heartbeat sensor is intended to provide a digital output of the heart pulse when a finger is placed on the sensor. When the heartbeat detector is functioning properly, the beat LED flashes in sync with each heartbeat recorded by the device. It operates on the principle of light modulation caused by the flow of blood through the finger at every pulse.

Fig 2.3.2: Heartbeat Sensor

Temperature Sensor :-

When it comes to temperature sensors, the International Standards Organization (ISO) defines them as "electronic devices that detect and turn the temperature of their surroundings into electronic data in order to record, monitor, or transmit temperature variations." There are many different setups of temperature sensors available on the market today. Non-contact temperature sensors, such as infrared (IR) temperature sensors, are often used.

Fig 2.3.3: Temperature Sensor

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Wi-Fi Modules :-

The Wi-Fi Module is a self-contained system on chip (SOC) with an integrated TCP/IP protocol stack that can provide access to your Wi-Fi network to any microcontroller. The Wi-Fi module, also known as the serial to Wi-Fi module, is a component of the Internet of Things' transmission layer.

The sensors for detecting the temperature and heartbeat are connected to the Arduino development board through a USB connection. The values from the microcontroller are communicated to the web server with the assistance of a Wi-Fi connection. The parameter values may be accessed by physicians and patients through an Android application that has been downloaded and installed on their smart phones. In our system, we make use of the Arduino board. The microprocessor in the module communicates with and controls all of the other hardware components in the overall system. The major purpose of this project is the creation and implementation of a smart patient health monitoring system. In addition to being implanted in the patient's body, the sensors are utilised to monitor the patient's temperature and heartbeat. Two more sensors are put at the patient's apartment in order to monitor the temperature of the room in which the patient is now confined. Each of the four sensors is coupled to a control unit, which calculates the values of all four sensors at the same time using the information from all four sensors. These estimated data points are then sent to the base station through the Internet of Things cloud infrastructure. When the values are received from the base station, they are made accessible to the doctor, who may access them from anywhere. Therefore, a doctor may assess the patient's condition using the temperature and heartbeat data, as well as the readings from the room sensor, and take appropriate action as a consequence of this assessment.

3. Problem Statement:-

In a hospital environment, it is customary for a doctor or other paramedical staff member to be in charge of occasionally checking on a patient's status. This is accomplished by continually monitoring a number of critical parameters, including the patient's body temperature, heart rate, and blood pressure. The effect is that after some time, this task becomes tedious. As a consequence, it may cause complications. Previous efforts to address the issue in a variety of methods have been made, with the most prevalent being the use of GSM to deliver SMS messages and the use of an RF module to convey patient information from the transmitter to the receiver equipment. Moreover, while dealing with the previous scenarios, the patient's history is not presented; instead, just the most current data is shown. We will achieve this via the usage of Internet of Things (IoT) technologies. On order to keep patient data in the cloud, we will use this technology, which will enable us to preserve patient data records and send emergency alerts if necessary, as well as offer emergency alerts if required. Thus, professionals will be able to see patients' medical histories at any time and from any place as a consequence of the use of this technology. We will be able to monitor patients from a distance and

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preserve their lives by sending out emergency notifications in real time if we implement this project.

APPLICATIONS

The Internet of Things enables medical equipment to collect critical data and transmit it to clinicians in real time. Regardless of where the patient is located or what time it is, the reports offer an accurate assessment of his or her status. Patients will be able to communicate with physicians from the comfort of their own homes thanks to the linked gadgets and wearables.

ADVANTAGES

The following are the most important benefits of IOT in healthcare: • IOT allows for real-time patient monitoring, which reduces the number of needless doctor visits, hospital stays, and readmissions by a large margin.

It allows clinicians to make evidence-based, educated judgments, and it ensures complete openness in the process.

Continuous patient monitoring and real-time data assist in the diagnosis of illnesses at an early stage, or even before the disease manifests itself, depending on the appearance of symptoms.

The ability to provide proactive medical therapy is made possible by continuous health monitoring.

It is a big difficulty for anybody working in the healthcare business to manage pharmaceuticals and medical equipment. These may be handled and exploited more effectively while incurring lower expenses thanks to the use of linked devices.

DISADVANTAGES

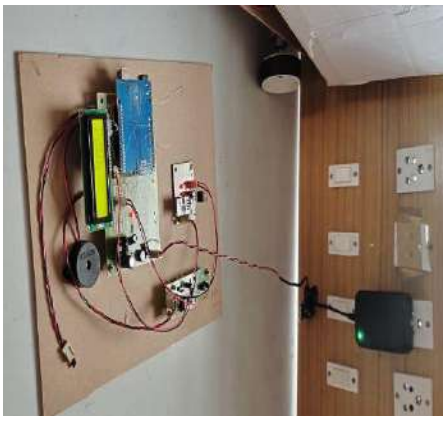
On the other hand, potential disadvantages associated with the widespread use of the Internet of Things in healthcare include:

• The right to privacy may be jeopardised in certain cases. As we've previously discussed, systems are susceptible to hacking. A great deal of attention will need to be paid to data protection, which will need large extra financial investments.

• Unauthorized access to centralization is a serious problem. There is a possibility that dishonest interlopers may get access to centralised systems and carry out their malicious objectives.

• Health-care legislation across the world. International health administrations have already issued criteria that must be properly adhered to by governmental medical facilities that include the Internet of Things (IoT) into their daily operations. These may, to a certain degree, limit the amount of capacity that may be achieved.

4. Result:



Components in the block diagram include the following: transformer, rectifier, 5v regulator, LCD display, heart beat sensor, temperature sensor, Wi-Fi module, buzzer, and website. The block diagram also includes the following components: (in English). In addition, the patient's heart rate and body temperature are shown on the LCD display device. When utilised in combination with the Arduino microcontroller, power sources with voltages of 12V and 5V may be used to power the gadget. It is usual for the temperature to be 31 degrees Celsius and the heartbeat to be 75 beats per minute at that normal period; the buzzer is in the OFF position during that normal time. Data from the temperature sensors and heartbeat sensors is stored in a database and may be retrieved at a later point in the process. When the body temperature sensor, the heartbeat sensor, and the temperature of the surrounding environment are not calibrated properly, the microprocessor is called upon to do so. Simply downloading and installing the MOBILE TELNET software on our smartphone, signing in using the IP address 192.99.41.1 and connecting to Wi-Fi are two straightforward methods of getting started. Because of the Bluetooth module, the buzzer will automatically activate and send a message to our smartphone if the patient's heart rate increases over 75 beats per minute. Following that, even if the doctor is a long distance away, medications may be delivered and the physician may advise the need for further action. It is possible to ascertain the output health state for each and all combinations of the input sensors as a consequence of this.

5. CONCLUSION

Currently, the Internet of Things is regarded as one of the most practicable alternatives for any remote value tracking application, particularly in the area of health monitoring. Individual wellness parameter data is securely stored in the cloud, hospital visits are decreased for standard regular checks, and, most importantly, the health may be tracked and illness diagnosed by any doctor from anywhere at any time, which is a significant benefit. In this study, we present the development of an Internet of Things-based health monitoring system. The system used sensors to monitor the user's body temperature, pulse rate, and the humidity and temperature of the surrounding environment, which were all shown on an LCD. The sensor results are subsequently sent wirelessly to a medical server where they may be analysed. These data are subsequently sent to a personal smart phone equipped with an IoT platform, which is permitted. The doctor may then diagnose the ailment and assess the patient's overall health based on the information he has obtained.

6. FUTURE SCOPE

In this study, we discuss the significance of Internet of Things (IoT) adoption in remote health monitoring systems, as well as the potential advantages of doing so. The small sensors combined with the Internet of Things will have a significant influence on every patient's life, allowing them to minimise their fear of danger even while they are away from home and their physician. Sensory data may be collected in a variety of settings, including the workplace and the home. Additionally, the difficulties in sensing, analytics, and illness prediction are discussed, and it is suggested that these issues be solved in order to enable a smooth integration into the medical profession.An external peripheral, such as a Wi-Fi module, is attached to the Arduino Mega 2560. • We utilise an IOT free account, which is obtained by enrolling with a certain website, in order to minimise the amount of time spent on the internet altogether. It would be ideal if it were able to see the ECG graph in the IOT server environment.

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• In this project, we can only see BP in the IOT server, which is a limitation.

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