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IOT Based Covid Patient Health Monitor in Quarantine

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ABSTRACT: In times of COVID we have special Covid 19 Quarantine centers setup in order to treat Covid patients. Since Covid is highly infectious it is very important to quarantine Covid patients but at the same time doctors need to monitor health of Covid patients too. With the increasing number of cases it is becoming difficult to keep a track on the health conditions of many quarantined patients. To solve this issue we here design a remote IOT based health monitor system that allows for remotely monitoring of multiple Covid patients over the internet. The system monitors patient heartbeat, temperature and blood pressure using a heartbeat sensor, temperature sensor and BP Sensor respectively. The system then transmits this data over the internet using wifi transmission by connecting to wifi internet connection. The data is transmitted and received over IOT by IOT Gecko platform to display data of patient remotely. The entire system is run by a microcontroller based circuitry. If any anomaly is detected in patient health or if the patient presses the emergency help button on IOT device, an alert is sent over IOT remotely. The system is mounted at patient bedside and constantly transmits patient health data over the internet so that doctors can monitor multiple patients remotely and attend the desired patient urgently when needed.

KEYWORDS: IOT, BP sensor , Arduino uno , BPM sensor

I. INTRODUCTION

In times of COVID we have special Covid 19 Quarantine centres setup in order to treat Covid patients. Since Covid is highly infectious it is very important to quarantine Covid patients but at the same time doctors need to monitor health of Covid patients too. With the increasing number of cases it is becoming difficult to keep a track on the health conditions of many quarantined patients. To solve this issue we here design a remote IOT based health monitor system that allows for remotely monitoring of multiple Covid patients over the internet. The system monitors patient heartbeat, temperature and blood pressure using a heartbeat sensor, temperature sensor and BP Sensor respectively. The system then transmits this data over the internet using Wi-fi transmission by connecting to wi-fi internet connection. The data is transmitted and received over IOT to display data of patient remotely. The entire system is run by a micro controller based circuitry. If any anomaly is detected in patient health or if the patient presses the emergency help button on IOT device, an alert is sent over IOT remotely. The system is mounted at patient bedside and constantly transmits patient health data over the internet so that doctors can monitor multiple patients remotely and attend the desired patient urgently when needed. Primarily, this device utilizes ARDUINO, ESP8266, Heartbeat Sensor and BP Sensor for further correspondence. In proposed system we implement the existing system in IOT platform and add some additional features to reduce human effect during the quarantine time of Covid patients like measuring some of basic parameter of patients in the routine manner. First thing is measuring blood pressure of the patient and remotely update it in could for future treatment plan by doctors. Also this proposed system includes measurement of heartbeat of patients and temperature of patients etc. In times of COVID we have special Covid 19 Quarantine centers setup in order to treat Covid patients. Since Covid is highly infectious it is very important to quarantine Covid patients but at the same time doctors need to monitor health of Covid patients too. With the increasing number of cases it is becoming difficult to keep a track on the health conditions of many quarantined patients. To solve this issue we here design a remote IOT based health monitor system that allows for remotely monitoring of multiple Covid patients over the internet. The system monitors patient heartbeat, temperature and blood pressure using a heartbeat sensor, internet using wi-fi transmission by connecting to wi-fi internet connection. The data is transmitted and received over IOT by platform to display data of patient remotely. The entire system is run by a micro controller based circuitry. If any anomaly is detected in patient health or if the patient presses the emergency help button on IOT device, an alert is sent over IOT remotely. The system is mounted at

patient bedside and constantly transmits patient health data over the internet so that doctors can monitor multiple patients remotely and attend the desired patient urgently when needed. Primarily, this device utilizes ARDUINO, ESP8266, Heartbeat Sensor and BP Sensor for further correspondence. In proposed system we implement the existing system in IOT platform and add some additional features to reduce human effect during the quarantine time of Covid patients like measuring some of basic parameter of patients in the routine manner. First thing is measuring blood pressure of the patient and remotely update it in could for future treatment plan by doctors. Also this proposed system includes measurement of heartbeat of patients and temperature of patients etc.

II. LITERATURE SURVEY

1. **Ibrahim Kareem Hannon** IoT is considered as one of the fastest growing technology in the medical and industrial fields, and one of its use is the transmission of the Medical information of the patients to the general practice (GP) or hospitals. And because of the last situation of the COVID-19, and the increasing number of the infected people, the researchers started to focus on how to transmit and monitor the patients' information remotely in order to decrease the chance of infection. This paper introduces an affordable IoT-based application aiming to decreases the chance of COVID-19 infection transmission. The proposed device can help the patients by checking their health status, while doctors remotely monitor this information. This paper presents a measuring and recording device for heart rate, oxygen saturation levels, and body temperature. An Arduino device with sensors will be used to measure these records and send them to the cloud server. The results show that the information has been sent successfully to the cloud.
2. **Nimia Chandra das** In the medical system, it is crucial to hold patient past health records to give the correct treatment to the patient and ensure the medical practitioner's physical health safety. The 'Pati-Care' patient healthcare monitoring system is a promising alternative to the conventional method of checking the human body and checking the patient health record. Despite the ongoing investigation, an outbreak of a pan-demic disease called COVID-19 it creates a situation involving exposure to a danger to medical practitioners. In this paper, we implement a Patient Care Monitoring system called Pati-Care to reduce viral diseases affection risk. We use IoT and WEB service for communication with users or patients and take his past health record and a doctor can check remotely to his patient. Our implemented prototype gathers biomedical and orientation information through sensors and re-serves it in a WEB Server. A doctor or a medical practitioner is able to assign medicine remotely and monitor patient instant health
3. **Anamika Chauhan** COVID-19 has hit the world like a storm and brought the healthcare systems along with entire economies down with it. In the age of IOT, there has been an increase in the use of interconnected sensors for automating many day-to-day tasks. Internet of Medical Things or IOMT is a subdiscipline of IOT that can alleviate the stress on the medical institutions during this pandemic and allow for remote patient monitoring at a lower cost. This paper will focus on an Android App that will measure the Heart Rate and Oxygen Saturation (also known as SPO2) of COVID-19 patients and the general public using photoplethysmography and IOT. The edge provided by our proposed model is the wide availability of a large range of sensors and microcontrollers and it's relatively low cost as compared to the current architecture being used. Another advantage of our approach is generation of data that can be used for further understanding and research. The app will then be upgraded to connect to multiple sensor devices connected to the same microcontroller module and receive data from those, hence creating a fully functional interface for complete health monitoring of patients as well as the general public at a minimal cost.
4. **M.F. Mridha** As the whole world is striving to combat the Coronavirus disease (COVID- 19), healthcare and health monitoring systems are struggling to confront the virus. Many cases have been observed where the COVID-19 could not be identified at a specific time. Furthermore, any effective strategy that can monitor the coronavirus state in the human body has not been established yet. As a result, patients of the coronavirus could not receive proper treatment when necessary. Therefore, the death toll due to COVID-19 is rising. This paper proposes a systematic approach to combat the COVID-19 pandemic more efficiently by combining the concept of 'Internet of Things' (IoT) and machine learning (ML). The paper also gives a brief idea about how IoT can be used to monitor the health status and also to detect the severity of coronavirus in a human body by using some of the biological data such as body temperature, heart pulse, etc. from the patient's body. The developed system can provide healthcare, maintain distant communication, and emergency medical support to the patients. This paper proposes a practical solution with the help of the developed health monitoring system that can mitigate the loss done by the COVID-19.

III. PROPOSED SYSTEM

Primarily, this device utilizes ARDUINO, ESP8266, Heartbeat Sensor and BP Sensor for further correspondence. In proposed system we implement the existing system in IOT platform and add some additional features to reduce human effect during the quarantine time of Covid patients like measuring some of basic parameter of patients in the routine manner. First thing is measuring blood pressure of the patient and remotely update it in could for future treatment plan by doctors. Also this proposed system includes measurement of heartbeat of patients and temperature of patients etc.

1. Block diagram

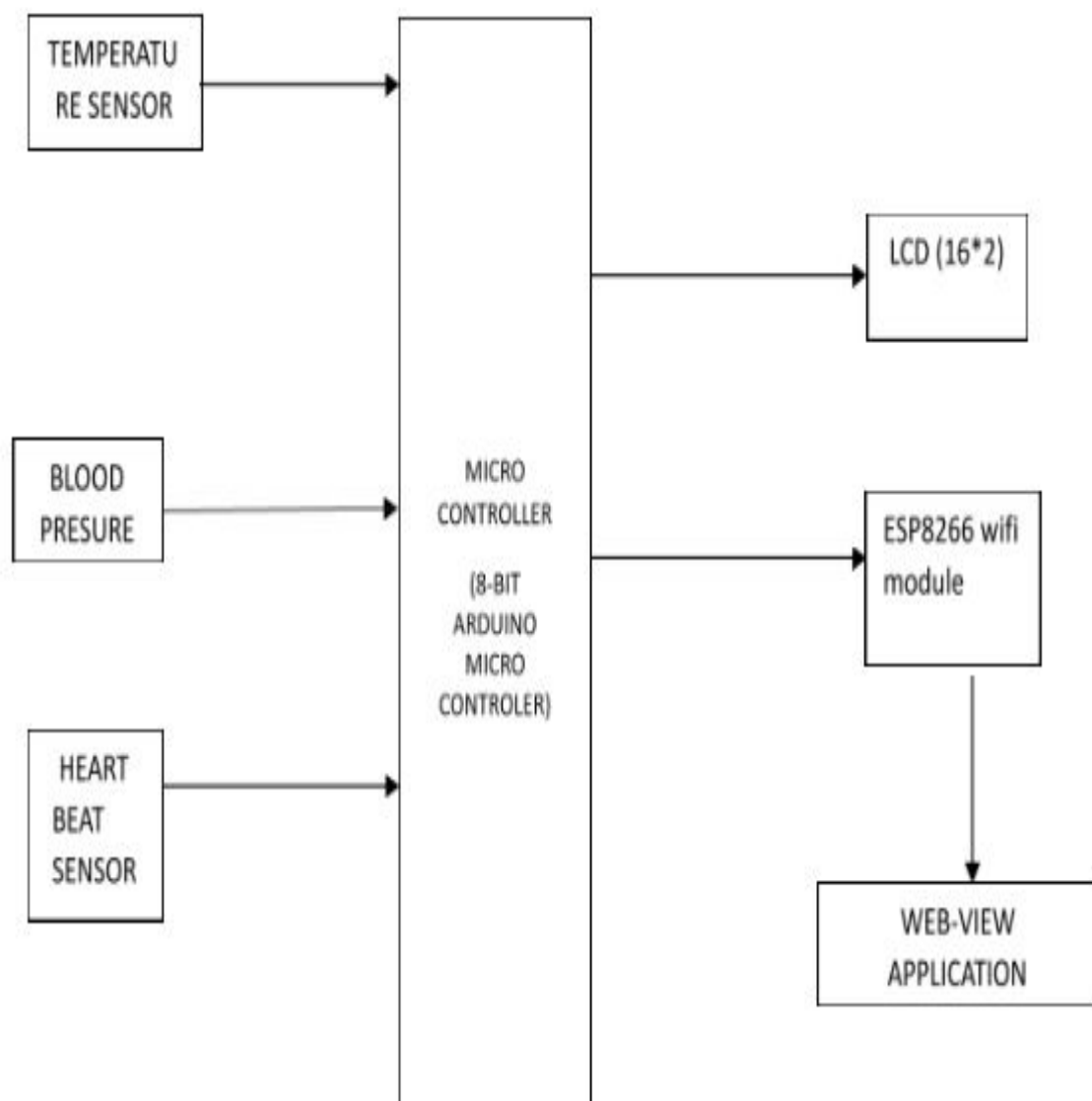


Fig 1: Block Diagram

2. Connection diagram

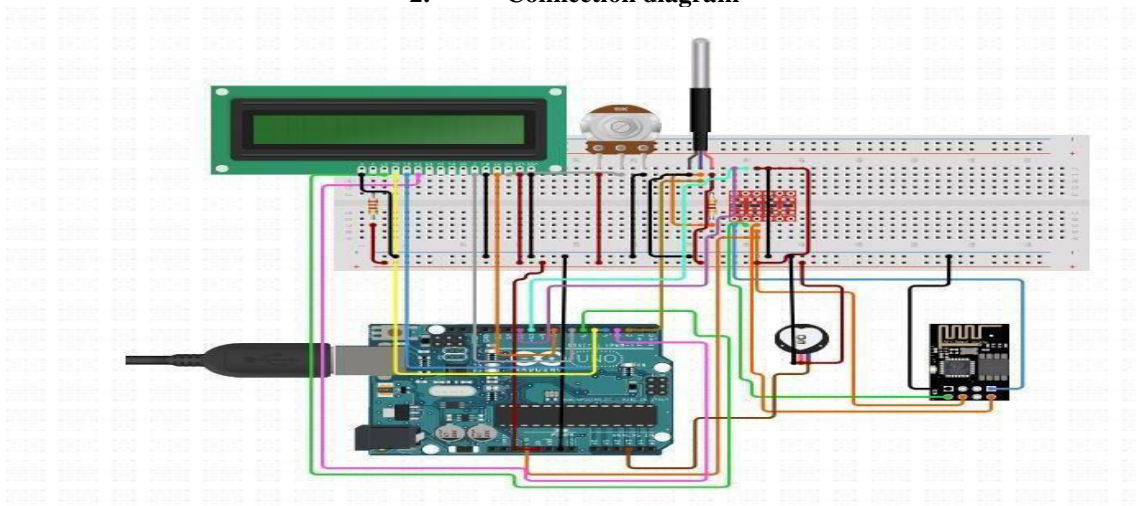


Fig 2: Connection Diagram

III. WORKING PRINCIPLE

As its name suggests, embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a Micro controller system which is designed to perform a specific task. For example, a fire alarm is an embedded smoke. A typical industrial microcontroller is quite unsophisticated compared to a typical enterprise desktop computer and generally depends on a simpler, less-memory-intensive program environment. The simplest devices run on bare metal and are programmed directly using the chip CPU's machine code language. Often, however, embedded systems use operating systems or language platforms tailored to embedded use, particularly where real-time operating environments must be served. At higher levels of chip capability, such as those found in SoCs, designers have increasingly decided that the systems are generally fast enough and tasks tolerant of slight variations in reaction time that "near-real-time" approaches are suitable. In these instances, stripped-down versions of the Linux operating system are commonly deployed, though there are also other operating systems that have been pared down to run on embedded systems, including Embedded Java and Windows IoT (formerly Windows Embedded). Generally, storage of programs and operating systems on embedded devices make use either of flash or rewritable flash memory.

- Give the power supply
- The parameters measured are blood pressure, heart rate, temperature
- The components measure the values when they are connected to the person body
- These values are displayed on the LCD display
- The values are stored in cloud server using ESP8266 Wi-fi module
- The values stored can be accessed by “**Thing speak**” platform
- The buzzer makes the sound when the values are above the saturated levels as an indication.

IV. APPLICATIONS

4.1 Can be used in quarantine: In hospitals and other medical facilities, an isolation ward is a separate ward used to isolate patients suffering from isolate diseases. Several wards for individual patients are usually placed together in an isolation unit.



Fig 4.1: quarantine

4.2 Isolation wards related to high infectious diseases:

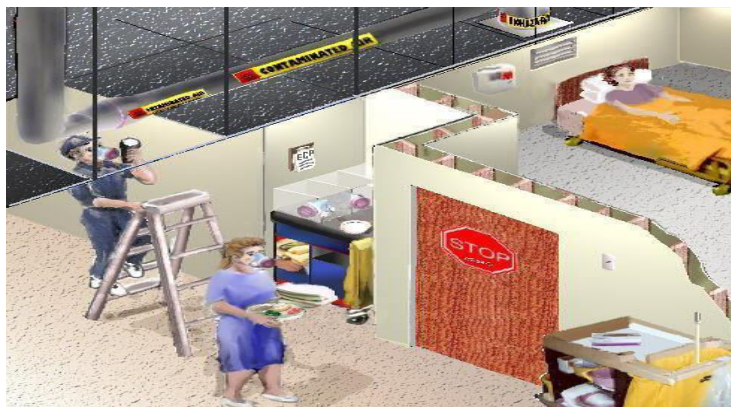


Fig 4.2 : Wards

There are several diseases other than corona like Ebola, infectious Tuberculosis, Marg burg virus disease and many in that case this type of diseases will be very helpful in that case Scientists predicted that there is a chance that this type diseases can occur in future.

V. RESULTS

- The values are displayed on the LCD are temperature, pulse rate, Blood pressure



Fig 5.1 : LCD Values

- Circuit Diagram is as follows

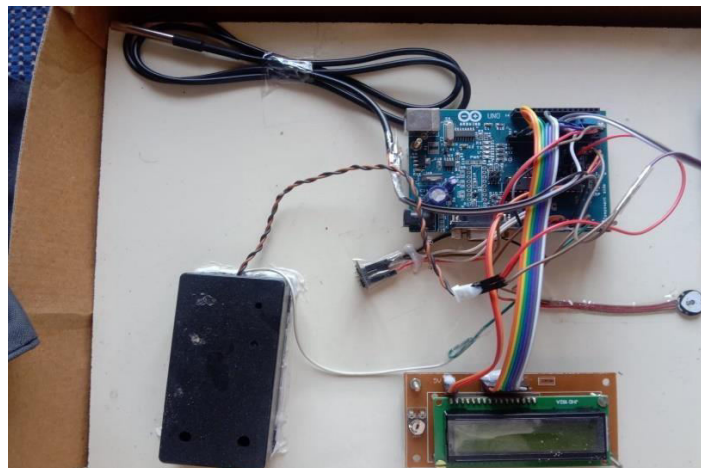


Fig 5 2: Circuit Diagram



Fig 5.3: Measuring of Blood Pressure

- Measuring of Blood Pressure with help of Blood Pressure monitor.



Fig 5.4: BP Field chart

- Representation of Blood Pressure value in Thing Speak platform

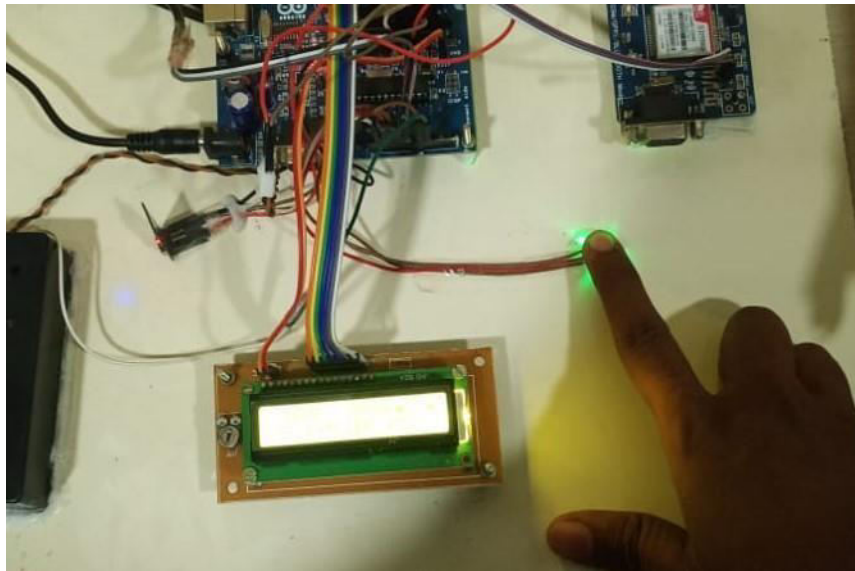


Fig 5.5: BPM Sensor

- Measuring of BPM value by touching the sensor

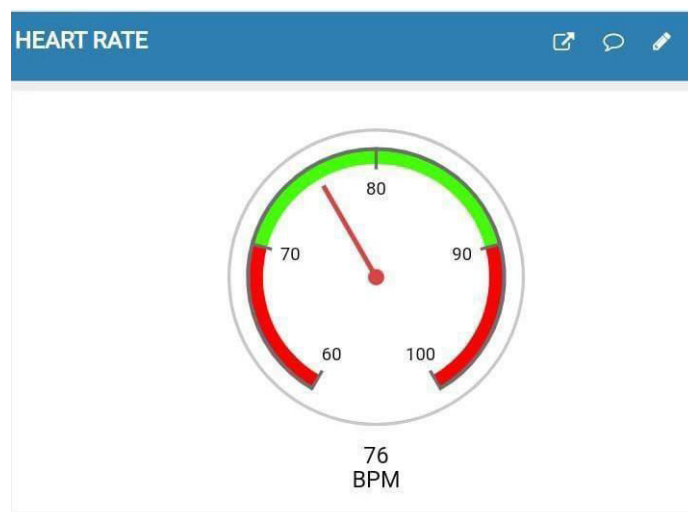


Fig 5.6: BPM Value

- Representation of BPM value in Things speak platform

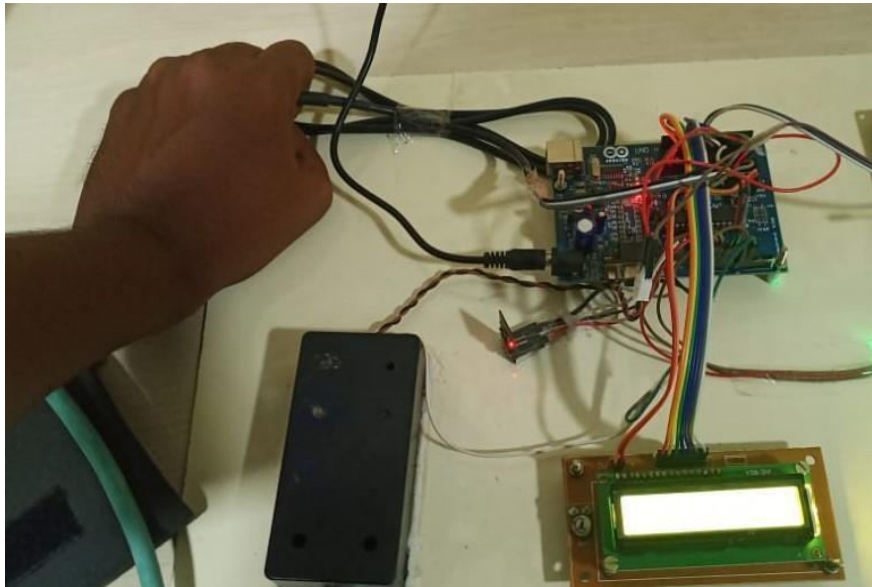


Fig 5.7: Measuring temperature

- Measuring temperature using temperature sensor by holding the rod



Fig 5.8: Temperature value

- Representation of temperature values in Thing speak platform

VI. CONCLUSION

The COVID-19 pandemic has resulted in a global health crisis as thousands of people die from the disease every day. The fatality rate can be minimized if proper treatment is administered at the right time. Various steps, including regular monitoring of pulse rate, SpO2 level, and temperature, have been taken to ensure proper treatment. However, the oxygen level of a COVID-19 patient decreases with time, and the patient can die shortly if emergency steps are not taken. Considering the abovementioned facts, an IoT-based smart health monitoring system was developed for COVID-19 patients. The system runs through an IoT-based mobile application, and both the doctor and the patient can receive alerts from this system during emergencies. Therefore, individuals can use this system effectively anywhere. Advanced features can be added in the future because the entire system is IoT-based.

COVID-19 is considered both a global health crisis and an international economic threat. The restrictions put in place in response to the COVID-19 pandemic has had a devastating effect on many businesses, marketplaces, economics, society, and our lives. The full health, social, and economic consequences of this pandemic and its restrictions will take time to be fully recognized and quantified; however, there are many ongoing efforts in the research and industrial communities to utilize different technologies to detect, treat, and trace the virus to mitigate its impacts. Internet of Things (IoT) technology has shown promising results in early detection, quarantine time, and after recovery from COVID-19 however, as we learn more about the virus and its behaviour, we should adjust and improve our approaches in different phases.

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