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A Smart Kit to Facilitate and Take Care of People during Quarantine using IOT

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Abstract

Most people across the globe are facing various issues during the pandemic of COVID-19. Therefore, to overcome this problem, every citizen has their responsibility to save their life first. Hence the current situation demands that by maintaining quarantine zone. Each and every one should have to use modern technology so that everyone will get self-quarantine. This project involves the different modules which help the government to find the hotspot of COVID-19 by connecting the medicals to this project. The problem originates when a COVID-19 positive person travels through different areas and when there is a need of getting information about the travel history of the person, often there is a lack of this information. This extend gives the data of an individual to the government utilizing IOT innovation. Therefore, it helps to prevent the spread of the disease with the help of IOT enabled automatic health monitoring system which will reduce the direct contact of the patients with doctors.

Keywords: COVID-19, pandemic, quarantine, IOT, health monitoring system.

1.Introduction

Due to COVID-19 population-level screening has been made mandatory, and telemedicine is ideally positioned to enable this. Since telemedicine has advanced over the last decade, remote monitoring has come out as a new and powerful modality. COVID-19 demands regular interactions with populations in real-time. Remote monitoring has certain operational and design features that are convenient for COVID-19, chiefly the asynchronous communication. Monitoring can be used in specific to gather the pandemic data and acquire real-time clinical feedback. As telemedicine is continuously growing and evolving, remote monitoring has turned out to be a valuable tool for payers, providers, and public health officials.

Due to COVID-19, telemedicine is gaining national attention, which is a long-overdue exposure. Telemedicine is a censorious component in the ever-changing environment of a spreading epidemic since it provides better care than the traditional face-to-face model.

COVID-19 is compelling an immediate re-evaluation and confrontation on how to handle such pandemic situations. Telemedicine is now enabled by the technology and the digital society, and now it is time for such new modalities of “digital health” to take charge and succeed. Telemedicine has altered the traditional belief that a face-to-face visit is required for health care. Remote monitoring is one of the three main structures of telemedicine which appears most applicable to handle the type of screening and informational challenges that COVID-19 hands out.

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Thus, this system helps in monitoring the quarantine people's health remotely with the help of IOT and wireless sensor network. Each patient will be enabled with the test kit with them. The system will continuously monitor the patient health parameters like heartbeat, temperature, and blood pressure values. Once the value reaches any abnormal value the system will send an intimation to the doctor or care taker with the help of WSN network. Then the care taker can take immediate action.

2.Existing Methodology

In the existing system, the important signs, such as wheezing levels which can predict heart issues, are not being recorded at all or not often enough. Hence the health of the patients is deteriorating. Most of the times, the patients don't get medical attention when required, which could affect their health severely. Doctors need to regularly monitor patient health.The number of patients are very high when compared to the number of doctors and hence the doctors run a risk of infection by monitoring the patients.

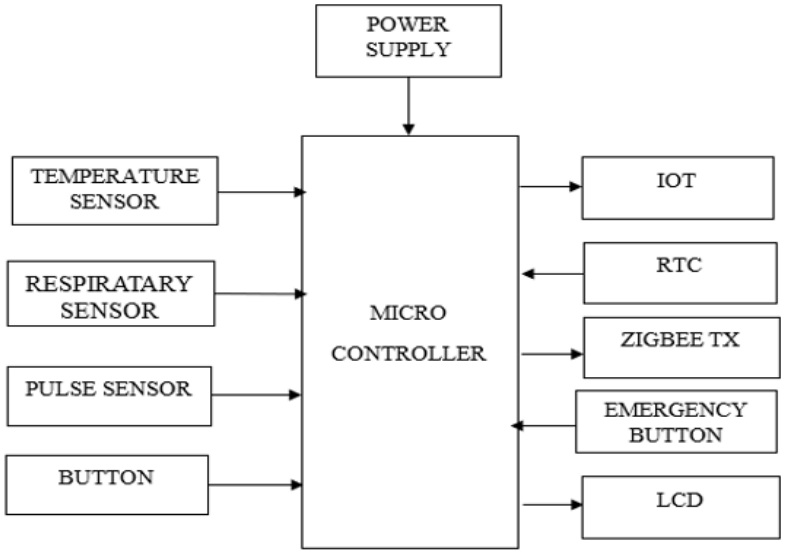
3.Proposed Methodology

The operation starts with checking the internet. The Internet of Things is widely used in the health care sector. Using the internet of things, we can establish communication between any two devices. Hence, the present work is designed as a patient monitoring system using Internet of Things. The device has a controller which is connected to various sensors.

A temperature sensor is used for monitoring the patient's temperature. A respiratory sensor is utilized to identify the breathing levels. A Pulse sensor is utilized for understanding heart beat levels and a real-time clock attached with the controller is used to check if the food is given in the right time to quarantine zone people. An emergency button is also provided which can be used if the patient is in critical condition. On the off chance if the persistent flag is high, it indicates that the patient is out of the quarantined zone. So we can effectively discover if the patient is in the zone or not. All data gets upgraded in IOT module.

4.Block Diagram

4.1 Patient section:



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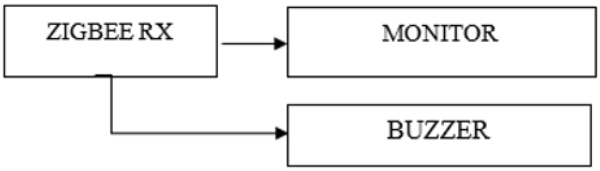
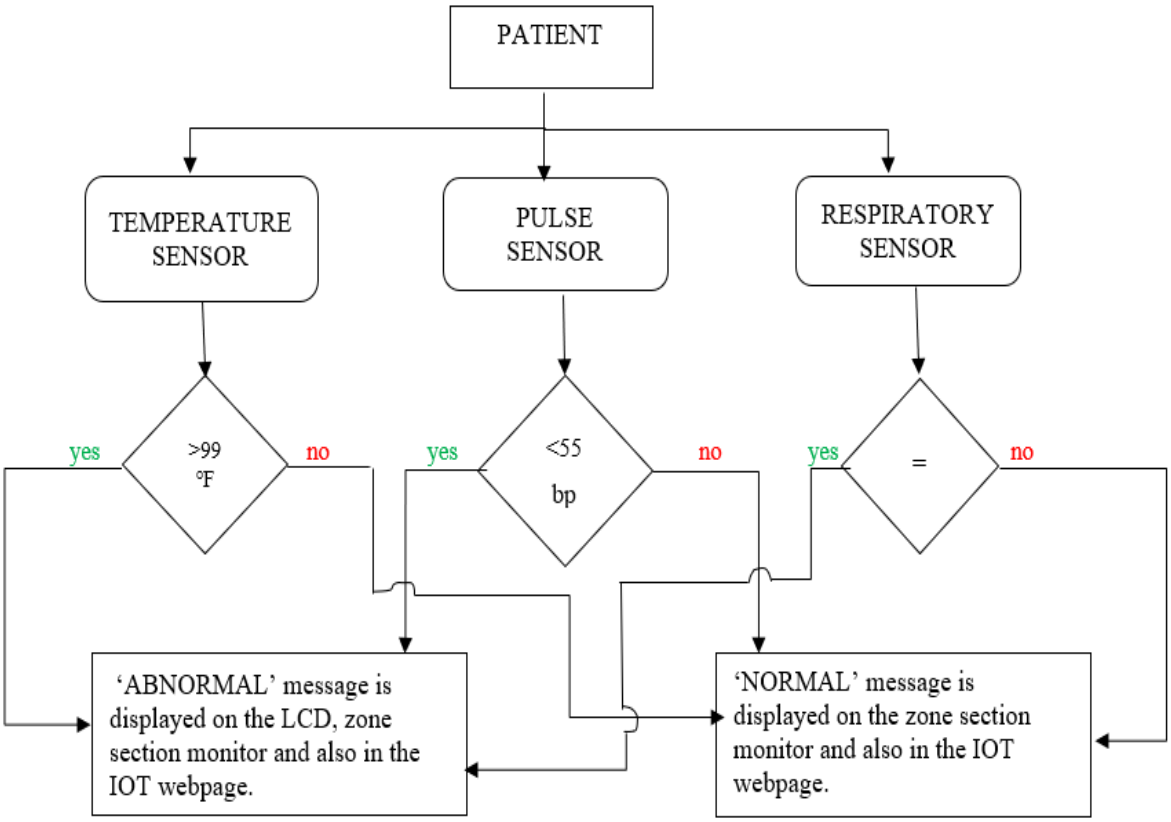
4.2 Zone Section:



5.Data-Flow Chart



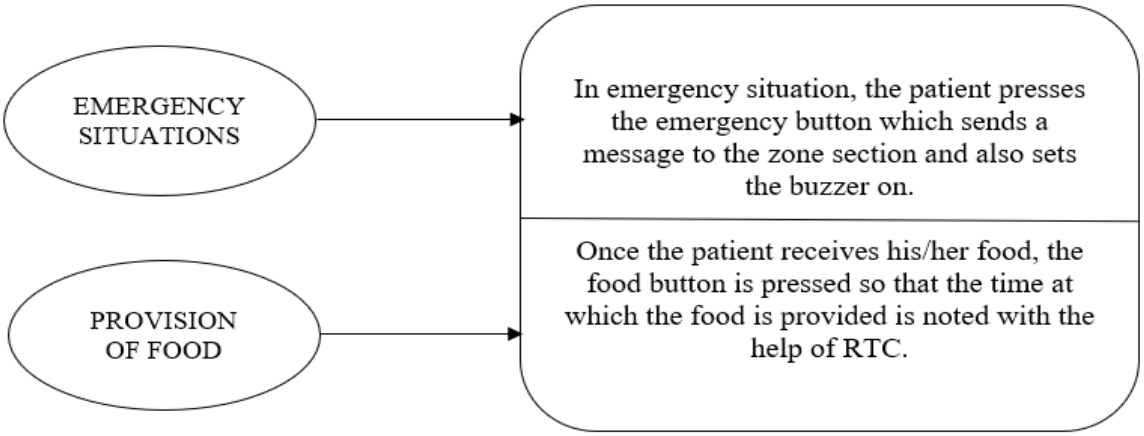


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Figure 1. Data-Flow Diagram

6.Problem definition:

The major problem faced by the Healthcare workers are

1.They need to monitor the condition of the patient at regular intervals.

2.The number of patients is high when compared to the availability of doctors.

3.The doctors themselves are at high risk of infection due to direct contact with patients.

As a solution to this problem, we have developed a system which can monitor the patients regularly and alert the healthcare worker at the zone section in case of emergency, thus reducing the physical contact with patients which in turn reduces the disease transmission rate.

7.Module Description:

7.1 Module I -Patient Section

The Respiratory sensor, Pulse sensor and Temperature sensor senses the breathing levels, pulse levels and the temperature (once in every five seconds) of the patients respectively. These readings are displayed on the LCD screen. If the readings are not within the appropriate ranges, it is notified through the LCD screen.

- ❖ Considering the Temperature sensor, if the temperature value is “100°F” and beyond, it displays a message as “ABNORMAL” along with the noted temperature, or else it displays the temperature alone.
- ❖ Considering the Pulse sensor, if the pulse value falls below “55 bpm”, it displays a message as “ABNORMAL” along with the noted pulse value, or else it displays the pulse rate alone.
- ❖ Considering the Respiratory sensor, if the respiratory state is “1”, it displays a message as “ABNORMAL” along with the state, or else it displays the Respiratory state as “0”.

These readings are also transmitted to the ZONE SECTION through the Zigbee transmitter and are displayed on the monitor.

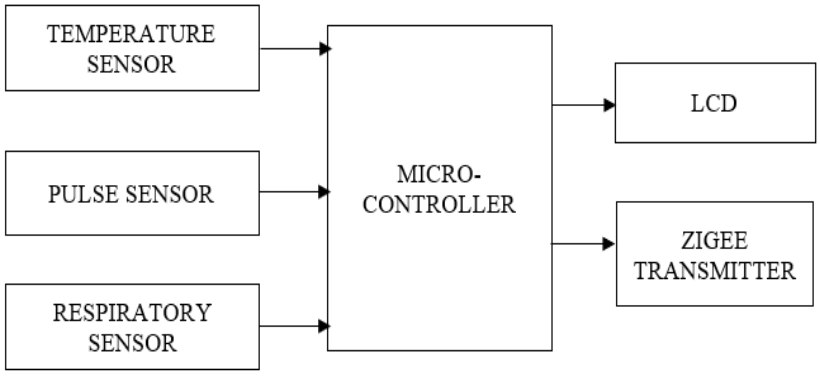

Figure 2.Sensor Readings displayed through LCD

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Table 1. Normal and abnormal ranges of sensor values

S.NO	SENSOR	NORMAL RANGE	ABNORMAL RANGE
1	TEMPERATURE SENSOR	T<100°F	T>=100°F
2	PULSE SENSOR	55 < P < =100	55= > P >100
3	RESPIRATORY SENSOR	0 (Respiratory state)	1 (Respiratory state)

The recorded sensor values are stored in cloud using IOT, which can be viewed through a web page from any device at any time with the help of a login ID and a password.

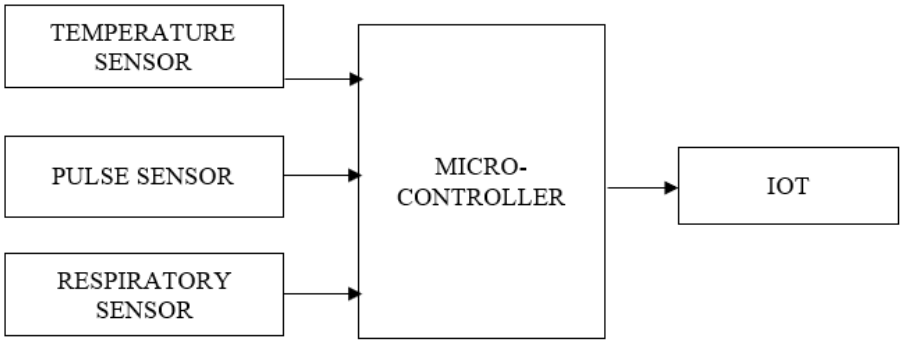

Figure 3. Sensor Readings displayed through IOT

Once the patient receives his/her food, the food button is to be pressed so that the time at which the food is provided is noted with the help of Real Time Clock. In case the patient feels to be in a critical condition, he/she can notify the person in zone section (Buzzer sound) by pressing the emergency button.

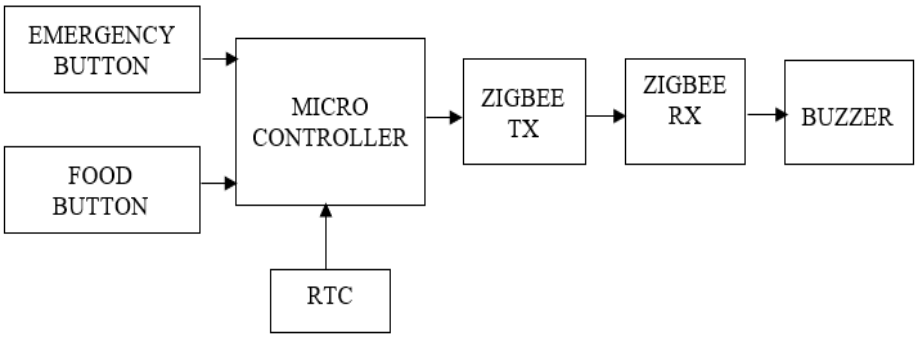

Figure 4. Food and Emergency Indication

7.2Module II-Zone Section

The Zigbee transmitter in the patient section transmits the recorded data to the zone section which is displayed on the screen through the “Real Term”

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Application. If the recorded readings aren't in the specified ranges, it displays a message saying "ABNORMAL", else it just displays it as "NORMAL".

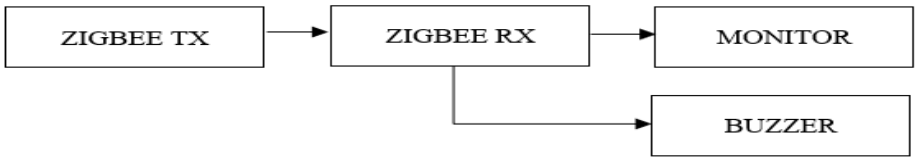

Figure 5. Zone Section monitor

8.Results

This contact-less monitoring system reduces the rate of transmission of the disease, thus protects the citizens of the nation. It also lessens the burden of the Healthcare workers as they needn't check and monitor the patients 24/7. The sensors read the values time to time which is stored in the IOT webpage for future reference and is also displayed in the zone section monitor. Through the IOT webpage, the doctors or relatives of the patient can look into the patient's condition then and there by logging in using a user id and password provided to them. If the patient feels to be in an emergency condition, they can notify the healthcare workers by pressing the emergency button which sets the buzzer on, so that immediate help is provided. By implementing this system, the patient monitoring is made much easier which in turn reduces the risk of infection of COVID-19.

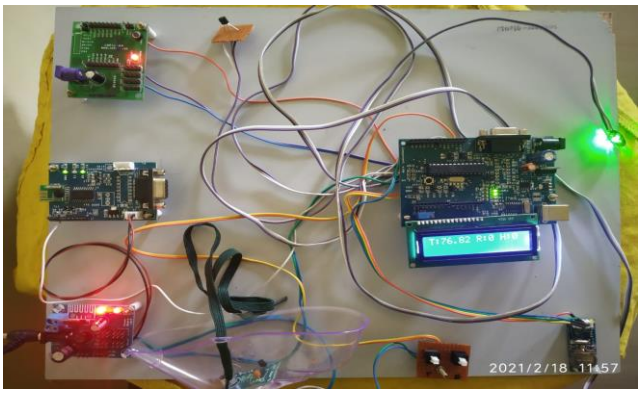

Figure 6. Patient Section

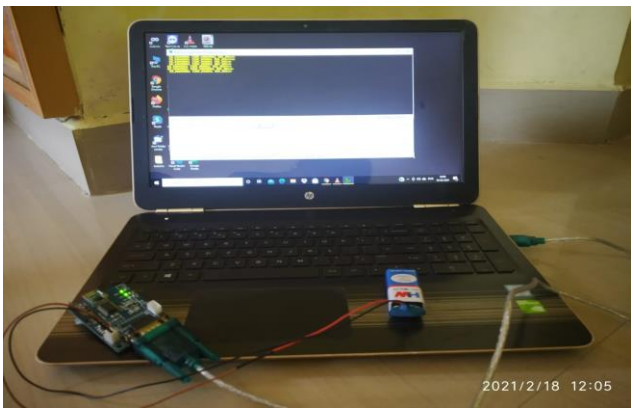

Figure 7. Zone Section

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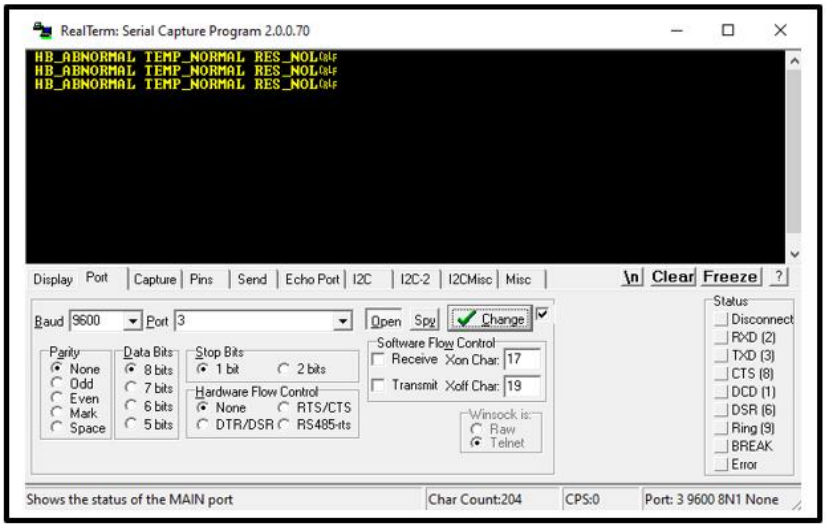

Figure 8. Real Term application in zone section

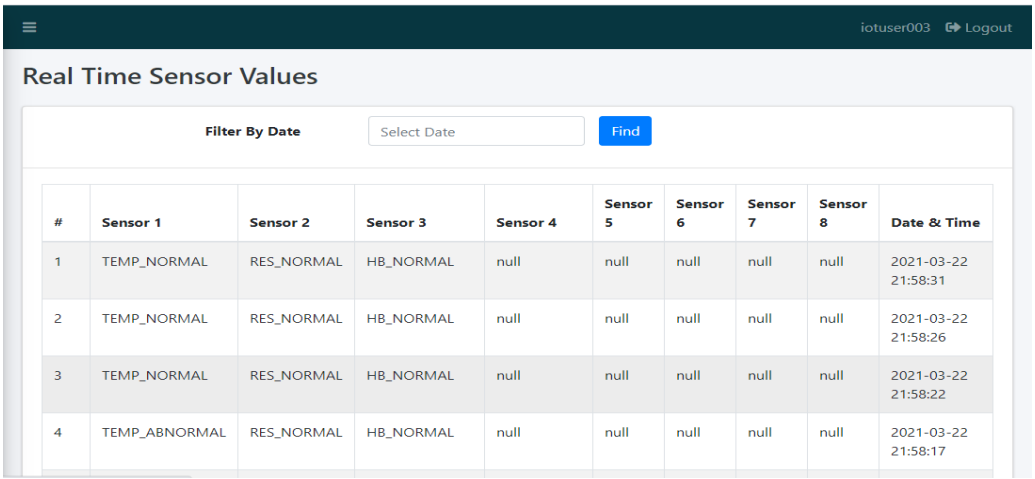

Figure 9. IOT webpage

9.Conclusions

The current work was focused mainly on making life more convenient for those who affected by CORONA and thus kept in quarantine. The new system has been developed in order to reduce the burden of doctors and also the possibilities of disease spreading. The system performs a dual role of both health monitoring and updating the monitored data to the doctors or to the care takers allotted in the hospitals in CORONA ward during an era of the pandemic. The proposed method will have a great impact on the quality of life by reducing the rate of transmission of communicable diseases. Patients diagnosed and under treatment for a disease such as COVID-19 will not have any cause to move about frequently and thus, quality of life is ensured and transmission rate is reduced.

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