OPTIMIZED REMOTE HEALTH MONITERING SYSTEM

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Abstract

It is difficult to monitor every patient by a doctor/hospital management during this pandemic time. And also, it is not possible to observe the health condition of quarantine people (who are suffering due to COVID-19). Traditionally the detection systems were only found in hospitals and were characterized by huge and complex circuitry which required high power consumption. In order to avoid the direct contact with patient we are implementing a system to monitor patient health remotely. The system consists of various sensors for measuring different parameters like Temperature, Oxygen level, Heart Beat (BPM), Body Movement, Humidity, Air Quality. The data collected from these sensors will be transferred via an Arduino GSM module to the Personal Doctor, Hospital Management, Family respectively through an SMS alert. The SMS should contain a link, by clicking on the link the data should be displayed on web page in a particular manner. If the range of the parameters exceed or subceed it should give an emergency alert.

1. INTRODUCTION

For the past 2years we are undergoing through very serious situation. That is COVID-19. In this pandemic situation we lost many lives. Due to many reasons like medical scarcity, less number of doctors (at the right time), sudden attack of virus, people awareness and so on. Due to covid we lost nearly 5 lakhs peoples in India and in worldwide we lost 55 lakhs people. Which is huge loss for mankind. Due to high population, it is difficult to monitor the patient, with less staff and hospitals in India. India has a total of 43,486 private hospitals, 1.18 million beds, 59,264 ICUs,

and 29,631 ventilators. On the other hand, there are 25,778 public hospitals, 713,986 beds, 35,700 ICUs, and 17,850 ventilators. Total private infrastructure accounts for nearly 62% of all of India's health infrastructure. Total population in India is 1,400,000,000. To control the health conditions of peoples at critical situation, we go with new technologies which helpful to save the lives. Specifically, in this pandemic situation usage of technology is the one of the best options. In covid the mankind is divided into 3 categories that is firstly non effected people (from covid), secondly effected but

they stay in quarantine and lastly effected from covid and they are in critical condition. For non-effected people no need of doctor consultation, but quarantine people need monitoring of the patient. For critical condition it is necessary of doctor. So, we mainly focus on the monitoring of the patient. There is some risk to contact with patients in this situation. Spreading of virus is high due to direct contact, to avoid this we can monitor a patient remotely by using some new technology, which available in the market. In previous years and present we are using high circuitry and huge equipment's to monitor the patient. After we got some new technologies to monitor the patient like by using Raspberry pi, in which parameters of the patient can be by observe by using LCD near the patient, without any professional doctor and nurses (hospital staff). But for present we need equipment's like which can monitor the patient remotely with less circuitry.

2. RELATED WORK

Considering the present COVID-19 pandemic situation, many people are facing adverse effects. There is lack of awareness about the situation and lack of proper health monitoring systems. The treatment of every patient is very difficult and the monitoring of patient is not so easy at present. Because the people who are affected by the covid-19 are being quarantined and family or doctor wouldn't go closer to check the condition of person/patient, as they would get effected with the virus. COVID-19 patients have several symptoms, such as fever, shortness of breath, decrease in oxygen saturation level, dry cough, diarrhea, vomiting, sore throat, headache, loss of taste and smell, body pain, and abnormal pulse rate. Among these symptoms, high fever, low oxygen saturation level, and abnormal pulse rate are considered serious. Sometimes, the patient can't know the sudden change in these parameters and may this cause death of the patient. In general equipment used to monitor the health of the patient is large in size, high power consumption, more costly, and this equipment should always be kept near the patient in the hospitals, not able to use by every quarantine patient in their places. One should available for long time inorder to monitor the condition of the patient and check the parameters. This is too difficult at present situation i.e., to go near to the covid patient and observe their state of condition. As the number of people who are affected by the covid is too high. So, it is very tough to maintain the data of every patient in records/hard copies. As every person/patient would not like to know their condition and details by others or someone else. Therefore, the health condition of the patient should be confidential.

3. IMPLEMENTATION

Based on the related works done in the field of remote health monitoring it is known that all the data sensed by the sensors sent to the destination and stored. It results in the accumulation of data and produce the congestion in transmission. It will waste the time of doctor or care taker also. To overcome this problem our work proposed an optimization technique to find out the critical and abnormal data and that alone transmit to the destination and stored. So that the data storage and power consumption are reduced considerably.

1. To monitor patient health remotely.

2. To inform the doctor, hospital management, family about the health of the patient through a SMS which consists of a web page link to view the parameters.

3. To reduce the power consumption of the system by using Arduino.

4. To reduce the cost of the health monitoring system

We need to monitor the five different parameters to know the condition of the patient. Parameters like Temperature, Oxygen Level, Blood Pressure, Body Movement and Air Quality. These parameters will be sensed by the electronic sensors, the sensed data will be sent to the Arduino. In Arduino analogue data will be converted into digital data, that will be transferred to the GSM module. GSM will update the Web Page as well as it will send the SMS to doctor, hospital management and patient family.
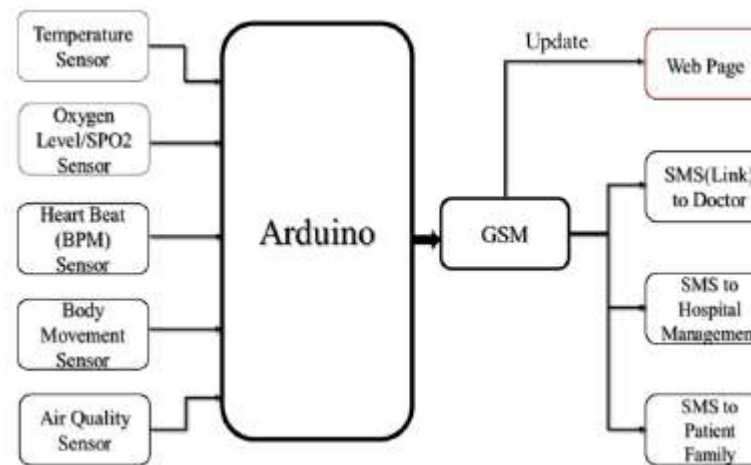
Block Diagram for Methodology

Above five sensors/devices will sense the patient parameters and its data will be sent to the Arduino. In this we are using Arduino UNO, it will take the data from the sensors and it will be converted into the digital data. Converted digital data will be divided into three categories, i.e., like normal condition, abnormal condition and critical condition. These categories will be divided in the code, what we dump into the Arduino. Arduino will only send the data to the GSM, which is abnormal and critical condition data. Because to reduce the network traffic and to decrease the storage capacity. And also, normal condition data is unnecessary to the doctors.

The data from Arduino to GSM will be transferred, the data in digital form. GSM-900 is used to transfer or update the data to the website and also it will send the SMS

to the doctor, hospital management and family members at critical condition and abnormal condition data.

4. EXPERIMENTAL RESULTS

The pulse rate is a measurement of the heart rate, or the number of times the heart beats per minute. As the heart pushes blood through the arteries, the arteries expand and contract with the flow of the blood. Taking a pulse not only measures the heart rate, but also can indicate the following:

• Heart rhythm

• Strength of the pulse

The normal pulse for healthy adult's ranges from 60 to 100 beats per minute. The pulse rate may fluctuate and increase with exercise, illness, injury, and emotions. Females ages 12 and older, in general, tend to have faster heart rates than do males. Athletes, such as runners, who do a lot of cardiovascular conditioning, may have heart rates near 40 beats per minute and experience no problems.

BPM

Normal: 60-100

Not Well: <60 BPM Body Carcita

>100 BPM Tachy Carcita
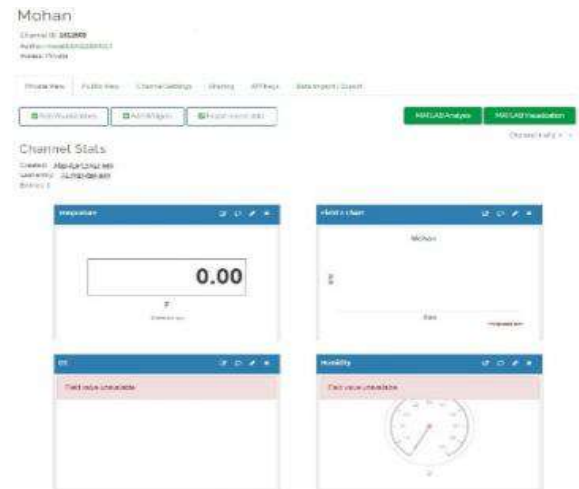
Prototype

5. CONCLUSION

Optimized Remote Health Monitoring system is most useful in this pandemic situation. It can save many lives by monitoring the patient condition & alerting the doctors by SMS, if there any abnormal and critical condition to the patient. We reduced the power consumption by using the Arduino and GSM module. The network traffic will be less by transferring only required/necessary data to the destination, destination like personalized doctor, Hospital management and patient family members. There will be a unique id to each patient to maintain the patient data

confidential. Sensed parameter values will be transferred to the Arduino, Arduino will divide the data and transfer the required data to the GSM module. GSM module will go with two tasks. Firstly, it updates the web page and secondly it will give alert message to the destination. Message/SMS consist of a link, which gives the direct parameter values of the patient. By knowing the current data of the patient, based on that doctor will take the action.

In this we are only alert the doctor, hospital management and family members through the SMS, not with the call. We can add alerting the doctors through the phone call, it is easy to take the action if the patient condition is critical. And also, we can provide the clear information to the family members like fever, cold or any other particular medical issue based on the parameter ranges. For this we required continues power supply, there is chance of power cuts. To avoid this, we can use a battery, which runs the Arduino and GSM module.

6. REFERENCE

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