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# Iot Based Wellness Tracking

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***Abstract*:-** This paper introduces an IoT-based wellness tracking utilizing Biosensor Module MAX3100 for blood saturation and heart rate, DS18B20 for body temperature, and additional sensors for room conditions. The system enables remote monitoring of patients' vital signs, facilitating timely interventions. The use of ESP32 Arduino ensures secure data transmission. The proposed system enhances patient care, safety, and contributes to personalized medicine, promoting a proactive healthcare approach. Tested successfully, this system allows medical staff to monitor multiple patients remotely, minimizing infection risks and optimizing healthcare delivery.

**Keywords** : IoT,MAX30100,DS18B20

## 1.Introduction

IoT is quickly changing the healthcare sector, as evidenced by the plethora of new health IT businesses. Keeping an eye on a patient's status while they are at home can be challenging because of our hectic daily schedules. Patients who are elderly in particular require routine monitoring. As a result, we suggest a novel method that makes automating this process simple. Using a web server, our device provides an intelligent patient health monitoring system that tracks vital indications such as body temperature, blood oxygen saturation, and heart rate.. A wellness tracking system is an effective tool that people may use to monitor and manage many areas of their physical, mental, and emotional health in order to take charge of their health and well-being.In an era where the pursuit of a balanced and healthy lifestyle is becoming increasingly important, such a system plays a pivotal role in enabling individuals to make informed decisions about their health. We will use the Pulse Oximeter MAX30100/102 to measure heart rate/heart rate (BPM) as well as blood oxygen level (SpO2). To measure the body temperature, we will use the DS18B20 temperature sensor. Likewise, the patient should be placed in a room with a certain temperature and humidity so that the patient does not feel uncomfortable. To do this, we must also monitor the temperature and humidity of the room. Therefore, we will use the DHT11 temperature and humidity sensor.

## 2.Literature Survey

R. Priambodo and T. M. Kadarina [1] proposed by the 2020 IEEE International Conference on Communication Networks and Satellite (Comnetsat).Remote patient monitoring is possible in the healthcare industry with the usage of Internet of Things (IoT) applications. To stop the virus from spreading during the COVID-19 pandemic, infected individuals who are asymptomatic must isolate themselves. Medical equipment with an internet connection can be used to assess physiological parameters like body temperature, blood oxygen saturation, and heart rate, and then transmit the results to a server. Additionally, remote monitoring can lessen hospital visits from patients, which lessens the strain on medical staff. In this study, we suggest a self-isolation monitoring system for COVID-19 patients that uses the Internet to track physiological parameters including SpO2.Incoming data is continuously processed by an open source Elasticsearch Logstash Kibana (ELK) stack on the server, which is well-known for logging and indexing massive amounts of data. This allows medical professionals to examine and view patient measurement results and their location on a dashboard. In this manner, they may keep an eye on the patient's state as they attempt self-isolation at any time and take appropriate preventive measures.

A. Hidayatetal [2] proposed by the 2020 3rd International Conference on Computer and Informatics Engineering (IC2IE).The severity of the virus's transmission was shown by the increasing number of Covid-19 positive confirmed cases throughout Indonesia, especially in Banyuwangi. Information obtained from news and public media, as well as surveys carried out in Banyuwangi health facilities (Faskes), indicates that most hospitals assigned to handle Covid-19-symptom patients have not been able to provide patients with enough rapid test equipment for independent early detection. Comparably, an individual enforcing quarantine due to the Covid-19 is either placed under hospital supervision as a positive patient, or they impose their own quarantine in their house as a supervising person because the virus has recently left the red zone area. A covid-19 infectious risk evaluation is necessary. Not every Covid-19 infection patient experiences symptoms right away; they may take up to 14 days to manifest, or they may not show any signs at all. On the other hand, an individual who does not exhibit Covid-19 symptoms runs the danger of spreading the infection to others. Breathlessness, an irregular heartbeat, and altered lung function that resembles pneumonia symptoms are some of the signs and symptoms of Covid-19. The symptoms that have been seen suggest that the person's blood soluble O 2 levels are abnormal. usual blood vessels have an O 2 level between 75 and 100 mmHg. If this level is higher than usual, it will harm the lungs' cells. If it is lower than normal, it indicates that the person needs more O 2. When someone has COVID-19, they will display symptoms that are comparable to those of other illnesses, particularly pneumonia and asthma. Thus, the primary emphasis of this work was the creation of tools used to measure the level of disintegrated O 2 in the blood, which was done independently and with assistance from the medical staff. The medical community has created and made widespread use of the Pulse Oximetry Kit.

K. V. Sahukara, M. B. Ammisetty, G. S. K.G. Devi, S. Prathyusha, and T. S. Nikhita[3] proposed by the 2021 IEEE International Conference on RFID Technology and Applications (RFID- TA), 2021.In the early phases of the COVID-19 pandemic, when there was no WHO-approved vaccine or treatment, self-isolation and maintaining social distance became essential to breaking the COVID infection chain. The latent applications of Internet of Things and Radio Frequency Identification in the healthcare sectors are presented in this study. In order to do this, a smart tracking system for patient health data, including height, weight, pulse rate, and temperature, is proposed. This can be utilized by multispecialty hospitals to automate and manage their databases. The unique identification number (UIN) that this system will produce for each patient to be listed in the hospital administration system (HMS). Additionally, this UIN may be connected to a patient's medical data pertaining to vital signs for a follow-up visit. Patient data can be retrieved by RFID from any location in the world. Contact-free sensors are used with the Internet of Things (IoT) to monitor and measure the bodily parameters of patients, including height, weight, temperature, and SpO2. By using RFID tags, physicians and patients may consistently monitor a person's health status, which is continuously collected by contactless sensors.

M. N. Mohammed et al. [4]. Corona virus Illness also referred to as Covid-19 is an infectious disease that affects the human respiratory system. This virus spreads swiftly via tiny droplets that come into touch with persons coughing, sneezing, or just chatting. This virus may survive for long periods of time in the air and can even live on inanimate items.There were crowds in certain locations during this period, including the station, hospital, and shopping center. In addition to direct contact, people in those areas run the risk of contracting the virus by touching contaminated surfaces. As a result, a device capable of cleaning polluted surfaces is necessary. Robots powered by the Internet of Things could play a big role in combating the coronavirus, which lives on inanimate surfaces. The robot in the proposed system uses UV-C lamps to disinfect objects' surfaces. Health authorities will benefit from the use of UV disinfectant robots in lowering the rate of transmission.

L. Priyan, M. G. M. Johar, M. H. Alkawaz, and R. A. A. Helmi [5] proposed by the beginning of 2020, the WHO has formally classified the COVID-19 outbreak to be a pandemic due to the As of April 2021, there were 175 million verified illnesses and 3.78 million confirmed deaths worldwide. Because daily physical contact hastens the development of this sickness, a new Standard Operating Procedure (SOP) was developed specifically to manage outdoor social activities by civilians utilizing widely used social distancing techniques. Those who disobey the directive will pay a fine that is compounded at greater than RM 1,000, a maximum six-month prison sentence, or both. This study introduces a smartphone application designed to assist citizens in managing their physical proximity to others, hastening social distancing, and slowing the rate of rise in incidents. In a time when smart devices are widely available to people of all ages and backgrounds, this project can leverage the cutting-edge technology contained in smartphones to alert users and provide them the ability to keep an eye on others to avoid making physical contact. Additionally, this project offers two distinct methods for tracking users' distances. The first method uses the Bluetooth sensor as a beacon, enabling users must be aware of any other Bluetooth-capable gadgets that might be too near to one another. Another medium use augmented reality to allow users to track their distance in a real-world environment using a camera module. Additionally, this paper examines some of the techniques employed in earlier information technology initiatives to track and identify citizens' abstracts regarding patient monitoring system social distancing patterns.

## 3.Proposed Work

**Problem Statement** :

Develop an IoT-based wellness tracking solution to tackle the pressing challenge of efficient health monitoring in a digitally connected era. The system should be capable of collecting, analyzing, and interpreting diverse health data from wearable devices and sensors. Address issues related to data accuracy, privacy, and seamless integration to empower individuals in managing their well-being. Overcome technical hurdles and user adoption barriers to create an effective and user-friendly IoT wellness tracking system, contributing to the evolution of personalized healthcare. The system should integrate seamlessly with various health monitoring devices, provide real-time data analysis, ensure data security and privacy, and offer actionable insights to users. Overcome challenges related to interoperability, data accuracy, and user engagement to create a robust solution that empowers individuals to monitor and enhance their well-being effectively in today's dynamic healthcare landscape.

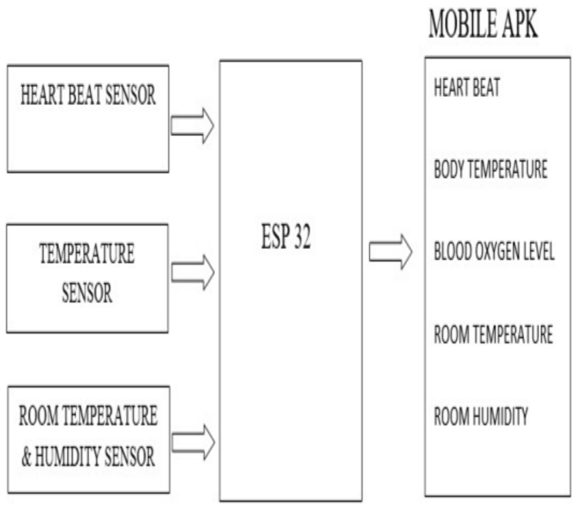
## 4.Methods

The proposed methodology for Our goal is to make the device integrated with vital health monitoring features as a single product with low cost. It can monitor and log the data for the patients and doctors to look into the health progress over the period. Through ESP32 controller, we transfer the information to the doctor for monitoring the patient’s health status through web serve.

The first step involves clearly defining the objectives and scope of the system, outlining the specific health parameters to be monitored. Selection of appropriate IoT devices and sensors comes next, ensuring accuracy and compatibility. Efficient data collection and transmission mechanisms are then established, incorporating secure protocols for data transfer to a central server or cloud platform. A robust database architecture is designed to handle storage and management of health data securely. Algorithms are developed for real-time processing and analysis, extracting meaningful insights to contribute to holistic wellness assessment. Cloud computing integration provides scalable resources, and a user-friendly interface is crafted for optimal user experience across various platforms. Emphasis is placed on security and privacy measures, adhering to industry standards. The system's interoperability, adherence to regulatory compliance, and scalability for future enhancements are meticulously considered. Thorough testing, validation, and staged deployment ensure a seamless transition, accompanied by user training and ongoing support. Continuous monitoring and maintenance strategies are implemented to uphold system performance and data integrity over time. This comprehensive methodology ensures a well-structured and effective IoT-based wellness tracking system.

Initially, it's crucial to define the overarching objectives of the tracking system, aligning them with user expectations and needs. Identifying key wellness metrics, such as physical activity and sleep patterns, informs the selection of appropriate tracking devices and sensors, ensuring accuracy in data collection. The integration of IoT technologies facilitates real-time data transmission to a secure storage infrastructure, setting the foundation for reliable information processing. Developing user-friendly interfaces accessible on various platforms enhances user experience. Privacy and security protocols are paramount, addressing concerns around the handling of sensitive health data. Cloud integration supports scalability and computational efficiency. The implementation of algorithms for data analysis yields actionable insights, providing users with meaningful feedback. Adherence to interoperability standards ensures compatibility with diverse devices, while compliance with regulatory frameworks guarantees ethical use. Rigorous testing, user training, and staged deployment contribute to a seamless introduction of the wellness tracking system. Continuous monitoring, maintenance, and a feedback loop for improvements solidify the system's long-term effectiveness, establishing it as a reliable tool for promoting and maintaining individual well-being.

**5. Block Diagram**



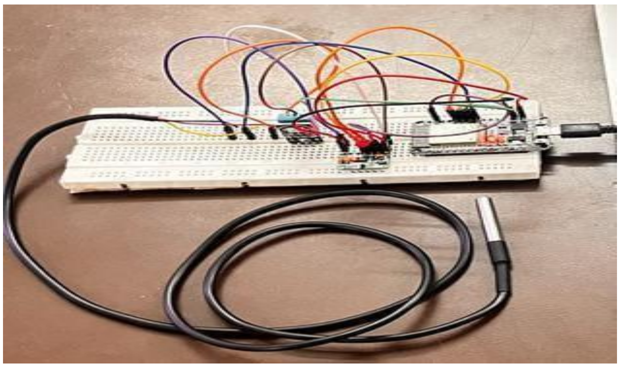

In this block diagram the ESP32 is primarily used to get the data from the input devices. Pulse sensor, temperature sensor, room temperature, and humidity sensor are input devices connected to the ESP32. The sensors' data is processed and routed through the web server. The vital health parameters of the person can be monitored by the doctor/family member from anywhere at any time. If any changes in the health parameters the indication can be made. By that the monitoring person can take the corresponding measures to normal the health parameter.

**Hardware components used:**

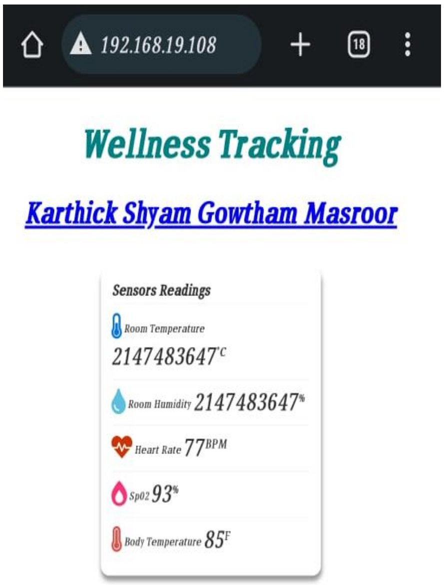
DOIT has produced a development board called DOIT Esp32 DevKit v1 for the purpose of evaluating the ESP-WROOM-32 module. Its foundation is the ESP32 microcontroller, which combines low power consumption, Bluetooth, Ethernet, and Wi-Fi into a single chip.Maxim Integrated produces a 1-wire programmable temperature sensor called the DS18B20. It is frequently used to measure temperature in abrasive settings including soil, mines, and chemical solutions. The sensor is easy to install and comes with a waterproof version, making it a robust option.The temperature sensor is a digital temperature sensor that may be programmed. This sensor communicates via a single cable. The voltage range is 3.0 V to 5.5 V. The current usage is 1 mA. The temperature ranges from -67°F to +257°F.This sensor has an accuracy of 0.5°C. The O/P resolution ranges from 9 to 12 bits. In 750 milliseconds, a 12-bit temperature is converted to a digital word. The temperature can be computed between -55°C and +125°C.The DHT-11 Digital Temperature and Humidity Sensor is a low-cost digital temperature and humidity sensor. It uses a thermistor and a capacitive humidity sensor to monitor the ambient air before giving a digital signal to the data pin (an analog input pin is not required).

With a pulse oximetry sensor and a heart rate monitor built in, the MAX30100 is an integrated solution. It incorporates two LEDs (IR and RED), a photodetector, enhanced optics, and low-noise analog signal processing to detect pulse oximetry and heart rate signals.

**7.Prototype**



**8.Results**




The suggested system was put to the test and examined. Using the appropriate tools, the temperature sensor (DS18B20), pulse sensor (MAX30100), and room temperature and humidity sensor (DHT11) were calibrated.

**9.Discussion:**

In summary, there is a greater chance that IoT will have a positive influence on the healthcare sector in the future. In addition to the expanding market for IoT in healthcare, the Covid-19 epidemic has sparked discussions about the role IoT will play in the future and how to safely link patients and healthcare providers. An option for assisting persons suffering from chronic conditions and greatly enhance their quality of life is the created Internet of Things-based wellness tracking. Patients who are in critical conditions must always be monitored. Updates on vital signs, body temperature, heart rate, SpO2, ECG, and room temperature and humidity are required for medical professionals. This system will use sensors and other devices to get this data. IoT health parameters are constantly being updated. Using smart gadgets, doctors can access a patient's health information from anywhere.

**List of abbreviation:**

1. IoT – Internet of Things

2. SpO2 – Saturation of peripheral oxygen

3. IEEE – Institute of Electrical and Electronics Engineerrs

4. BPM – Beats Per Minute

5. IC2IE - International Conference on Computer and Informatics Engineering

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