INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
(Volume 7, Issue 3 - V7I3-1773)
Available online at: https://www.ijariit.com

IoT Based Healthcare System

Shivani Purohit
shivanimpurohit@gmail.com
Navrachana University, Vadodara, Gujarat

Drashti Sojitra
drashtisojitra8@gmail.com
Navrachana University, Vadodara, Gujarat

Mohit Chawla
mdchawla05@gmail.com
Navrachana University, Vadodara, Gujarat

Kriti Vishesh Jaiswal
kritij@nuv.ac.in
Navrachana University, Vadodara, Gujarat

ABSTRACT

Looking at the current pandemic situation in the world, every human being's health has been a major concern. In this scenario, the best option for dealing with an epidemic is an IoT-based health monitoring system. The Internet of Things (IoT) is a recent internet trend that is becoming a popular research topic, especially in health care. The key goal of this project is to keep track of a patient's heart rate, temperature, and oxygen saturation (Spo2) in real-time. Aside from that, the device monitors the patient's position using tilt, temperature, humidity, and CO2 level in the room. Tilt is a core aspect of our project. The Arduino Nano is wired to all the sensors. The Arduino nano is a microcontroller that manages the system's functions. Arduino uses a Wi-Fi module to send data to an IoT platform through the ThingSpeak wireless network.In this system, Arduino uses a Wi-Fi module to send data to an IoT platform called ThingSpeak. ThingSpeak is used to store, retrieve and visualize our real-time data. So authorized individuals can access the patient's measured data from any location and take appropriate actions if it is required.

Keywords: *Internet of things (IoT), Health, Sensors, Microcontroller, ThingSpeak*

1. INTRODUCTION

The Internet of Things (IoT) refers to devices or objects that can communicate with the Internet using physical devices, sensors, microcontrollers, and network access to capture and share data. Each computer has its unique identifier (UID), which allows for simple machine-to-machine (M2M) communication. Data is obtained from computers all over the world and stored in the cloud in vast amounts. Systems would become more effective and intelligent as a result. In the field of healthcare systems, the word "Internet of Things (IoT)" has recently gained popularity. IoT in healthcare uses sensors, microcontrollers, and other devices to analyze and send sensor data to the cloud, which sent to caregivers (doctors). Integrating IoT capabilities into medical devices increases the quality and efficiency of treatment for both COVID-19 and non-COVID patients. IoT in healthcare could store thousands of medical records in a computerized format, allowing patients to access their information at any time. Many portable health sensing components have been developed, allowing patients to wear them while being monitored. The patient's health monitoring device is connected to the doctor's computer, allowing the doctor to track the patient's condition at any time. Since IoT-assisted patients can be accessed via the Internet, the patient's health status can be detected at the appropriate time, allowing appropriate action to be taken.

In this project, a system is connected to the patient's body to measure key vitals such as the patient's temperature, SpO2, and heart rate, as well as the room's humidity, temperature, and CO2 level. It also contains unique features such as a tilt and a buzzer.

The measured values are then uploaded to the IoT cloud platform (ThingSpeak) and displayed on the LCD. As a result, doctors or concerned persons can observe through that platform and take appropriate action if necessary. Our system is not only for doctors or clinics; anyone can use

2. PROBLEM STATEMENT

Due to the rise in many health problems, individual health support should be considered very important in today's world. As the number of patients increases, the number of doctors available decreases. As a consequence, certain patients' diagnoses are

postponed or overlooked. Everyone is aware of the difficulties faced by people in pandemic situations these days. Some hospitals do not have enough beds for each patient, and it is difficult for a doctor to visit each patient face to face in this situation. As an outcome, this IoT-based healthcare system allows doctors to virtually track their patients. Also, these days people need to check their vitals almost every day so people need to buy every single device that measures their vitals and if we go to buy every single device it will be really expensive.

3. OBJECTIVE

Medical data is transformed into knowledge by the Internet of Things, allowing for better patient care. Healthcare is becoming increasingly technologically advanced, with a focus on integrating disparate systems. As a result, the Internet of Things (IoT) is critical in healthcare. So, our goal is to use the internet of things to monitor a variety of important patient parameters. This IoT-based Healthcare Monitoring System was developed to create hardware that monitors a patient's pulse, temperature, oxygen saturation, room humidity and temperature, and patient's position. This device may be used by a doctor or a health expert to remotely track all of the patient's critical health parameters.

4. SCOPE OF PROJECT

Our device is useful for anyone because anyone of any age may have a medical problem. This system is user-friendly, which means that everybody can use it with only a few basic features. Mainly this project is based on the real-time parameters of a patient's health so any doctors, Physician Assistants, a person who has cardiovascular conditions, individuals with some infections, elderly people in our home, or any person can use this system for monitoring their health.

5. METHODOLOGY

5.1.Proposed System

The core objective of this project is the design and implementation of a smart patient health monitoring system. These days everyone is familiar with the problems faced by people in the pandemic situation, some of the hospitals don't have enough beds for each patient and it's also hard for a doctor in this situation to go and check each patient face to face. So this IOT based health care system helps the doctor to monitor their patient virtually.

We aim to monitor various significant parameters of the patient using the internet of things. This IoT based Healthcare Monitoring System developed to design hardware that measures a patient's heartbeat, temperature, Oxygen Saturation, and room humidity and temperature. A doctor or health specialist can use the system to monitor remotely all vital health parameters of the patient or person of interest.

5.2. Schematics

5.2.1 Project Flow: Figure1 shows the project flow of this project. Our system consisting of several sensors. The sensors are embedded on the connected to Arduino nano. Which calculates the values of all the sensors and displays them on the LCD as well as uploading those values to the IoT cloud platform (ThingSpeak) via the wifi module. Those measured values are then accessed by the doctors or concerned person at any other location via the IoT cloud platform. Thus, based on the measured values, doctors or concerned individuals may track a patient, determine the patient's condition, and take appropriate steps if required.

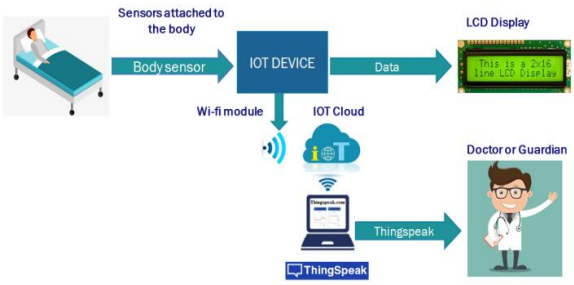

Figure 1: Project Flow

The proposed design of IoT based healthcare system is built around Arduino nano microcontroller which is the brain of our project. Arduino collects real-time health data from integrated pulse oximetry and heart-rate monitor which measures heartbeat in minutes or BPM (beats per minute temperature and oxygen saturation (SpO2).

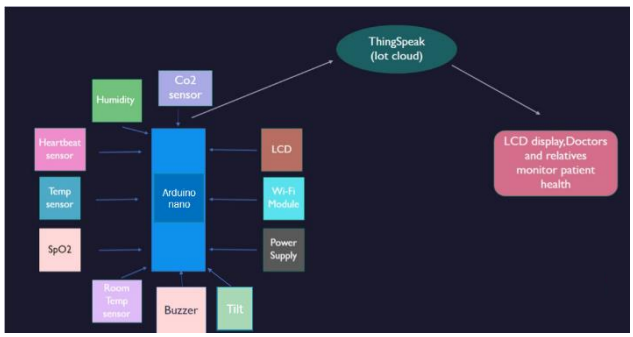

Figure 2: Block Diagram

A buzzer produces auditory beeps when the toxic level (CO2) of the room is greater than 50 or the patient falls off the bed. A generic ESP8266 IoT module is connected to Arduino nano. It is a wi-fi module that is responsible for connecting the machine to the internet via hotspot and also for sending health data to an IoT server (ThingSpeak) for storing, retrieving and monitoring. This circuit can not only send a patient's health data to a server, but it can also view real-time data on a 162-inch LCD display. This is helpful for a healthcare provider who is on-site and constantly treating a patient.

Hardware Implementation

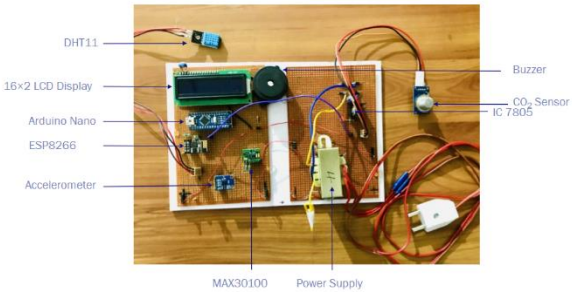

Figure 3: Hardware Implementation

In the above image, it is shown complete device setup which includes an Arduino nano microcontroller board with a power supply attached to it. The microcontroller is connected with all the sensors which include DHT11(Humidity sensor), ESP8266(Wi-Fi module), MAX30100 sensor, fall detection sensor (Accelerometer), Toxic gas sensor(CO2), Microcontroller also connected with Buzzer which will be used in case of toxic level is high or patient fall off the bed. LCD is connected to a microcontroller which displays 16*2 of information as soon as a device is turned on. And finally, once a device is connected to the network via wifi-module it displays all the patient measures parameters on display as well as on the IoT platform (ThingSpeak).

6. RESULTS

The humidity sensor, MAX30100 Sensor, fall detection sensor (Accelerometer), Toxic gas sensor (CO2), ESP8266 (Wi-Fi module), LCD are connected to a microcontroller. Figure 3 above shows the interfacing of all the sensors and LCD with the Microcontroller (Arduino nano). All the values are calculated via sensor and displayed in an LCD. So this figure shows the output values of the sensors so that these values are visible even to the patient.

Figure 4: Results

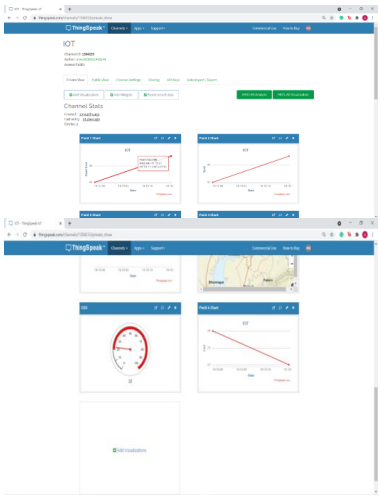

Figure 5: UI

All of the calculated values are sent to the IoT cloud network (ThingSpeak), where authorized users can access the data through the IoT application platform. We are using the ThingSpeak platform to upload our data and visualize our data. Below figures are the screenshots of the ThingSpeak platform where all the data are uploaded and represent as a form of Charts with the time and date. The above figures show the Temperature of the patient, Heart rate of the patient, SpO2 of the patient, humidity of the room, the temperature of the room, and CO2 level of the room with time and date.

Table 1: Analysis

S NO.	Temperature	SPO_2	Criteria
1	38°C	95%	Home Treatment
2	35°C - 37°C	>=95%	Fit to go
3	38°C – 38.8°C	91% - 95%	Steady
4	39.4°C or above	<=90%	Emergency

Below is the table of analysis that our device carries out. It analyses the vitals according to the given table and gives a tentative judgment whether it is "Home Treatment", "Fit to go","Steady" or "EMERGENCY". On the patient's health and then the doctor can verify it and make the final decision.

7. CONCLUSION

The Internet of Things is regarded as a practical solution for any remote value tracking, especially in the field of health monitoring. Even though IoT is being used in all areas of medical technology, there is still space for advancement and study. Early detection of any health condition will assist the patient in taking the appropriate emergency precautions that can save his or her life. In this case, the Internet of Things (IoT) will assist. Patients can be monitored in real-time by IoT-based health tracking services, which can alert them of any anomalies. This device uses sensors to measure body temperature, pulse rate, room humidity and temperature, etc.; which are also reflected on an LCD. However, the IoT architecture must-have features to ensure confidential data is kept safe. In addition, the sensors used must be compact enough to be conveniently integrated into a variety of devices. The concept of a smart health management system based on IoT architectures is a novel contribution to medical science that will minimize health issues and prevent unnecessary deaths.

8. FUTURE SCOPE

This device monitors the patient's vitals. The recent device collects the vitals and gives the decision according to it. For example, if the patient's body temperature is between 35°c - 37°c and SPO2 is greater than 95% then the device will output the patient is Fit to Go. But this analysis is displayed on the LCD Screen. This data cannot be displayed on the platform which we are using that is ThingSpeak as it has limitation. To overcome this limitation an application can be developed for android, IOS, and Web or else a website can be made.

9. REFERENCES

[1] Milon Islam, AshikurRahaman& Md. Rashedul Islam,"Development of Smart Healthcare Monitoring System in IOT Environment".

[2] AshikurRahaman, Md. Milon Islam, Muhammad Sheikh Sadi, Sheikh Nooruddin, Developing IOT Based Smart Health Monitoring Systems: A Review.

[3] PrajoonaValsalan, Tariq Ahmed Barham Baomar, Ali Hussain Omar Baabood, IOT BASED HEALTH MONITORING SYSTEM.

[4] M. Sathya, S. Madhan, K. Jayanthi, Internet of things (IoT) based health monitoring system and challenges.

[5] Parthasarathy G, Soumya T R, Ramanathan L,and Ramesh P, Improvised Approach for Real Time Patient Health Monitoring System Using IoT.

