

# IOT REVOLUTIONIZES HEALTHCARE: COVID-19 PATIENT HEALTH MONITORING SYSTEM

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**ABSTRACT:** It is critical to have medical monitoring systems designed specifically to meet the growing healthcare demands in developing countries. This is critical given COVID-19's high contagiousness. Those infected are compelled to stay under quarantine. Physical examinations of patients remain an absolute necessity for medical investigators. Monitoring individuals in solitude is growing more challenging as the number of cases increases. IoT technology is crucial to the construction of the machine that connects Wi-Fi sensors. It is commonly used in healthcare facilities to collect and transmit specific sensor tracking data about patients. This software communicates largely via wireless networks (Wi-Fi) and is outfitted with incredibly powerful sensors that are linked to the transmitter region. The gadgets contain a temperature stage tracking instrument, a heart rate sensor, a pulse oximeter, and a blood pressure sensor. These sensors, which are quickly attached to the sick individual, capture information about their condition. The medical agent receives identical information wirelessly at the position of the receiver, and as long as that receiver is working, he will surely be kept up to date on any developments involving their clients. It will also offer users with verbal instructions to help them adhere to their prescribed routine. Furthermore, a single alert gadget will be placed next to the patient in order to effectively communicate and aid with the crucial conditions of the people in their care. The alert will ring when the patient presses the emergency response button.

**KEYWORDS:** oximeter, wifi, IOT, Heart beat sensor, medical data.

## 1. INTRODUCTION

Every time people achieve progress in a set amount of time, their health is always the primary priority. Consider the present coronavirus pandemic, which has caused significant economic damage in China. In locations where the outbreak is severe, it is preferable to check on patients via remote health and fitness tracking technology. This implies that the only option right now is a health tracking device that is heavily reliant on the Internet of Things (IoT). People who sign up for Remote Person Monitoring can communicate with human services offices more affordably by promoting client statements in locations other than traditional medical facilities, such as their own homes. The fundamental idea behind this strategy is to develop and implement cutting-edge technology that employs sensors to monitor people's health and well-being and uses the

internet to immediately notify loved ones if something goes wrong. The purpose of employing monitoring devices is to decrease healthcare expenditures by reducing doctor visits and hospital stays. Our bodies use temperature and pulse to determine what is wrong with us, just as medical technologies do. The sensors are connected to a microcontroller that plays music and subsequently to an LCD screen. Additionally, the group may be able to share alarms. Also, the form not only informs the buyer about the patient's status via the Internet of Things (IoT), but it also displays the patient's temperature and pulse online in a random order if it detects any unexpected changes in the patient's heart rate or temperature. As a result, Internet of Things (IoT)-based resilient well-being utilizes the internet to properly display patient health features while also extending the time frame. The SMS-based system for monitoring persons and the IOT-based system

for inspecting individuals both have significant potential. The nuances of customer success can be seen through the use of diverse clients in an Internet of Things (IoT)-based architecture. You must verify the information in the text by visiting a website or URL. On the other hand, altering elements in GSM-based visibly affect how visual information is conveyed to individuals via GSM using SMS methods. People in most rural areas may no longer be able to walk to the nearest medical center. Many individuals ignore health problems in teenagers that manifest as changes in vital parameters such as body temperature, heart rate, and others. When a character's health is jeopardized and their illness has reached a serious level, they seek professional assistance, which may cost the company money that they could have earned. This is especially crucial when a disease spreads to an area where healthcare is difficult to get. As a result, having a smart device that can be monitored from a distance could help to prevent disease transmission and possibly save many lives. The healthcare business has extensively used the Internet of Things (IoT) to connect current medical resources. This has made it feasible for older patients and those with chronic conditions to receive dependable, efficient, and intelligent healthcare services.

## 2. LITERATURE SURVEY

The Internet of Things (IoT), when combined with smart cities and healthcare, opens up a myriad of options for a variety of pursuits. Remote surveillance and real-time health structures are now the most common IoT applications in healthcare. IoT technologies can be used to monitor and control undesired occurrences, such as the global coronavirus (COVID-19) outbreak in 2020, with little regulatory burden on individuals and organizations. In contrast to SARS in 2003, COVID-19 has a higher tendency for transmission and causes respiratory symptoms and indications. Preventing people from approaching one another may slow the spread of viruses until a vaccine is created. Improved surveillance, healthcare, and transportation infrastructures could significantly minimize the spread of infectious microorganisms. When assessing an endemic, an Internet of Things

device equipped with artificial intelligence (AI) may use the following functionalities: Implementing picture ID systems and safety measures to give the people a sense of security and protection. 2) Using drones to move items, clean spaces, or distribute supplies to persons. 3) Contact tracking, applications, and AI-enhanced technologies make it increasingly difficult for individuals to join public spaces. Typically, an Internet of Things (IoT) healthcare system consists of a large number of web-enabled monitoring devices. This allows for real-time surveillance of a specific location or client congregation. Artificial intelligence (AI) can help medical devices detect the presence of a virus by monitoring body temperature, blood oxygen levels, breathing patterns, and other signals. An extra useful skill could be the ability to observe people's movements. Observing interpersonal communication patterns among people during a communicable disease outbreak can provide valuable information. Using Bluetooth technology and other gadgets, it is feasible to gain a pretty precise assessment of people's spatial utilization when walking around public places. Individuals in close proximity, say within a specified data range of 2 meters, may receive a warning about a specific trait. This minimizes the risk that an infection may spread to others. When creating these systems, addressing security and record-keeping is essential to ensuring that personal information is handled responsibly. Governments may also attempt to use such techniques and data for long-term surveillance in order to influence and improve public behavior during a pandemic. Certainly, everyone wants to live a trouble-free, physically healthy, and peaceful life, regardless of their geographic location, sexual orientation, age, or health state. However, certain circumstances, such as advanced age, illness, medicine use, living in a medical facility, disease outbreaks, worldwide pandemics, and similar situations, continue to pose challenges. With the introduction of health and well-being surveillance technologies, it is now much easier to maintain a balanced and healthy lifestyle. In addition, these platforms improve communication between healthcare experts and the general population. This allows for exact

monitoring, assessment of physical fitness levels, routine medical checkups, and easy access to a healthy way of life. Furthermore, sophisticated health and well-being monitoring systems and support structures are improving their ability to help people lead better lifestyles. This is possible because to advancements in information and communication technology (ICT) and the proliferation of the Internet of Things (IoT).

Zikali's research shows a link between the growing proportion of elderly people in the population and the corresponding increase in demand for health surveillance. According to the same research paper, the old population is expected to outnumber newborns and children by 2045. This is because people believe that the old are more vulnerable to life's perils. According to recent population surveys, this is because an increasing number of people are getting older. The global lack of home health and wellness aides, nursing assistants, and home hospital therapists adds to the high cost of senior care. A fitness and health monitoring system can thus drastically minimize a client's hospital stays, wait times, and general health risks, as well as their reliance on social interaction. Furthermore, it has the ability to dramatically reduce the worry, tension, and workload of medical workers. Telemedicine solutions and a wide range of exceptional portable scientific instruments are now much more available to the general population because to advances in voice and data communication, which allow connections at any time and from any location.

Intelligent home technology has improved people's health and made medical care more accessible to the elderly and crippled. This permits people to live in their own homes, rather than in specialist facilities like hospitals or nursing homes, in a state of freedom and comfort. The hospital treatment device, a critical component of the intelligent home automation system, will enable better medical care for people getting care at home or in rural areas. Patients may experience less anxiety as a result of being confined to their hospital rooms alone. Physicians can use computers to perform scientific evaluations remotely, write medicine prescriptions, and

analyze key health indicators while treating patients in their offices. Smart home healthcare devices use advanced software and system technology to allow users, particularly the elderly or disabled, to completely control certain household equipment via smart phones, tablets, computers, and the internet.

### 3. EXISTING SYSTEM

Because of the emergence of the unique coronavirus, healthcare has become the most significant aspect of US policy. As a result, the best strategy to combat one of these illnesses is to employ an Internet of Things-enabled fitness monitoring device. The Internet of Things (IoT) is a high-tech web platform that is becoming increasingly popular, particularly in the health-care industry. This aspect of remote health care tracking has improved as more people use wearable sensors with their cell phones. Even when a scientific expert is not physically there, IoT surveillance for well-being monitoring works effectively to prevent illness spread and provide precise measurements of a person's fitness state. This essay discusses developing a small gadget that can monitor a person's temperature, heart rate, and other fundamental environmental variables. We recommended utilizing a tool that regularly checks for and resolves user difficulties, similar to how user data is stored on a web server using Wi-Fi-based remote file storage. A product that employs Iota technology that is commonly suggested for tracking fitness and wellness. According to this tool, anyone with the appropriate permissions can access data collected by any Iota tool. The data is solely used to speak with doctors about identifying medical issues based on the information gathered. Also, there is already a system in place to monitor a patient's vital signs, such as temperature and heart rate, and it sends data to the cloud every 15 seconds. Another scientist created a wireless health tracking device that can function even when a patient is not in the hospital but is in a critical condition because it is connected wirelessly. A variety of sensors are connected to the CPU. These contain modules for measuring fingerprints, blood pressure, temperature, and pulse rate. The

GSM module connects these devices to the sensor node, which allows the equipment to measure the patient's physiological features. The doctor learns about the patient's condition via SMS from the GSM module. This project was designed to be wireless and satisfy the needs of both regular patients and those affected by COVID-19. It is advised to avoid using a heartbeat tracker because heart problems have a significant impact on the health of people with COVID-19. So, the suggested Internet of Things (IoT) strategy for monitoring COVID-19 patients' health is beneficial to those who have been infected with the virus. Another researcher developed a device that uses an ECG tracker to monitor patients' physiological data. Using the Internet of Things, doctors may monitor their patients' health issues from afar. The ECG tracker continuously collects the patient's data and delivers it to the cloud as a graph. People affected with COVID-19 should also contribute to our study. However, the patient's electrocardiogram (ECG) was the primary method utilized to monitor the experiment, which is inadequate for COVID-19 individuals. A new COVID-19 patient health tracking system is being developed to address the needs of COVID-19 patients in terms of blood pressure, heart rate, temperature, blood oxygen levels, and other physiological indicators. Another system is implemented that uses video tracking to monitor the health of patients. These benefits are beneficial for the elderly or those who are ill and require assistance with daily duties. COVID-19 patients can also benefit from this technology, which allows doctors to monitor their health via video tracking. The DS18B20, ADXL345, AD1015, and DS18B20 tire designs are Internet of Things (IoT)-based health tracking systems created specifically for rural residents. You can link these gadgets to the Internet of Things (IoT), which will send data to a cloud server.

#### 4. PROPOSED SYSTEM

Because of the rising demand for healthcare services, this rapidly developing country requires clinical tracking devices. Because COVID-19 is extremely contagious, it is necessary to separate affected people from others. Nonetheless, medical

practitioners want to regularly examine the health of COVID-19 patients. As the number of COVID-19 cases grows, it becomes more difficult to provide entertainment for the hundreds of people who are currently confined. An IoT-enabled wireless sensor network with a specific device format is being declared. It is typical to collect more data before relocating the numerous sensors that monitor patient information in medical institutions. The application has a wireless community network (Wi-Fi) and a variety of sensors, including a pulse oximeter, temperature sensor, heart rate detector, and blood pressure sensor. Each of these sensors is linked to an element of the transmission. Similarly, in order to get customer input through sensing devices, these sensors are quickly attached to people. The clinical agent is located within the receiver area, where the same information is provided wirelessly. Aside from that, he'll have access to all patient reports through the receiver issue. Additionally, it will provide patients with aural reminders to take their medications at the times suggested by their physicians. In addition, a single, loud chime will be set at the client's home to alert others in the case of a medical emergency involving the patient.

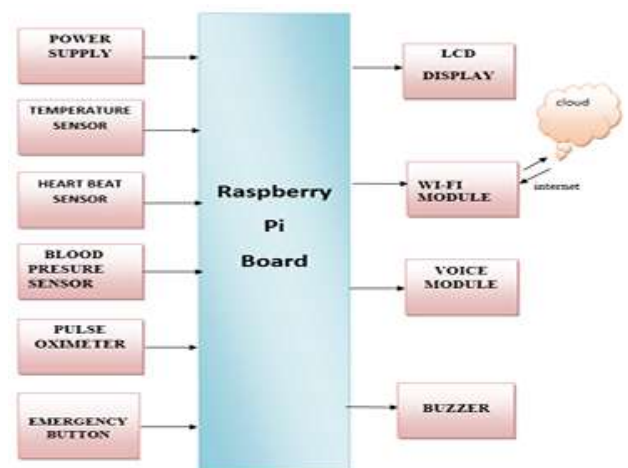


Fig.1. Block diagram.

##### A) Temperature Monitoring Sensor:

We use an analog LMS35 temperature tracking sensor to continuously monitor the temperatures of our patients before transferring the data to the cloud. Doctors should use Internet of Things (IoT) technologies to monitor their patients' body

temperature. The temperature sensor is depicted in the image below (Figure 2).



Fig 2. Temperature (lm35) sensor

### B) Heart Beat Sensor:

The heartbeat tracker monitors the patient's heart rate throughout time. The sensor is coupled to a Raspberry Pi microcontroller, which monitors the heart rates of COVID-19 patients and uploads the data to the cloud. This sensor should include an LED light source as well as an LED light sensor. Figure 3 shows an image of the heartbeat sensor.



3. Heart Beat Sensor

### C) Blood Pressure sensor:

As part of this study, a BMP280 blood pressure tracker is used to continually monitor COVID-19 patients' blood pressure and communicate the results to the cloud.

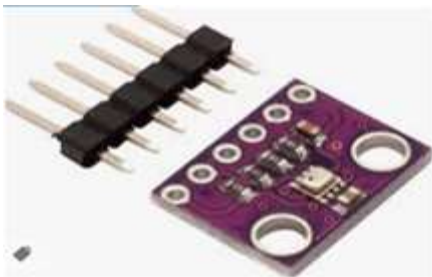


Fig 4 Blood Pressure sensor

## 5. EXPERIMENTAL RESULTS

Utilizing supported ways allows you to live a useful and comfortable life. One of the most crucial elements of any smart home automation system is the ability to operate and monitor home systems remotely. As a result, it is suggested that we create a device that not only monitors and controls activities in the home, but also encourages its users to live better lives. As Iota

grows, smart home automation has made significant progress in a variety of areas, including making daily life easier and better, particularly by providing human assistance; allowing you to control home appliances from a distance; detecting movement inside the home; lowering energy costs and increasing safety; and providing medical care to the elderly, disabled, and people who are not in hospitals. Regardless, it is critical to carefully consider the design of a device that can monitor health and fitness while also performing housekeeping. Taking this into account, consider the following scenario: John has been released from the hospital but is instructed to remain in bed at home because his doctor has to check on him on a frequent basis. John requires certain comforts when he returns home, such as the ability to turn on the TV while lying down on the mattress and alter the settings for a light or fan without leaving the bed. This is why we decided to assist folks like John by recommending an effective home healthcare automation solution. The recommended equipment monitors the home and stores physiological data in a module. The module then transmits the recorded parameters to the doctor. That looks a lot like it.



Fig.5 pulse oximeter interfacing.

The second fallacy stems from the ongoing global pandemic. To restrict the virus's spread, the government instructs people to stay at home, not go out with others, and avoid physical contact. A few days of self-isolation or self-quarantine is also recommended for persons who have come into contact with people who have only been tested and are not exhibiting any symptoms. People who test positive for a disease but have only mild symptoms may consider staying away from others. A person who is feeling arousal may need to self-isolate or enter quarantine. During this time, they must provide regular updates to a medical specialist and document any symptoms or



indicators of any type. As a result of this surrender, we must broaden the scope of the smart home health center treatment device to help people develop COVID-19 symptoms and indicators from the comfort of their own homes.



Fig.6 Hardware kit of the project covid-19.

## 6. CONCLUSION

This challenge features an Iota framework that assesses people's fitness and health issues and advises them on how to maintain the appropriate amount of physical distance. Creating a personal IoT node and a smartphone app is the most effective solution to the problem. The Iota sensor node may use this combination to collect information about a person's health, such as their temperature and blood oxygen saturation levels. To send data to the internet server, you must first establish a network connection on your phone. The study proposed that people be reminded to maintain their distance using an ultrahigh frequency distance-tracking device that may be used both indoors and outdoors. Using machine learning techniques on players' physical features, it is feasible to determine how they are doing and notify users in real time. When someone coughs, a vocal coughing device records and analyzes the type and severity of the cough while constantly listening to their voice. The fog-based server examines data received from an Iota node over a mobile network or a spouse link. In addition, the Iota node can be used to improve data in areas without internet connection or fog-based networks. The device can reduce the risk of contracting the Corona virus while also assisting members in keeping track of their daily tasks.

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